

# ***THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT***

## **Information Technology (IT) and its Role in Establishing Total Quality Management (TQM) in Higher Education Institutions in the Sultanate of Oman**

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### **Abstract:**

*Providing high-quality service is one of the keys to a successful organization to gain sustainable competitive advantage and to also maintain productivity and institutional effectiveness. The use of Information Technology (IT) has greatly impacted organizations and institutions in various countries in the world as they involve Total Quality Management (TQM) in their day-to-day business operations as revealed in existing research studies and literature. TQM and IT combined have a lot to offer and should be realized by every key administrative personnel in the organization. It has been proven over the past years that information technology and quality management services have supported each other to optimally achieve the organization's goals.*

*This study will embark on evaluating the role of IT to achieve TQM among the HEIs of Oman. The increasing number of stakeholders and the complexity of academic and non-academic services have created wide range of activities that would greatly affect performance and productivity of educational institutions in the Sultanate. Through this, TQM plays a vital role in shaping high standards of quality assurance and management services of higher education institutions (HEIs) in order to meet the institution's vision, mission, objectives and the standards of quality assurance in Oman. This study in particular will assess information technology utilization rates among HEIs in Oman. Identify the positive effects and major constraints for adopting TQM and IT. Present suggestions on IT application to fully implement TQM. Generate a framework of TQM and IT model that can be utilized by HEIs in Oman.*

**Keywords:** Higher Education Institutions (HEIs), Total Quality Management (TQM), TQM and IT Framework, TQM in HEIs, IT in HEIs

### **1. Introduction**

The emerging trends in the tertiary education around the globe have prompted various stakeholders to deliberately improve their system on teaching, learning, and research and community extension. This becomes a very challenging task among the government accreditation bodies and the higher education institutions to formulate strategies for competitiveness. The introduction of the concept of Deming's on Total Quality Management has contributed to the sophisticated applications of learning tools and practices of many organizations around the world particularly on higher education. In order to adopt the changing education system there is a need for the higher education institutes to further enhance their Information Technology competitiveness in delivering quality teaching and learning among the various fields of educational specialization.

The relevance of providing quality education is geared towards the development of the economy by proving the human capital access to the different strategies of learning employed by higher education institutions. Total Quality Management is considered as one of the most important factors in shaping the strategies utilized by the higher education institutions in providing effective and efficient delivery of services to their stakeholders and more effectively, with the use of Information Technology.

This paper highlights the role played by IT in TQM among higher education institutions with reference to the institutional standards such as: Governance and Management; Strategic/Operational Planning; Customer and Market Focus; Financial Management; Human Resources; Physical Resources; Performance and Evaluation Management; Curriculum Design; Accreditation Process; Research and Development; Partnerships and Linkages; Benchmarking; and Instruction. The role of IT in document controls, traceability, monitoring and standards and measurement as a tool in support to the attainment of TQM in higher education institutions is also emphasized.

### **2. Statement of the Problem**

The research study sought to answer the following questions:

- What are the different information technologies utilized by higher education institutions in Oman in order to facilitate smooth operation of the identified TQM elements?

- What is the perception of the respondents on the usefulness, effectiveness and level of acceptability of IT as a vehicle to achieve TQM?
- What are the positive effects and major constraints for adopting TQM and IT as perceived by higher education institutions in Oman?
- What conceptual model is appropriate and recommended for use by higher education institutions in Oman?

### 3. Significance of the Study

The research study seeks to acquaint higher education institutions in their quest towards the use of IT as a tool to achieve TQM. This study will serve as a useful reference to begin with to further manage and improve organizational processes to satisfy HEI's stakeholders using said scheme.

#### Research Method

The descriptive method was employed in gathering relevant information to come up with sound and objective results. A survey questionnaire was floated to higher education institutions in Oman through an electronic survey tool called Google forms. Mean and percentage were used to analyze and interpret the data.

### 4. Results

On the Frequency and Percentage of TQM elements implemented by HEIs in Oman, results show that 100% of the respondent institutions are employing the following TQM dimensions Governance and Management, Strategic/Operational Planning, Customer and Market

Focus, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development and Accreditation Process; 71.43% for Partnerships and Linkages, Financial Management and, Benchmarking and 57.14% for Instruction and Research Development. The results show that the respondent-institutions have yet to achieve Quality Management in all of its dimensions to fully achieve Total Quality Management.

On the Effectiveness of the Implementation of the TQM Elements in HEIs in Oman, the results show that the TQM dimension Instruction was perceived "Extremely Effective" by the respondent-institutions with a mean 4.413. The respondent-institutions also considered the following TQM dimensions such as Strategic/Operational Planning, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation, Curriculum Design and Development and Partnerships and Linkages as "Very Effective". On the other hand, Governance Management, Customer and Market Focus, Accreditation Process, Research and Development and Benchmarking were perceived "Moderately Effective."

On the Usefulness of TQM Elements and IT Application as perceived by HEIs in Oman, results show that the TQM dimensions such as Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development and Instruction were perceived "Extremely Useful" with IT application by the respondent-institutions. The TQM dimensions such as Governance and Management, Strategic/Operational Planning, Customer and Market Focus, Financial Management, Financial Management, Human Resource Management, Accreditation Process, Partnerships and Linkages and Benchmarking were perceived "Most Useful" with IT application by the respondent-institutions. The only TQM dimension perceived as "Moderately Useful" with IT application was Research and Development.

On the Level of Acceptability of Information Technology to support the TQM elements, the TQM dimensions such Strategic/Operational Planning, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development, Accreditation Process, Research and Development, Benchmarking and Instruction were perceived "Perfectly Acceptable" by the respondent-institutions. The TQM dimensions such as Governance and Management, Customer and Market Focus, Partnerships and Linkages were perceived "Acceptable" by the respondent-institutions.

The respondents' perception on the positive effects of utilizing IT to support the TQM elements/indicators show that 100% of the respondent-institutions perceived Increased Productivity and Increased Efficiency as the positive effects of utilizing IT to meet and support the TQM elements/dimensions while 85.71% for Stakeholder Satisfaction.

The respondents' perception on the major constraints in the effective implementation of the TQM through IT approach to deliver high quality services in HEIs show that 100% of the respondent-institutions perceived Lack of Human and Physical Resources for IT as the major constraint in the effective implementation of the TQM through IT approach to deliver high quality services in higher education institutions while 71.43% perceived Lack of Leadership and Management Commitment for TQM and Resistance of the Workforce.

### 5. Discussion

Proposed Conceptual Framework of TQM and IT Model for HEIs in Oman

The researchers came up with a conceptual model that served as their guide in the completion of the paper. The model presents the different aspects and elements vital to IT as a vehicle to achieve TQM in HEIs in Oman. Education has been viewed as a system or 'a network of interdependent components that work together to try to accomplish the aim of the system' (Deming, 1993:98). The system consists of inputs, transformation processes and outputs. Sahneyet al. (2004) advise that in education there are human, physical and financial resource inputs that undergo processes including teaching, learning, research, administration and knowledge transformation.

According to Ali and Shastri (2010), TQM is inevitably common factor that will shape the strategies of higher educational institutions in their attempt to satisfy various stakeholders including students, parents, industry and society as a whole. The paper is a theoretical attempt to explain the application of TQM in tertiary education. It deals with issues pertaining quality in higher

education and moves on to identify variables influencing quality of higher education. It also conceptualizes a model for application of TQM in higher education.

A model was built on an existing model by Ali and Shastri who discussed in their paper the application of TQM in tertiary education which made them conceptualized a model for application of TQM in higher education as shown in Figure 1.

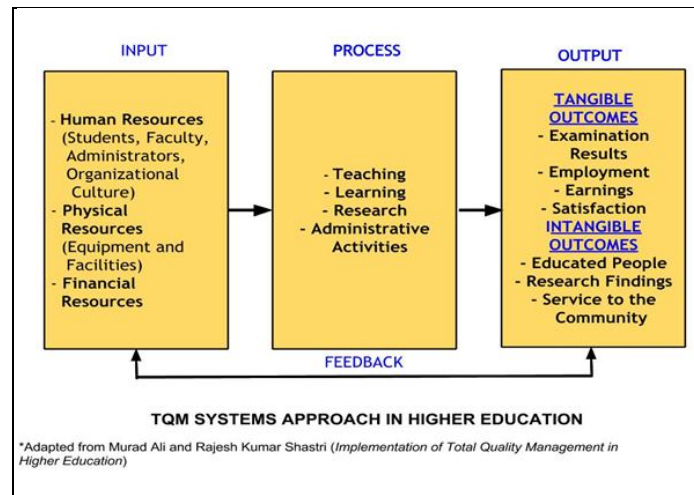


Figure 1: Total Quality Management Systems Approach in Higher Education

Issues of TQM are addressed in the model as they relate to productivity and customer satisfaction as a crucial element. The research was drawn to such systems approach in higher education which comprises of inputs, processes and outputs, all encompassed in an arbitrary boundary and environment. Such existing framework underpinned the development of the conceptual model of the research study as it depicts the true and realistic sense and approach of a TQM system in higher education. Other added outcomes can also be considered when we use Information Technology to achieve TQM in higher education as shown in Figure 2.

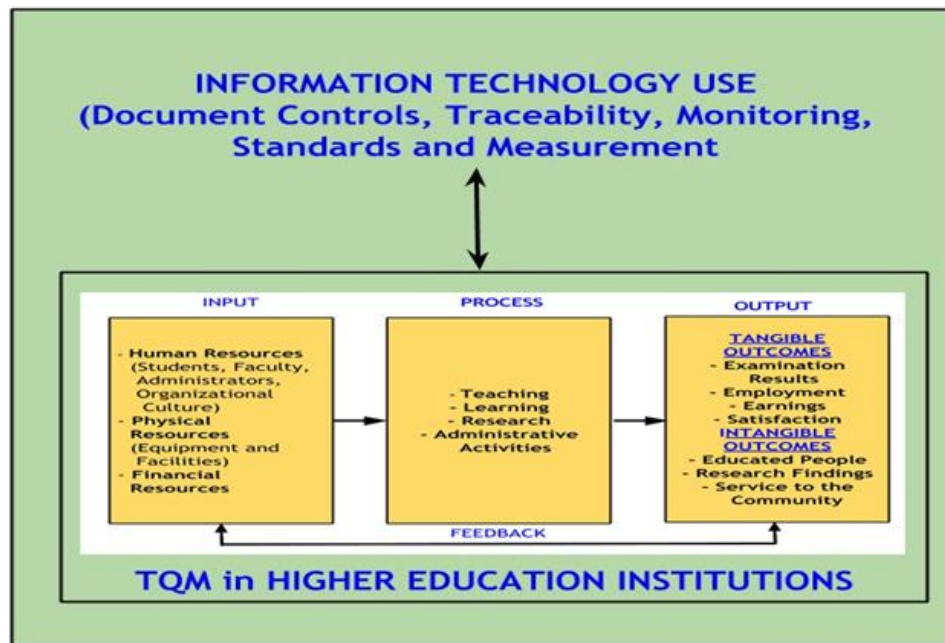


Figure 2: Utilization of IT and TQM in Higher Education Institutions

There is no specific indicator to measure quality in higher education institutions in Oman at present. Many varied approaches and tools have been utilized by the different higher education institutions to achieve quality assurance, quality management and total quality management. The dimensions of quality involve all educational processes which correspond to determining and avoiding the risk before it happens to be able to achieve the ultimate objective of fully implementing quality management in higher education institutions. Properly implementing the above-mentioned standards through TQM and IT will yield to cost-reduction, productivity, increased efficiency and effectiveness, competitive and higher moral as shown in Figure 3.

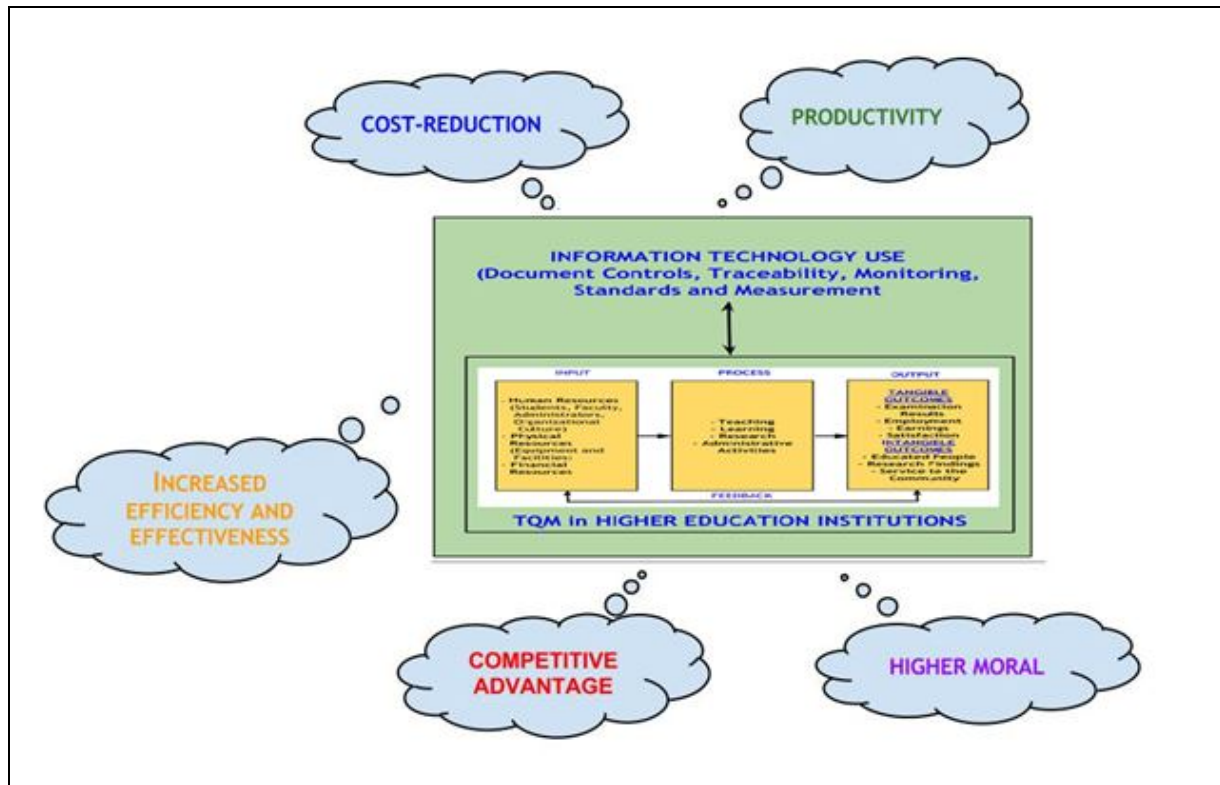


Figure 3: Utilization of IT and TQM in Higher Education Institutions Outcomes

5.1. IT in Support to TQM

A model is introduced in this research paper to show the adoption of IT in TQM as shown in Figure 4. The identified dimensions of higher education institutions such as fitness for purpose, value of money, transformation, excellence and management and accountability intertwined with the different TQM indicators through the participation and involvement of all employees in the HEI. One important consideration is the support of the different infrastructure components in the TQM implementation through quality planning, quality assurance and quality control with the use of the ADRI model.

The different usage of IT in TQM is emphasized on document controls, traceability, monitoring, standards and measurement. Document Control is vital in achieving quality management system by ensuring that the institution’s documents are properly distributed and approved by official competent authorities. Part of controlling documents is to ensure that current documents are appropriately recorded while the old and obsolete ones are properly discarded. Traceability is keeping track of information, its history and location. Monitoring is to be aware of the status of any process that will be superseded by the evaluation of the process through standards and measurement.

Any higher education institution utilizing IT and a lot of innovative equipment and instruments to control, trace, monitor documents through standardization and measurement will precisely enjoy the following added outcomes: cost-reduction, productivity, increased efficiency and effectiveness, competitive advantage and higher moral.

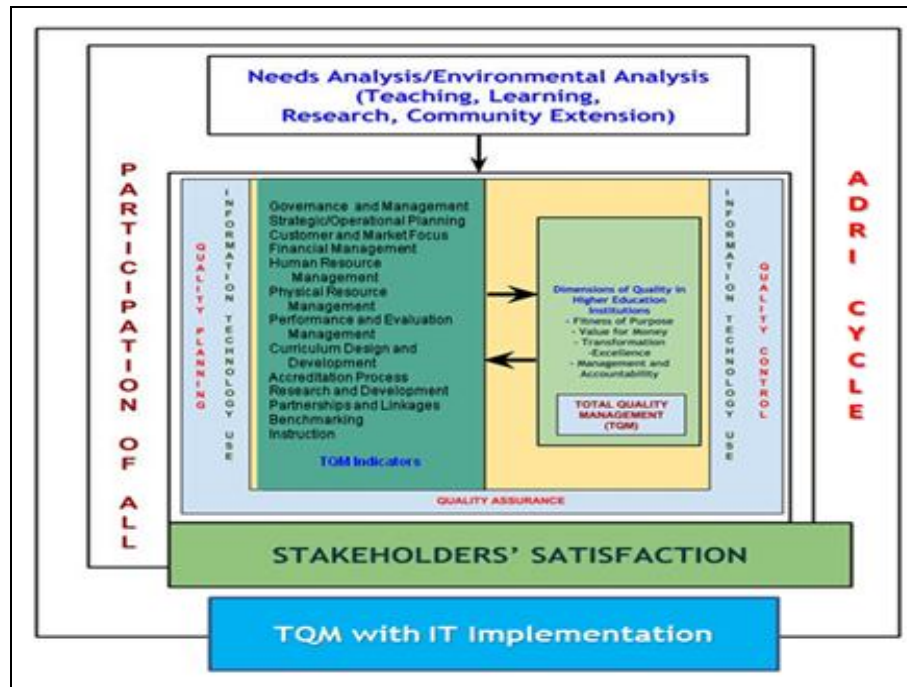


Figure 4: TQM with IT Implementation

## 6. Summary of Findings

- The TQM indicators which are mostly used are Governance and Management, Strategic/Operational Planning, Customer and Market Focus, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development and Accreditation Process.
- The results show that higher education institutions are utilizing different components of the IT infrastructure. The use of the Computer Hardware shows an aggregate result of 90.11%; 89% for Web Internet Technologies; 81.32% for Networks; 70.33% for Computer Security; 54.64% for Library System, Payroll System, Staff Performance Evaluation System and the like; 54.95% for Application Software (ERP, DSS, MIS and the like).
- The result shows that the TQM dimension Instruction was perceived as “Extremely Effective” by the respondent-institutions with a mean of 4.413. The respondent-institutions also considered the following: TQM dimensions such as Strategic/Operational Planning, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation, Curriculum Design and Development and Partnerships and Linkages as “Very Effective”. On the other hand, Governance Management, Customer and Market Focus, Accreditation Process, Research and Development and Benchmarking were perceived as “Moderately Effective.”
- The result shows that the TQM dimensions such as Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development and Instruction were perceived as “Extremely Useful” with IT application by the respondent-institutions. The TQM dimensions such as Governance and Management, Strategic/Operational Planning, Customer and Market Focus, Financial Management, Financial Management, Human Resource Management, Accreditation Process, Partnerships and Linkages and Benchmarking were perceived as “Most Useful” with IT application by the respondent-institutions. The only TQM dimension perceived as “Moderately Useful” with IT application was Research and Development.
- The result shows that the TQM dimensions such Strategic and Operational Planning, Financial Management, Human Resource Management, Physical Resource Management, Performance and Evaluation Management, Curriculum Design and Development, Accreditation Process, Research and Development, Benchmarking and Instruction were perceived “Perfectly Acceptable” by the respondent-institution.

## 7. Conclusion

Many institutions around the world are striving to achieve quality of the products and services they offer to their clientele. The target of achieving TQM is not far to be achieved, the only thing that is vital is to ensure that the various institutional standards set by the accreditations bodies will be fully implemented by the HEIS. Such will serve as their guiding principle to be able to achieve quality.

Below are recommended suggestions to be able to fully implement TQM and IT:

- HEIs have to consider implementing TQM with other information technologies such the Enterprise Resource Planning (ERP) system; a popular technology used in many HEIs in Oman and abroad. ERP is a computerized tool used to improve organization’s performance by strengthening decision making, managing human and physical resources,

automating systems by facilitating the easy and simplified document controls, traceability, monitoring and standards and measurement.

- HEIs in Oman have to conduct conferences and awareness seminars on TQM to give a full view of how it is properly and fully applied and implemented. The presence of top management has to be ensured to allow them to completely understand the TQM concepts and its implementation in higher education institutions. Top management's support is vital to the organization in order for all staff to embrace TQM.
- HEIs in Oman have to conduct awareness seminars and sessions on the implementation of TQM and IT use. It is recommended that these institutions have to integrate TQM with other technologies to be able to enjoy and exploit its full potential.

### 8. Future Research

- Other relevant studies linking TQM to IT have to be pursued in order to have an in-depth study on how best IT could be applied in support to the smooth implementation of TQM system in HEIs in Oman.
- Classify the responses of the respondents based on the classification of the colleges and universities as categorized by the OAAA and have bigger sample size. This will determine the different perceptions and responses of HEIs in Oman with regard the use of IT infrastructure in the implementation of TQM.
- Measure the effectiveness of adopting IT application with TQM.

### 9. Acknowledgement

Special thanks to higher education institutions in Oman who had participated as respondents and to the people who contributed in one way or another in the completion of this research paper.

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