

# Integrating the Total Quality Management and Sustainability in the Libyan Higher Education System by Evaluating the Policy and Strategy

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**Abstract**—There has been an increasing interest in the implementation of the Total Quality Management (TQM) in the Higher Education (HE) sector over the past decade. However, TQM sustainability remains a significant challenge. This paper draws upon a case study of Libyan HE to explore how models of sustainability and TQM can be integrated into one of Sustainable Quality Management (SQM). The paper introduces the literature relating to TQM, Deming's Plan-Do-Study-Act, and the European Foundation for Quality Management models and sustainability models (Triple Bottom Line and Five Capitals Model) and considers how these can enhance the HE sector. It presents the qualitative and quantitative data and analysis from over 30 interviews and 678 questionnaires with internal HE stakeholders in Libya (University staff and students, administrators and senior management, and representatives of the National Quality Centre). The data collection focused on the integration of TQM and sustainability criteria to generate a framework for SQM. This consisted of eight Critical Success Factors (CSFs) and 72 sub-criteria derived from these models. The overall findings are summarized and detailed consideration is given to one CSF relating to policy and strategy, which is of particular significance for Libyan HE. A final section of the paper presents the key findings relating to this CSF and discusses the relevance of SQM for HE in Libya and more widely. The results clearly show that the policy and strategy will enhance the quality and sustainability of higher education in developing countries.

**Index Terms**—sustainable quality management, policy and strategy, higher education in Libya, triple bottom line, and five capitals model

## I. INTRODUCTION

The quality of education is the main element in competition between countries [1]. The definition of quality is perplexing and can be seen as the driving force for all human effects [1], [2].

Edward [2] states that "Absolute quality it is similar in nature of goodness, beauty, and truth". However, specific criteria for assessing the quality of the Higher Education (HE) in Libya is required. Rapid developments in Total Quality Management (TQM) in many industrial sectors

over the past few decades were primarily driven by the global economic competition that can lead to excellence in products and services [3].

Scholars such as Edwards Deming, Joseph Juran, Philip Crosby and others provided major contributions that revolutionized quality thinking [4].

Although the origins of TQM were particularly oriented towards the manufacturing sector, other sectors also chose to adopt the TQM primarily due to its success in manufacturing. The term "Total" implies that quality is important in every part of the organization, including processes, services, products, suppliers, customers and internal external stakeholders [5].

The challenges faced with the long-term sustainability of TQM have stressed the need for research in this area [6].

TQM integrates a set of values, tools and techniques. Therefore, the sustainability of the TQM implies sustainability of these values, tools, and techniques [7].

Dale [8] identified this as a critical issue of TQM a point of view supported by Elkington [9].

The primary objective of the study on which this paper is based is to explore a framework towards a "Sustainable TQM" that leads to an understanding of the synergies between sustainability and TQM in an HE context. Therefore, the framework of Sustainable Quality Management (SQM) that is explored through this study is predominantly oriented towards the sustainability of TQM values, tools, and techniques [7], [8].

Sustainability offers solutions for pursuing development, while ensuring conservation of the economic, environmental and social resources for the present and future generations. These three dimensions are referred as the Triple Bottom Line (TBL) and are often used to measure the sustainability in organizations [10].

This paper aims to utilize the Policy and Strategy (PS) for integrating the quality management and sustainability in order to improve HE sector in Libya. It is organized as follows: Section II presents the system description. Section III explains the study methodology. Section IV discusses and analyses the results and the final section draw together the conclusions and suggests areas for the future study.

## II. SYSTEM DESCRIPTION

The fundamental notion of sustainability is that resource exploitation is minimised while resource conservation is maximized so that they are available for the future. Thus, sustainability can be viewed as a balance between resource exploitation and resource conservation. Imbalances in SQM are encountered due to the following:

1. Inadequate representation of the environmental and ethical dimensions of the TBL in the Quality Models (e.g. the key TQM literature revealed that little work has been done on the Quality Action Programs (QAPs) such as enhancing biodiversity on University campuses or the inclusion of TBL accounting in the financial processes of the University systems).
2. Unsustainable values, tools, and techniques are implemented in the TQM processes.

If the procedures that neutralize harmful waste are not considered by an organization while implementing TQM processes, there can be a TBL imbalance. This can be understood through the following approaches adopted for the study:

1. Identification and analysis of SQM, Critical Success Factors (CSFs) and Quality Action Programmes (QAPs)
2. Gap analysis and level of implementation of these QAPs in the HE.
3. Linking TQM and QAPs.
4. Evaluating SQM in Libyan HE sector through the development framework and sustainability index.

An example of the synergies between the quality and sustainability criteria is shown in Fig. 1 for the Policy and Strategy. Other Critical Success Factors have been identified in SQM by Kumar *et al*, 2004 [11]. Deming's (PDSA) and European Foundation for Quality Management (EFQM) models also describe the PS criteria in the quality dimension. This is based on quality planning which depends on the inspection system, performance evaluation of staff and performance against benchmarks. On the other hand, the Five Capitals Model (FCM) describes the PS criteria in the sustainable development dimension, including efficient use of the natural resource, promotion of the local culture, transparency, and the integration of environment and ethical factors with financial processes.

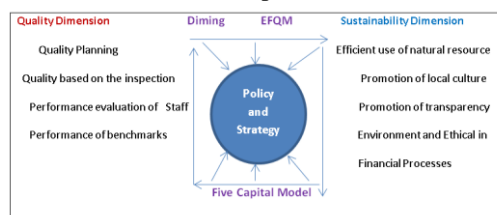


Figure 1. Quality and sustainability criteria for the policy and strategy critical success factor

### A. Sustainable Quality Management in Higher Education

The World Summit on Sustainable Development held in Johannesburg in 2002 reaffirmed the importance of sustainable development as a base for overcoming

poverty and improving the quality of life worldwide, especially in the developing world [12]. As a follow-up, the United Nations General Assembly adopted the United Nations Decade of Education for Sustainable Development; this was proposed in Japan (2005 – 2014) and co-sponsored by forty-six countries.

Subsequently, many national organizations and universities are involved in developing and implementing sustainability criteria into HE curricula [13]-[15]. A report presented by Rusinko [16] illustrated how environmental sustainability and management theory can be integrated based on a class exercise and points to "Sustainability in Higher Education" as a driver for innovation. Some universities in the UK, such as De Montfort University and the University of the West of England, have developed strategies for the sustainable development of their campuses [17], [18].

Policy and Strategy (PS) are considered important factors in quality and sustainability. They refer to the plan of the institution based on values and vision and how these are turned into actions. This activity is also referred to as deployment in the EFQM model. However, the PS prescribed by the Five Capital Model for sustainable development requires the inclusion of the TBL into the financing process, minimizing the use of resources and maximizing the innovation. The deliberations presented in the 2009 report of the UNESCO Higher Education regional conference points to the dilemma of the Arab states concerning resource use, quality, and student enrolment [19]. One of the policy issues faced by Arab nations (including Libya) is whether or not to increase enrolment beyond current capacity and resources such as laboratories, libraries and, more importantly, the teaching faculty. Therefore, Libya and other Arab countries need to make a clear policy statement on available resources versus sustainable enrolment. For example, the use of Information and Communication Technologies has the potential to reduce resource use and enhance the number of students and support in student and teacher training through the implementation of e-learning processes [19]-[21].

## III. METHODOLOGY

Quality and sustainability of HE are often conducted through exploratory approaches which include a Deming's Plan-Do-Study-Act (PDSA) and EFQM models and sustainability models which include (FCM and TBL). A gap analysis of the Libyan HE system was undertaken to explore how the quality and sustainability were related at five institutional levels as listed in Table I. This study focuses on the implementation of a mixed method approach [22], [23] to integrating TQM and sustainability into the Libyan HE system. The methodology of this study is comprised of two main parts. The first is the development of the SQM framework through an analysis of the literature, discussed above, and the second is the trialling of the framework in Libyan HE through a questionnaire survey and interviews conducted by Libyan experts. The triangulation of these approaches addressed the following questions.

TABLE I. INSTITUTIONAL CATEGORY, GROUP IDENTIFICATION CODES (GROUP IDS), DESCRIPTION AND NUMBER OF RESPONDENTS INVOLVED IN THE STUDY

Institution	Group ID	Description	Number of Respondents
Tripoli University	ACTU	Academic staff,	293
Gharyan University	ACGU	Academic staff,	241
Quality Centre	NAQC	Non-academic staff,	27
HE secretariat	NAHE	Non-academic staff,	23
STU	STU	Students	94
		Total	678

## A. Research Questions

1. What are the significant Critical Success Factors (CSF's) that influence SQM in higher education?
2. What is the sub-criteria that links these CSFs with quality and sustainability dimensions?
3. What are the linking criteria between PDSA and EFQM models and how are these related to the sub – criteria of the research question 2?
4. How do the stakeholders of higher education perceive and evaluate PDSA and EFQM models for implementation in Libya?
5. How do the existing PDSA and EFQM approaches need to be modified for SQM evaluation in higher education of developing countries like Libya?

## B. SQM Framework Modification

This study focuses on exploratory approaches that include the TQM models (PDSA and EFQM) and sustainability models (TBL and FCM). And also, the four elements are considered as follows: pilot status studies based on ontological and epistemological perspective, theoretical gap analysis in the Libyan HE system, developing questionnaires and adoption same structure interview. The SQM framework was evaluated and modified through the questionnaire and expert interviews. The former was based on eight Critical Success Factors, (Leadership, Policy and Strategy, Continuous Improvement, People Focus, Customer Focus, Process Management, Training, and Key Results). This paper will focus on one of this Policy and Strategy, which has been introduced above.

Questionnaires were distributed to two academic institutions (Tripoli and Gharyan University staff and students) and two non-academic HE institutions (The National Quality Centre and HE secretariat). Tripoli University is a national level University and Gharyan University is a regional institution, thereby allowing for comparison between national and regional viewpoints. 1100 questionnaires were distributed in the institutions from five groups (Table I.) with 678 returned, a response rate of 61.6 percent. A total of 31 semi-structured interviews were also undertaken with participants from the five groups selected according to their experience of HE, quality management, and sustainability.

TABLE II. HIGH AND LOW SCORES OF KWMR AND PROBABILITY LEVELS OF SIGNIFICANCE FOR VARIOUS QAPS UNDER (PS)

QAP No.	CATOGORY >>	INSTITUTION			GAQ / Rank	Sustainability Index
	Question on the QAP	GROUP / KWMR		p		
		High	Low			
PS1	Quality policy and strategy are only understood at senior levels of the organization	NAQC 372.9	ACTU 331.3	0.668	1.94 / 15	0.400
PS2	Performance evaluation of staff members is not based on quality	NAQC 388.5	STU 307.7	0.017*	2.10 / 13	0.430
PS3	Planning for quality is considered to be important	ACTU 368.2	ACGU 310.9	0.007*	2.28 / 5	0.460
PS4	The organization evaluates quality, mainly through formal inspection of employees work	ACTU 376.7	ACGU 292.3	0.000**	2.27 / 7	0.464
PS5	The organization recognises the value of environmental and ethical issues in financial processes	ACTU 348.4	NAQC 321.8	0.969	2.13 / 12	0.429
PS6	There is transparency in the organizational processes	NAHE 415.9	ACGU 317.3	0.019*	2.08 / 14	0.432
PS7	There is a significant promotion of local culture in the institution's functions	NAQC 367.4	NAHE 297.9	0.009*	2.22 / 9	0.451
PS8	The institution strongly promotes the efficient use of natural resources	ACTU 353.4	ACGU 324.6	0.399	2.15 / 11	0.438
PS9	The intuitions strongly promote innovation in its research, teaching and administration	ACTU 387.0	ACGU 294.6	0.000**	2.29 / 4	0.450
PS10	The organization Includes stakeholders' needs and expectations in its strategy	ACTU 387.8	ACGU 296.0	0.000**	2.38 / 1	0.475
PS11	Performance is clearly related to relevant benchmarks	ACTU 366.9	ACGU 314.3	0.015*	2.28 / 6	0.456
PS12	Individual and team objectives are aligned with the organization's strategic goals	ACTU 388.0	NAHE 294.3	0.000**	2.38 / 2	0.469
PS13	Staff awareness of the relevance of the organization's goals to their activity is high	ACTU 369.4	ACGU 313.7	0.003**	2.32 / 3	0.462
PS14	The organization has a strong commitment to the local population	ACTU 378.7	STU 306.1	0.000**	2.26 / 8	0.446
PS15	The organization has a strong commitment to global resources, the environment and conservation	NAHE 355.4	NAQC 284.8	0.062	2.18 / 10	0.435

TABLE III. INSTITUTE RANKING OF GROUP AVERAGE SCORES FOR CSFS (GACS) [25]

GAC Rank	Leadership	Policy and strategy	Continuous Improvement	People Focus	Customer Focus	Process Management	Training	Key Results
<b>Institution</b>								
1	NAQC	ACTU	ACTU	ACTU	ACTU	ACTU	NAQC	NAQC
2	ACTU	NAQC	NAQC	NAQC	NAQC	STU	ACTU	STU
3	STU	NAHE	STU	STU	STU	NAQC	STU	NAHE
4	NAHE	STU	ACGU	ACGU	NAHE	ACGU	ACGU	ACGU
5	ACGU	ACGU	NAHE	NAHE	ACGU	NAHE	NAHE	ACTU

(ACTU: Academic Staff at Tripoli University, ACGU: Academic Staff at Gharyan University, NAQC: Non-Academic Staff at National Quality Centre, NAHE: Non-Academic Staff at Higher Education Secretariat, STU: Students)

### C. Data Analysis

Statistical analysis applied to these data included non-parametric Kruskal Wallis Mean Ranks (KWMR) test. [23] as listed in Table II. KWMR was used to measure how much the group ranks differed from the average across all groups. This test was used to indicate how each group had observed the implementation of a given QAPs in their work or study environment. Group Averages for QAPs (GAQs) and Group Averages for CSFs (GACs) were computed for all the groups and CSFs respectively as (Table III). Further to the statistical analysis, an analytical procedure was also followed based on Quality awareness of the academic and non-academic groups that lead to a Sustainability Index for each QAP as presented in Table II.

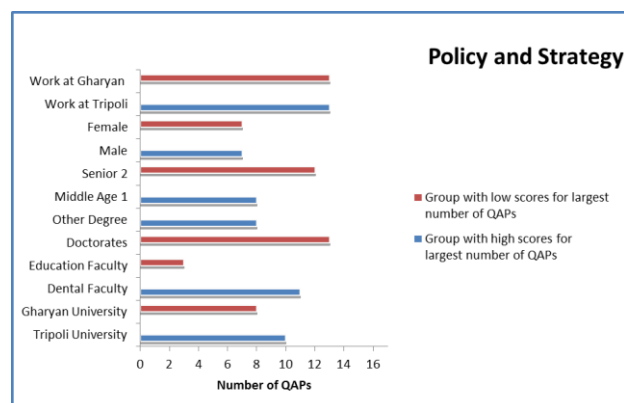


Figure 2. The largest numbers of QAPs for which different groups have scored high or low KWMR under Policy and Strategy CSF.

## IV. RESULTS AND DISCUSSION

Table II shows the results from the Kruskal Wallis analysis of the data for the PS (CSF) by institution groups. The Group Average of the QAP (GAQ) and the rank of the GAQ within the Policy and Strategy CSF for each group are also shown in Fig. 2. However, KWMR results show that 11 of 15 QAPs within the Policy and Strategy Critical Success Factor show significant differences between survey groups. Tripoli University has scored high for eight QAPs and Gharyan University has ranked low for seven. This suggests that in Gharyan quality matters related to Policy and Strategy are less developed when compared with Tripoli University. Table II shows statistically significant differences among the institution groups on matters relating to performance evaluation based on quality (PS2) quality planning (PS3), inspection

(PS4), transparency (PS6), promotion of local culture (PS7), promotion of innovation (PS9), stakeholder needs (PS10), benchmarking (PS11), individual and team objectives (PS12), awareness of organizational goals (PS13) and commitment to local population (PS14).

These differences were verified and explained by the expert interviews who felt that quality issues relating to the Policy and Strategy were not well understood by the questionnaire respondents. In part, this was felt to be due to Quality Management being a relatively new concept among the majority of HE internal stakeholders. For example, the promotion of local culture (PS7) was not felt to be important among many respondents. This implies that the tribal population of Libya is not encouraged to enrol and subjects are not introduced that are relevant to their professions and trades.

One of the Deming's principles is that the organization should reduce the focus on quality inspection and concentrate on service delivery (PS4). While Tripoli University has scored high and Gharyan low in response to this QAP traditional inspection system still predominate in the Libyan HE system. This was supported by a faculty member in the school of Education at Tripoli University:

*of course, I think the inspection is important in enhancing education quality because the formal inspection process reveals the mistakes and faults in the institutions; this can help the stakeholders to improve their plans and strategies.*

Results related to environmental and ethical issues in the financial process (PS5) showed no significant differences between the groups, although Tripoli University scored high when compared with the Quality Centre. This suggests that the environment, sustainability concepts is yet to be integrated within the quality processes at the National Quality Centre.

Past studies into the sustainability of Total Quality Management have placed an emphasis on transparency (PS6) [24]. However, in this Policy and Strategy QAP Gharyan University scored low when compared with HE Secretariat and there is a significant difference between the institution groups surveyed. This finding was supported by the Director of Quality Gharyan:

*Senior management of the universities should address the weaknesses in the process of finances allocated for the development of resources. There is a need for clear criteria for assessment with a commitment to transparency in the development and application of policies...*

No significant statistical differences were observed among the groups on the efficient use of natural resources (PS8). Tripoli University has however had a high rank for this QAP which may indicate that it has initiated steps towards 'green campus' concepts despite being situated in the capital city of the country. Lower scores by Gharyan university for this, even though it is situated in the green agricultural belt of the country suggest that the same 'green campus' agenda is less visible. The researcher was unable to find any environmental quality documents within the Libyan HE institutions studied. Some UK Universities including [17], [18] have already initiated clear policies on environmental and waste management programs.

The following analysis and discussion will focus on Group Averages for Critical Success Factors (GAC) as shown in Table III. Among the institution groups, Tripoli University, and the Quality Centre have shown better overall performance in Policy and Strategy CSFs as shown in Fig. 3. Gharyan University has shown overall lowest performance. These group average trends validated the results of the Kruskal Wallis statistical test. Therefore, overall comparison across CSFs reveals that for training and key results CSFs are frequently ranked low when compared to other CSFs as shown in Fig. 3. Group Average CSF results (Table III) show People Focus and Process Management are the best performing CSFs in the Libyan HE system. Policy and Strategy, which has been the focus of this paper, have shown medium level performance.

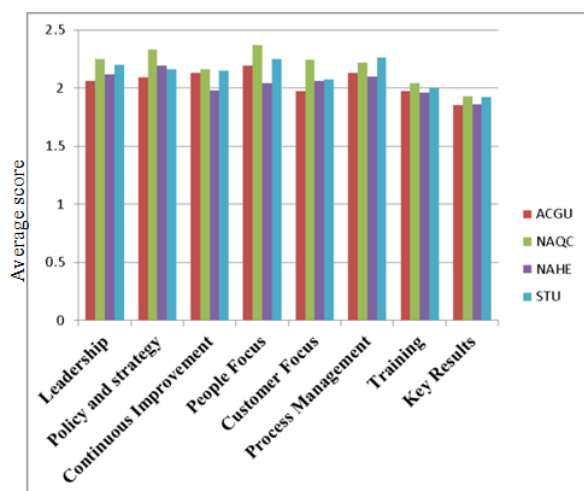


Figure 3. Sample plot of GAC scores for various institutional groups.

In general, there was a low level of implementation of the CSFs and QAPs in the institutions studied. This was due to an overall lack of quality awareness, inadequate knowledge of quality management tools and techniques, lack of quality training, poor procedures for evolving SQM policies and strategies and a lack of measurement of key results.

Quality issues were seen to be the responsibility of Senior Management and processes often failed to include internal stakeholders in the institutions studied.

A central feature of this study and the Policy and Strategy issues within the SQM framework is the

inclusion of sub-criteria relating to the natural environment. For example, the efficient use of natural resources, neutralizing harmful wastes and enhancing biodiversity is QAPs that focus on the university campus environment.

## V. CONCLUSION

This study has highlighted the potential of integrating Total Quality Management (TQM) and sustainability in the Libyan higher education sector. It has been combined with the analysis of quantitative and qualitative data to generate eight critical success factors and has focused on one of these, which is policy and strategy. A majority of the quality action programmes in policy and strategy were interpreted by the study groups with statistically significant differences. Mixed methods, analysis revealed that some of these differences are due to the absence of policies to include internal and external stakeholders in the education process. The outcomes have shown that TQM and Sustainability jointly advocate the promotion of local culture and prompt natural environmental issues that can improve the University campus environment. We found the several social and ethical problems, which encounter the enhancing of the quality and its sustainability in higher education institutions of Libya. This paper raises further questions about the integration of quality and sustainability and the potential influence on achieving sustainable quality management in other sectors within the Libyan, and other Arab, economies, which will be considered as apart of future work.

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