

Developing a Sustainable Quality Management (SQM) Model for Higher Education Institutions in Libya:

A Case Study Approach

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Sustainable Quality Management, Continuous Improvement, Libyan Higher Education, Triple Bottom Line and Five Capitals sustainability models.

Abstract

While many of the challenges currently facing the Higher Education Sector (HES) relate to Quality Management (QM) and its sustainability, relatively few studies have examined this issue in developing countries. Previous research has shown that universities often find it difficult to sustain quality management programmes beyond their initial implementation stages.

This paper emphasises the integration of sustainability frameworks, such as the Triple Bottom Line (TBL) and Forum for the Future's Five Capitals Model (FCM), into higher education quality management programmes. It argues for the need to rebuild and improve Higher Education Total Quality Management (TQM) systems at different institutional levels through the integration of Critical Success Factors (CSFs), including continuous improvement, training, leadership, and process management, together with factors that influence sustainability, such as values, ethics, and organisational culture.

The paper draws on Quality Consciousness Indices based on the Deming Cycle (PDSA: Plan-Do-Study-Act) and the self-assessment models of the European Foundation for Quality Management (EFQM). It explores how these frameworks can enhance quality within the higher education context of Libya as a developing country.

The study presents data and analysis from more than 30 interviews and 678 questionnaire responses collected from key higher education stakeholders in Libya, including university staff, students, administrators, senior management, and representatives of the National Quality Centre. Particular attention is given to one of the eight Critical Success Factors—Continuous Improvement—which is identified as a key element in integrating quality and sustainability within Libyan higher education. Finally, the paper considers the relevance of Sustainable Quality Management (SQM) for higher education institutions in Libya and discusses its wider applicability to developing countries.

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تطوير نموذج للإدارة المستدامة للجودة (SQM) لمؤسسات التعليم العالي في ليبيا: منهجية دراسة الحالة

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الكلمة المفتاحية	الملخص
الإدارة المستدامة للجودة، التحسين المستمر، التعليم العالي الليبي، نموذج الخط الثلاثي للاستدامة (TBL)، نموذج رؤوس الأموال الخمس للاستدامة (FCM).	في حين أن العديد من التحديات التي تواجه قطاع التعليم العالي حاليًا ترتبط بإدارة الجودة واستدامتها، فإن عددًا محدودًا نسبيًا من الدراسات تناول هذه القضية في الدول النامية. وقد أظهرت الدراسات السابقة أن الجامعات غالبًا ما تواجه صعوبات في الحفاظ على برامج إدارة الجودة واستمراريتها بعد المراحل الأولية لتطبيقها. تؤكد هذه الورقة على أهمية دمج أطر الاستدامة، مثل نموذج الخط الثلاثي للاستدامة (Triple Bottom Line - TBL) ونموذج رؤوس الأموال الخمسة (Five Capitals Model - FCM) التابع لمؤسسة Forum for the Future، ضمن برامج إدارة الجودة في مؤسسات التعليم العالي. كما تدعو إلى إعادة بناء وتطوير أنظمة إدارة الجودة الشاملة (TQM) في التعليم العالي على مختلف المستويات المؤسسية من خلال دمج عوامل النجاح الحرجة (CSFs)، بما في ذلك التحسين المستمر، والتدريب، والقيادة، وإدارة العمليات، إلى جانب العوامل المؤثرة في الاستدامة مثل القيم والأخلاقيات والثقافة التنظيمية. وتستند الورقة إلى مؤشرات الوعي بالجودة المبنية على دورة ديمينغ (PDSA) خطط - نفذ - ادرس - صحّح (، بالإضافة إلى نماذج التقييم الذاتي الخاصة بالمؤسسة الأوروبية لإدارة الجودة (EFQM) كما تستكشف كيفية مساهمة هذه الأطر في تعزيز الجودة ضمن سياق التعليم العالي في ليبيا باعتبارها دولة نامية. وتعرض الدراسة بيانات وتحليلات مستمدة من أكثر من 30 مقابلة و 678 استبانة جمعت من الأطراف المعنية الرئيسية بالتعليم العالي في ليبيا، بما في ذلك أعضاء هيئة التدريس، والطلاب، والإداريون، والإدارة العليا، وممثلو المركز الوطني لضمان جودة واعتماد المؤسسات التعليمية والتدريبية. وقد أولت الدراسة اهتمامًا خاصًا لأحد عوامل النجاح الحرجة الثمانية، وهو التحسين المستمر، باعتباره عنصرًا أساسيًا في دمج الجودة والاستدامة داخل مؤسسات التعليم العالي الليبية. وأخيرًا، تناقش الورقة أهمية الإدارة المستدامة للجودة (SQM) بالنسبة لمؤسسات التعليم العالي في ليبيا، كما تستعرض إمكانية تطبيق هذا النموذج على نطاق أوسع في الدول النامية.

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1. Introduction

A core component of higher education (HE) reform is systematic quality assurance and accreditation and improvement within HE is currently facing many challenges in different cultural and educational contexts (Kaivola, et al, 2007). Recently, total quality management (TQM) has led to an expanded body of literature attempting to define quality in higher education; this is particularly evident in many

developing nations where the quality of education is yet to be developed as a discipline (ORTUU, 2007). Studies by Avdjieva and Wilson (2002) have revealed that the universities in the developed countries are also facing political and cultural barriers to quality improvement programmes.

The synergies between quality and sustainability are particularly relevant to higher education (Sirvanci, 2004). While some universities in developed countries have embedded TQM activities already, some developing nations are still in the process of drawing up plans for it and are likely to encounter barriers from the existing cultural and value systems (Isaksson, 2004). The UN Decade of Education for Sustainable Development (2005–2014) called for a thorough integration of sustainability issues at all levels of education via a holistic, inter- and transdisciplinary approach and with a clear focus on values (UNESCO, 2009).

In recent years an increasing interest in the issues concerning Sustainable Quality Management (SQM) has been noted (Zailani, 2009) with a paradigm shift from TQM to SQM. This paper focuses on one aspect of this shift, how to utilize Continuous Improvement to combine TQM and Sustainability within the Libyan Higher Education System. This paper is organized as follows: Section 2. Summarises how continuous improvement relates to the existing quality models in Higher Education and Section 3. Outlines the methodology for the Libyan case study which forms the basis for the subsequent data, analysis and discussion presented in section 4. The final section presents the conclusion and potential implications for Libyan HE into the future.

2. Towards Sustainable Quality Management in Higher Education

The fundamental notion of sustainability is that social and human capital should be encouraged to grow alongside economic capital providing that the stocks of natural capital are not compromised; i.e. this is the new ‘bottom line’. Total Quality Management (TQM) processes should help facilitate this process thereby creating a synergy with the human system capitals through Sustainable Quality Management (SQM).

Many Critical Success Factors (CSFs) have been identified for SQM (Kumar et al., 2004) and for the following paper continuous improvement (CI) will be focused upon from both quality and sustainability perspectives. The Deming and EFQM Quality Models describe continuous improvement criteria in the quality dimension based on relational and functional aspects of TQM that include regular

feedback, academic curricula, investment in human resources, technology and continuous educational outcomes. On the other hand, the Five Capitals sustainability Model (FCM) describes continuous improvement criteria as supporting creativity and innovation, enhancing biodiversity, environmental, neutralizing harmful wastes.

2.1. Continuous improvement and 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 (Al-Saadi, 2010). As a follow-up, the United Nations General Assembly adopted the resolution - United Nations Decade of Education for Sustainable Development (DESD), proposed by Japan (2005 – 2014) and co-sponsored by forty-six countries. According to Barua et al., (2015) sustainability can be weak or strong, depending on the nature of capital accumulation. Weak sustainability is characterized by a non-declining combined stock of capital and assumes that man-made capital can be replaced with natural capital. Strong sustainability, on the other hand, implies that natural capital cannot be replaced by any other capital (Grunwald, G., Kara, A. and Spillan, J.E. (2025) 'Forging'); it is the new 'bottom line'.

Subsequently many national organisations and universities have been involved in developing and implementing higher education curricula on sustainability (Segovia and Galang, 2002; UNDP, 2002; HEFCE, 2009). A report by Rusinko (2005) illustrate how environmental sustainability and management theory can be integrated based on a class exercise and point to “Sustainability in Higher Education” being a driver for “Sustainability of Higher Education” through innovations that would emerge over time. Texeira-Quirós, J., Justino, M.R., Antunes, M.G., Mucharreira, P.R. and Nunes, R. (2022)

Sustainability in Higher Education (HE) has been widely advocated as more than an add-on to existing university practices (Cebrián et al., 2015) indeed some universities sees it as a new way of organising and profiling themselves (Wals, 2014). Müller-Christ et al. (2014) however, stress that the change towards sustainability requires whole-university approaches that connect curriculum, campus, research and community strategies and action. Some universities in the UK have developed strategies for the sustainable development of their campuses (Ponce, P., Álvarez-García, J. and colleagues 2024) requiring evaluative methods

that support comparison with competitors within a holistic vision of a "sustainable college or university" (Shriberg, 2002).

Within this drive to more sustainable HE the need for continuous improvement (CI) is key and refers to efforts that are directed at increased effectiveness and efficiency in meeting accepted customer and stakeholder expectations. It is a continuous process to achieve a better understanding of the market, to innovate products and processes, and to provide service to customers (Fisher and Nair, 2009). However, the ISO 9001:2000 standards for quality assurance systems prescribe continuous improvement through preventative action but retain a customer oriented focus (Isaksson, 2004; Zink, 2007). The stakeholder approach contrasts with that outlined by Libya in the UNESCO Arab regional conference on higher education and focused on the weaknesses in curriculum development (UNESCO, 2009). This was seen as being due to the inadequate implementation of the continuous improvement principles which should be ongoing, address the needs of all stakeholders of higher education and take place throughout the organisation (Redmond et al., 2008); (Taylor, 2003).

3. Research Methodology:

The Libyan case study adopted a Mixed Method Approach to explore Total Quality Management and sustainability in that country's HE system. This was grounded in a synthesis of Deming's Plan – Do – Study – Act (PDSA) and EFQM quality models and sustainability models including Forum for the Future's Five Capital Model¹ and the Triple Bottom Line and took place in two academic (Tripoli and Gharyan University staff and students) and two non-academic institutions (The National Quality Centre and Higher Education Secretariat). Tripoli University is considered a national level University, and the Gharyan is consider a regional University one. (table 1). The study comprised of two main parts; the development of a literature derived Sustainable Quality Management framework for the Libyan HE sector and the implementation of that framework in the following institutions. The framework was based on eight Critical Success Factors (CSF), (Leadership, Policy and Strategy, Continuous Improvement, People Focus, Customer Focus, Process Management, Training and Key Results) however this paper will focus on one of these, Continuous Improvement as introduced above. The data for the study was collected from 678 questionnaires (61.6% response rate – table 1) and 31 semi-structured interviews with participants from the five groups according to their experiences of quality management, sustainability, and higher education.

Table 1. Questionnaire responses received from various institutions in Libya

Organization	Number of responses received (% of total approached)	Number of responses from members staff	Number of responses from students (STU)
Tripoli University ACTU	336 (67.2)	293	43
Gharyan University ACGU	292 (58.4)	241	51
Quality Centre NAQC	27 (54.0)	0 n/a	0 n/a
HE Secretariat NAHE	23 (46.0)	0 n/a	0 n/a
Total	678 (61.6)	534	94

3.3. Data Analysis

Students (STU) are included in table 1 as a combined sub group of the two universities; the analysis for Tripoli (ACTU) and Gharyan (ACGU) includes both students and staff. The Kruskal – Wallis test (KWMR) was used to measure significant differences between three or more of the five groups of respondents (table 2) and the Mann-Whitney test (MWMR) was employed to explore the differences between any two groups (table 3). The tests indicate how each group perceives the implementation of a given Quality Action Programme (QAP) in their work or study environment; a higher value of KWMR or MWMR implies a higher level of perceived performance for a given QAP and vice-versa.

Group Averages for a given for Quality Action Program QAPs (QAP), its rank within the CSF and Sustainable Index value of the QAP are given in Table 2. While the QAP rank is a measure used for comparing the performance of an action programme for each CSF a Sustainability Index, (SI) was developed to explore how far a QAP is sustainable within the higher education system. SI values above 0.5 are considered to indicate a high level of sustainability, 0.4 – 0.5 are considered to indicate the medium level of sustainability and less than 0.4 is considered to indicate a low level of sustainability.

Table 2. High and low scores of Kruskal-Wallis Mean Ranks (KWMR) and probability levels of significance for various QAPs under the Continuous Improvement CSF (CI)

QAP No.	CATEGORY >>	INSTITUTION			QAP / Rank	Sustainab ility Index
	Question on the QAP	GROUP / KWMR		P		
		High	Low			
CI1	Regular feedback about quality is gathered from all stakeholders of the institution	ACTU 359.6	STU 301.1	0.049*	2.16 / 6	0.432
CI2	Investment in human resources is considered important by the organization	STU 367.2	NAHE 286.5	0.007*	2.32 / 4	0.460
CI3	Creativity and innovation are considered important by the organization	NAQC 359.3	NAHE 252.8	0.103	2.23 / 5	0.440
CI4	The institution has good systems for continuous improvement	ACTU 394.0	NAHE 253.2	0.000**	2.42 / 1	0.471
CI5	Academic curricula of the institution are continuously improved	ACTU 373.5	NAHE 238.6	0.000**	2.33 / 2	0.454
CI6	Educational outcomes are continuously reviewed	ACTU 389.5	ACGU 292.5	0.000**	2.32 / 3	0.460
CI7	Recycling waste and neutralizing harmful materials on campus is considered important by the organization	NAQC 373.8	NAHE 307.3	0.110	2.02 / 11	0.407
CI8	Employees are involved in the continuous review of organizational processes	NAQC 350.5	STU 303.0	0.215	2.05 / 8	0.410
CI9	Physical assets such as buildings, equipment, materials and stocks are continuously improved	NAQC 369.9	STU 335.2	0.875	2.05 / 9	0.420
PCI10	The continued promotion of biodiversity and environmental conservation is considered important	STU 332.1	ACTU 313.2	0.009*	2.04 / 10	0.409
PCI11	There are clear procedures for identifying and evaluating emerging environmental technologies	ACTU 359.9	STU 320.9	0.152	2.13 / 7	0.423

Table 3. High and low scores of Mann Whitney Mean Ranks (MWMR) and probability levels of significance for various QAPs under the Continuous Improvement Critical Success Factor (CI)

QAP No.	CATEGORY	GENDER			LOCATION		
		GROUP / MWMR		P	GROUP / MWMR		P
		High	Low		High	Low	
CI1	Regular feedback about quality is gathered from all stakeholders of the institution	M 348.3	F 319.1	.047	TRIP 350.1	GHAR 325.5	.065
CI2	Investment in human resources is considered important by the organization	F 348.3	M 335.7	.409	TRIP 357.4	GHAR 315.3	.003**
CI3	Creativity and innovation are considered important by the organization	M 342.1	F 333.4	.558	TRIP 351.0	GHAR 323.7	.050
CI4	The institution has good systems for continuous improvement	M 343.5	F 330.1	.387	TRIP 376.2	GHAR 289.6	.000**
CI5	Academic curricula of the institution are continuously improved	M 342.9	F 331.6	.442	TRIP 357.4	GHAR 315.5	.002**
CI6	Educational outcomes are continuously reviewed	F 345.0	M 337.1	.613	TRIP 376.1	GHAR 289.4	.000**
CI7	Recycling waste and neutralizing harmful materials on campus is considered important by the organization	F 346.7	M 336.4	.503	GHAR 354.8	TRIP 328.4	.064
CI8	Employees are involved in the continuous review of organizational processes	M 342.5	F 332.5	.512	TRIP 344.7	GHAR 332.4	.384
CI9	Physical assets such as buildings, equipment, materials and stocks are continuously improved	F 361.1	M 330.2	.041*	TRIP 342.8	GHAR 335.0	.582
CI10	The continued promotion of biodiversity and environmental conservation is considered important	F 349.9	M 335.0	.330	GHAR 359.8	TRIP 324.7	.014**
CI11	There are clear procedures for identifying and evaluating emerging environmental technologies	M 341.5	F 334.8	.657	TRIP 351.5	GHAR 223.0	.042*

Table 4. Institutions involved in the study of ranked according to Group Average Scores for CSFs (GACs)

Institution	Leadership	Policy and strategy	Continuous Improvement	People Focus	Customer Focus	Process Management	Training	Key Results
ACTU	2.23	2.35	2.28	2.37	2.29	2.73	2.02	1.8
ACGU	2.06	2.09	2.13	2.19	1.97	2.13	1.97	1.85
NAQC	2.25	2.33	2.16	2.37	2.24	2.22	2.04	1.93
NAHE	2.12	2.19	1.98	2.04	2.06	2.10	1.96	1.86
STU	2.2	2.16	2.15	2.25	2.07	2.26	2.00	1.92

(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.

The results in table 2 show the KWMR analysis of the data for Continuous Improvement (CI) by institution; 6 of the 11 QAPs have significant differences with Tripoli University (ACTU), and Students (STU) scoring high for 6 QAPs and the Non- Academic Quality Centre (NAQC) ranking low for 5 of them. This suggests that the Gharyan University, Quality Centre, and students quality and sustainability matters related to CI are less evolved when compared with Tripoli University. 5 out of 11

QAPs under this CSF (CI) shown statistically significant differences on among the observations of the institution groups on matters relating to regular feedback from all stakeholders of the institution CI1 was high at Tripoli University and in other institutions were low that indicated to the feedback from employee and students is not regularly collected, human resource development CI2, that dealt with investment in human resources was noted that human resources in the academic Universities of Libya are constrained and a large number of expatriates were recruited as teaching staff in most Universities. The KWMR shows that the students at academic Universities have scored higher level of awareness of this matter. Because, students interact with the expatriate teaching staff members on a day – to – day basis during the teaching – learning processes, good system for continuous improvement CI4 was scored high in Tripoli University when compare with quality centre, continuous improvement of the curriculum CI5, Results show that observations on this aspect are high at Tripoli university when compared to the regional university at Gharyan. It is noted that for questions CI4, CI5 and CI6

which are directly related to continuous improvement have shown higher level significant differences among the groups studied; this indicates a high level of variation in implementation at various institution groups, enhancing biodiversity CI10, KWMR results shown that Low scores by the universities on this QAPs calls for revitalizing the system with clear responsibilities being identified for managing the biodiversity of the campuses. Faculty member in the school of Education at Tripoli University supported this quantitative result:

Nobody is concerned about biodiversity as they do not have adequate capacity and resources to implement programmes on this subject... forestation activities are required in barren lands of the campuses for the conservation of soil and water. Landscaped parking spaces can be developed for promotion of biodiversity...

While, The KWMR results On the environment oriented about neutralizing harmful wastes (CI7) shows that there were no significant differences between groups; this suggest that in the higher education context, laboratory based work produces harmful wastes that require disposal after neutralizing them, and also, Creativity and innovation (CI3) for both quality and sustainability, results showed no significant differences between groups which are surprising. Because in the context of sustainable quality, creativity and innovation can be viewed from two perspectives. Firstly, these QAPs can be implemented in teaching and learning processes, Secondly, this can be applied in the quality management processes of the higher education system. Also the MWMR results on this QAPs CI shows that the high ranks of significant was in Tripoli University when compared with Gharyan University as shows in Table 4.

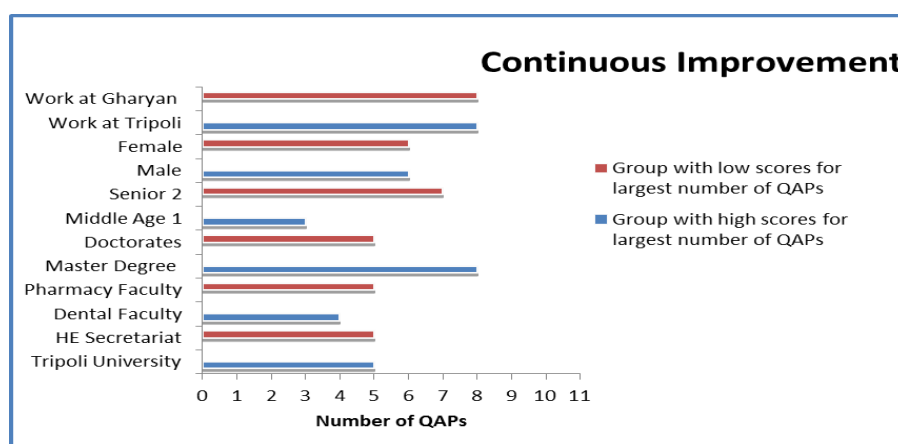


Figure 1. Largest number of QAPs for which different groups have scored high or low KWMR (or MWMR) under Continuous Improvement CSF

The following analysis and discussion will focus on Group Average for Critical Success Factors (GAC) as mentioned in Table 5. While the non – parametric test results were limited to reveal the trends at QAP level, the GAC ranks provide more insight into the CSF level performance of various groups. However, among the institution groups Tripoli University and the Quality Centre have shown better overall performance Figure3. Gharyan university has shown overall lowest performance. These trends were validated through the results from KWMA and MWMR test, and mixed methods techniques. Therefore, Overall comparison across CSFs reveals that for Training and Key Results CSFs are frequently low ranked when compared other CSFs as shown in Figure 1; these results corroborate with the findings of non – parametric tests for individual QAPs. The GAC results as mentioned in Table 5 is also observed that People Focus and Process Management are overall best performing CSFs in the Libyan higher education system. Policy and Strategy and Continuous improvement have shown medium level performance.

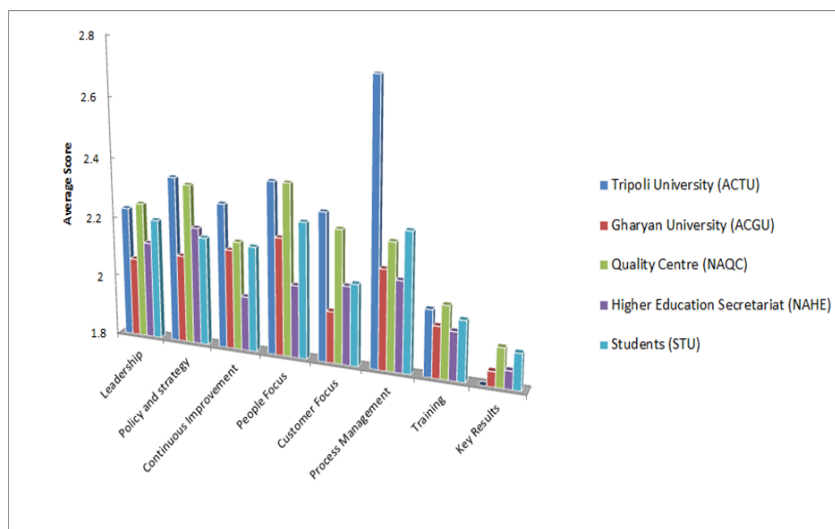


Figure 2. A sample plot of GAC scores for various institutional groups

In general, a low level of implementation of CSFs and QAPs was observed in the Libyan Higher Education Institutions studies due to lack of quality management awareness, lack of quality training programmes, inadequate knowledge of TQM tools and technique systematic feedback systems, inadequate awareness of sustainability issued such as Social justice and transparency in the financial process system, biodiversity, developing a green campus, enhancing environment, natural resources, , inadequate development and evaluation of SQM policies and strategies, inadequate expertise and training in quality and sustainability

approaches towards evolving SQM continuous improvement and lack of measurement of key results. Mixed methods analysis (Quantitative and qualitative) suggested that some of these differences may be due to following: Lack of clarity of Libyan education experts on leadership QAPs when compared to standard design criteria advocated by the PDSA, EFQM and sustainability models; different opinions on the use of self - assessment or external evaluation on performance evaluation of staff; potential confusion among the respondents in observing drivers as barriers; for example of this include dilemmas over the promotion of local culture or the promotion of different cultures; differences in viewpoints of respondents about involving only faculty members, or all internal stakeholders in the planning process of academic institutions. A central feature of this study and SQM is the inclusion of several QAPs as sub – criteria on the environment, natural resources and biodiversity. These were developed based on existing TQM and sustainability models. Inclusion of Triple Bottom Line (TBL) in the financial process; TBL based performance evaluation; efficient use of natural resources; neutralising harmful wastes; enhancing biodiversity are QAPs that focused on university campus environment. Results revealed that although Libyan HE leadership is aware of the significance of these QAPs, either due to limited funds or a lack well-defined guidelines, little action is observed at the university campuses on their implementation. The two universities studied are yet to develop policy documents on these QAPs, while such documents have already been developed in UK universities. This study identified the need for linking the TBL to various aspects of the education system: key financial results with economic sustainability; focus on social capital and sustainability; ecological results with environmental sustainability. Past studies have shown that even in the academic institutions of developing countries the financial outcomes and education output are not measured or compared with equivalent organisations as advocated by the TQM models. This is more perceptible in the case of Libya, where a free education system is predominant. Local government often funds universities. Lower scores of the two universities studied on these matters indicate that measuring financial outcome and education output are monitored to only a limited degree.

5. Conclusion

This study has highlighted the incorporating TQM and sustainability in the Libyan higher education system. It has combined the quantitative and qualitative data analysis to understanding eight Critical Success Factors (CSFs), and particularly focused on Continuous Improvement (CI) as one of important CSFs with a primary objective of exploring them in the context of synergies between quality and sustainability. Sustainable Quality Management (SQM) framework adopted from CSFs and QAPs in Libya Higher Education Institutions (LHEI) that is aimed to develop (SQM) model and has been evaluated. Libyan higher education system has lagged behind in implementing QAPs of Continuous Improvement,

specifically on the following aspects: collection of staff and student feedback and processing systems that were not developed due to lack of knowledge and expertise; Lack of a centralised coordination system in curriculum improvement ; lack of awareness of statistical quality control systems; education that largely relied on memory and not on creativity and innovation due to lack of functional heterogeneity among staff, limited empowerment of staff and a hierarchical organisational culture. Argument centred on the perceived skills required by students in the labour market often hampered creativity and innovation; Lack of books and references and the inability of staff and students to attend specialized courses and conferences hampered continuous improvement. Some of the barriers identified are the absence of teamwork, reliance on an inspection system for quality, preference for Arabic as the medium of instruction, resistance to change for fear of revealing defects, lack of funds and limited authority for quality offices, communication problems between local and head office, and an absence of reward systems and benchmarking. Among the survey institutions, Tripoli University and the Quality Centre have shown better SQM performance and the Gharyan University has been the lowest overall. In general, increased awareness of quality tools and techniques at Tripoli University is observed due to its proximity to the Quality Centre, which has well-qualified staff members and long term high academic standing. This paper provides new model (SQM) and concepts with important findings, and increase further questions, which has highlighted directions for further study. The SQM as new model can be extended to other sectors in the future, particularly those that have direct links with quality and sustainability domains such as oil companies, manufacturing, health and tourism sectors.

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