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The Effect of Unlimited Improvement (UI) On Total Quality Management (TQM): A Case Study Of The Higher Education Institutions In Libya

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Abstract

The concept of unlimited improvement (UI), the basic concept, is a quality management practice that contributes to the development of the quality of operations and administrative practices. In this study, the impact of unlimited improvement on Total Quality Management Practices was examined.

The research was conducted on Libyan Higher Education Institutions through a survey methodology involving 382 participants who worked or worked in Libyan Higher Education Institutions. The 6-item 5 Likert scale was used in the study and analyzed in SPSS 23.0 program. As a result of regression analysis, r2 shows a positive relationship between unlimited improvement and (TK), which is 0.408. The study results show that (TKY) implementation can be improved by applying (UI) indicators.

The importance of research (TQM) is revealed by the importance of the concept. Research has shown that unlimited improvement can improve the efficiency of Total Quality Management.

Keywords: Unlimited Improvement (UI), Total Quality Management (TQM), Higher education, Libya

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Sınırsız iyileştirme'nin (UI) Toplam Kalite Yönetimi (TKY) Üzerindeki Etkisi: Libya'daki Yüksek Öğretim Kurumları Örnek Çalışması

Özet

Temel kavram olan sınırsız iyileştirme (UI) kavramı, operasyonların ve idari uygulamaların kalitesinin geliştirilmesine katkıda bulunan bir Kalite Yönetim uygulamasıdır. Bu çalışmada, sınırsız iyileşmenin Toplam Kalite Yönetimi uygulamalarına etkisi incelenmiştir.

Araştırma, Libya yüksek öğretim kurumlarında çalışan veya çalışan 382 katılımcıyı içeren bir anket metodolojisi aracılığıyla Libya yüksek öğretim kurumları üzerinde gerçekleştirilmiştir. Araştırmada 6 maddelik 5'li Likert ölçeği kullanılmış ve SPSS 23.0 programında analiz edilmiştir. Regresyon analizi sonucunda bulunan r^2 0.408 olan sınırsız iyileştirme ve (TKY) arasında pozitif bir ilişki göstermektedir. Çalışma sonuçları, (UI) göstergelerini uygulayarak (TKY) uygulamasının geliştirilebileceğini göstermektedir.

Araştırmanın önemi (TKY) kavramının önemi ile ortaya çıkar. Gerçekleştirilen araştırma sayesinde, sınırsız iyileşme uygulamasının Toplam Kalite Yönetimi'nin verimliliğini artırabileceği tespit edilmiştir.

Anahtar kelimeler: Sınırsız iyileştirme (UI), Toplam Kalite Yönetimi (TKY), Yüksek Öğretim, Libya

Jell Numarası: M11

1. Introduction

Since 1980s, TQM has been considered as a dominant management strategy and a revolutionary instrument for managing change. According to McAdam (2000), the history of TQM can be traced to the early 1920s through the emergence of the quality control thoughts; it originated from a statistician named Shewhart using the statistical quality control (McAdam, 2000). Shewhart's work was later adopted and expanded by American experts (such as P. Crosby, E. Deming, and J. Juran). Whereas, some thought that the concept of TQM started from the initiatives of Japanese scientists (Taguchi, Ishikawa, and Shingo) after World War II (Sallis, 2005). Notwithstanding TQM has its establishment in the industrial sector, there has been a push to adopt TQM by educational organisations (Bayraktar, Tatoglu, & Zaim, 2008; Lim, Rushami, & Zainal, 2004; Sirvanci, 2004; Venkatraman, 2007).

The TQM concept resulted in developing several tools and processes for assessment and implementation, which aim to empower creativity and problem solving, ensuring the continuous improvement and aim for better performance and customer satisfaction (Alfalah, 2017)

There are a few frameworks that addresses different aspects of quality within the organization. Total quality management (TQM) is a scale that was developed in order to ensure that management prioritizes quality through the right practices and processes. The scale has been used in several organizations' types with its wide set of indicators. Nonetheless, there has been no scale that allows management to ensure that their developed quality practices and procedures are implemented throughout the organization and extended to all stakeholders and supply chain. The Unlimited Improvement (UI) scale is developed for this purpose, which allows researchers and management professionals to assess the extent of quality practices' implementation within organizations. In this research, the scales of the two concepts is applied to the Libyan higher education institutions in order to understand the effect of Unlimited Improvement on total quality management.

2. Theoretical Framework

Total quality management was developed in the late 1940s by Japanese scientists and engineers, who came together under a development committee aiming to enhance the productivity in Japan. Different dimensions were evolved as the concept was adopted by other countries and researches. Moreover, the different views of nations towards the concept of quality contributed into the development of the concept in different manners (Martinez-Lorente, Dewhurst, & Dale, 1998). In higher education application, Asif et al. (Asif, et al., 2014) presented a comprehensive total quality management scale, which they modified to suite the case study for an assessment of the higher education in Pakistani Universities. The original scale contained 208 indicators under eleven dimensions focused on leadership and the role of management in enhancing quality.

There are a few concepts that addressed the quality standards and practices within the organization; however, total quality management (TQM) is considered the greatest level of quality management as it includes all the levels and processes in order to simulate a greater impact on the quality outcome. Therefore, TQM can be defined as a set of techniques and procedures used to reduce or eliminate variation from a production process or service-delivery system in order to improve efficiency, reliability, and quality. It can also be defined as an integrative philosophy of management for the continuous improvement of product and process quality in order to achieve customer satisfaction. Furthermore, TQM is a management philosophy or an approach.

TQM is a technique that is characterized by some principles, techniques and practices (Singh & Singh, 2014). TQM is a system and set of practices which are aimed at relentless quality improvement and better business performance (Sohel-Uz-Zaman & Anjalin, 2016).

The main foundation of TQM is based on gaining the needed commitment from the executive management to the adopt and empower TQM implementation. The implementation processes require using computerized tools and statistical techniques in order to monitor and control processes, products and services. Such tools allow a more educated decision-making process, which is also used to assess performance on all levels. Moreover, TQM requires forming teams within the organization and exhibiting organizational support and employee empowerment, as well as clearly defining responsibilities within the team. The most important pillar of TQM is continuing the improvement as a sustainable practice and focusing on the products and services provided for a great customer satisfaction (Gul, Jafery, Rafiq, & Naeem, 2012).

TQM is a way of life for a company. It has to be introduced and led by top management. This is a key point. Attempts to implement TQM often fail because top management doesn't lead and get committed - instead it delegates and pays lip service. Commitment and personal involvement is required from top management in creating and deploying clear quality values and goals consistent with the objectives of the company, and in creating and deploying well defined systems, methods and performance measures for achieving those goals. These systems and methods guide all quality activities and encourage participation by all employees (Zhang, 2000).

The research reduced the scale for the case study into seventeen indicators that were considered key in the assessment process, while five main dimensions were included. The same scale was adopted by the current study for discussion and comparison purposes.

The Unlimited Improvement (UI) model was developed by Küçük in 2011 as a supportive model for quality management (Küçük, 2011, Küçük and Küçük, 2012, Küçük; 2016). The main idea of the model is ensuring that quality improvements and the adopted quality practices and processes are spread throughout the organization. The scale involves eight aspects; employees, personal rights, machinery and equipment, educational budget, social infrastructure, suppliers, managers and organizational structure. In Küçük

(2016), the author presented a case study that included three main dimensions of the concepts; participation, improvement and performance. The three dimensions contained twenty-one indicators that aims to ensure the reach of quality and TQM practices.

Major restriction areas encountered in quality improvement practices of organizations are listed below (Küçük, 2011).

- Structure of the Organization
- Managers
- Certain Employees
- Processes (Supply, production, customer delivery)
- Products
- Suppliers
- Tools
- Working Hours
- Personal Rights
- Educational Budget
- Social Infrastructure
- Permissions
- Reward System

These elements and issues which can be left out of the scope of continuous improvement practices in TQM are shown in Figure 10. As it can be seen from Figure 8, structure of the organization, certain managers and employees, some suppliers and some of the machinery and equipment can be excluded from the improvement and the improvement activities can be asked to be conducted through other factors. In other words, continuous improvement is carried out through some of these elements and the improvement may not be carried out in a way that it covers all the elements that constitute the organization (Küçük & Küçük, 2012).

3. Aims of Study

The main aim of the study is to study the influence of unlimited improvement on another quality enhancement scale; total quality management in order to understand their impact on each other and the correlational factors between the different dimensions.

4. Scope and Methodology

The questionnaire is conducted in operational higher education institutions in Libya and the sampling methods used are non-random and random. The non-random sampling is based on the researcher's judgement to select the most appropriate participants for this study. Nonetheless, academic staff from the Libyan higher education institutions were chosen randomly to reach the required sample size. It is important to note that the researcher's knowledge about the research application and domain is an important factor in shaping the research methodology.

It is necessary to disclose the means by which the data is collected. The data collection tool may be a pre-prepared and tested one, as the researcher might have developed (Küçük, 2016). The tools used for the measurement of the two concepts are developed from the literature as shown in Table 1. As mentioned in the scope section, the scales are altered to suite the purpose of the research, while preserving the measured dimensions that are included in each concept.

Table 1. Measurement scale development for the two concepts used in the research.

Concept	Literature Reference
TQM	(Asif, et al., 2014) (Eryılmaz, et al., 2016)
UI	(Küçük, 2016)

The evaluation scale used is a 6-point agreement Likert scale, where;

(1) Totally disagree
(2) Disagree
(3) Slightly disagree
(4) Slightly agree
(5) Agree
(6) Totally Agree

The sampling is performed in a random manner from the main population, which is the students and the staff of the higher education institutions in Libya. Therefore, a filtering question is added to the questionnaire at the welcoming page, where participants are asked whether they currently belong to a higher education institution in Libya. If the participant answers by "no", then he / she is disqualified from participating in the study. Moreover, the sample size mainly depends on the size of the population. The number of people currently belonging to Libyan higher education institutions is more than 100,000 and less than 1,000,000. Thus, the sample size to achieve a reliability of 95% ($p<0.05$) is 382 questionnaires (Küçük, 2016).

The sample quota for this research is determined to be between 350 and 450 participants through random sampling within a certain type of participants (Küçük, 2014). The questionnaires are conducted through an actual physical questionnaire form distributed on the participants.

In studying the influence between the two concepts; Total Quality Management (TQM) and Unlimited improvement (UI), 670 participants were interviewed and requested to fill the questionnaire forms, of which 390 were completed, the rest of the questionnaires were received incomplete in a manner that required their disqualification.

5. Research Model

The global scope of the research includes the measurement of the two concepts as shown in Figure 1. The measurement tool is altered to suite the

purpose of this research. The hypotheses are structured to measure the impact between the concept of Unlimited Improvement (UI) and Total Quality Management (TQM).

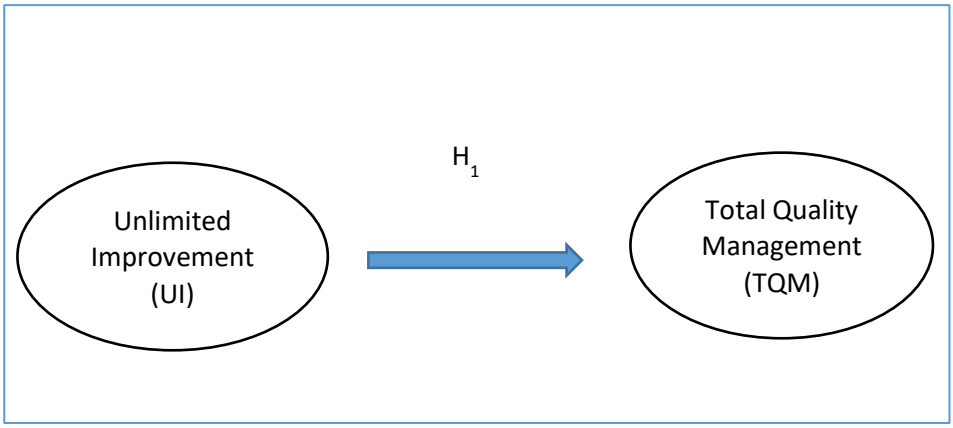

Figure 1. Research Model

6. Hypothesis

Küçük (2012) studied the scale of TQM in development of the unlimited improvement concept. Total quality management has been evaluated in different applications and organization types; however, there is no direct correlation that has been established between unlimited improvement and total quality management. Nonetheless, the relationship between both concepts and organizational performance has been established in many studies (Ay & Nurov, 2017; Benshina, 2018; Küçük and Küçük, 2012, Küçük vd. 2015). This study comes to establish these correlations and to conform against the findings of previous literature.

H1: There is a statistical influence between the Total Quality Management (TQM) and Unlimited Improvement (UI) or their sub-dimensions in the higher education in Libya.

7. Data Analysis

The available sample was inputted into SPSS Statistics to check its reliability through Cronbach's Alpha. Table 2 shows the demographics of the sample. As shown in Table 3, the factors for each concept are 0.941 and 0.955 for Total Quality Management (TQM) and Unlimited Improvement (UI), respectively. The overall Cronbach's Alpha is 0.955, which is in line with targeted reliability of 95%. Therefore, questionnaire distribution and collection, which were performed between the months of March and October 2018, were stopped.

Table 2. Demographics (n=390)

Information	Choices	Count	Percent (%)
Gender	Male	203	52.1
	Female	187	47.9
Relation to university	Management	22	5.6
	Staff	42	10.8
	Instructor/ Professor	245	62.8
	Student	81	20.8
Age Category	17 to 25	50	12.8
	26 to 35	119	30.5
	36 to 46	152	39.0
	46 and above	69	17.7

Table 3: Reliability Analysis by Cronbach's Alpha (n=390)

Concept	Concept Alpha	Overall Alpha
Total Quality Management (TQM)	0.941	0.955
Unlimited Improvement (UI)	0.955	

A one-way ANOVA analysis was performed to study the impact of gender, relationship to university and age category on the results of the correlational

analysis performed in the research. As shown in Tables 4 and 5, gender and age had no influence on the results based on a significance level pf p<0.05.

Table 4. One-Way ANOVA Testing For Gender Impact On Analysis Results

		Sum of Squares	df	Mean Square	F	Sig.
TQM	Between Groups	3,682	1	3,682	3,950	,048
	Within Groups	361,686	388	,932		
	Total	365,367	389			
UI	Between Groups	,024	1	,024	,018	,894
	Within Groups	523,033	388	1,348		
	Total	523,057	389			

Table 5. One-Way ANOVA Testing For Age Impact On Analysis Results

		Sum of Squares	df	Mean Square	F	Sig.
TQM	Between Groups	4,655	3	1,552	1,661	,175
	Within Groups	360,712	386	,934		
	Total	365,367	389			
UI	Between Groups	6,553	3	2,184	1,632	,181
	Within Groups	516,504	386	1,338		
	Total	523,057	389			

Table 6 shows that relationship with the university had a significance levels less than 0.05 for the two concepts. However, a post-hoc analysis shows minimal differences between staff and professors in the TQM concept, and professors and management in the UI concept.

Table 6. One-Way ANOVA Testing For Relationship To University Impact On Analysis Results

		Sum of Squares	df	Mean Square	F	Sig.
TQM	Between Groups	16,268	3	5,423	5,996	,001
	Within Groups	349,099	386	,904		
	Total	365,367	389			
UI	Between Groups	14,900	3	4,967	3,773	,011
	Within Groups	508,157	386	1,316		
	Total	523,057	389			

As shown in Table 7, factor analysis is performed for the indicators of Total Quality Management (TQM), the KMO factor is 0.946, which shows the reliability of the factor analysis. All of the factor loadings are above 0.4, which indicates that all indicators are interrelated in a correct manner according to Küçük (Küçük, 2014). The total variance explained is 61.496% indicating the percentage of indicators considered in the factor analysis. Factors above 60% validate the factor analysis (Küçük, 2014). The overall mean score of Total Quality management is 2.69, showing a moderate implementation of its dimensions in the higher education institutions in Libya.

Table 7. Total Quality Management (TQM) Factor Analysis (N=390)

	Factor Loading	Eigen value	Variance Explained (%)	Cronbach's Alpha	Mean Score	KMO
Total Quality Management (TQM)		1.625	61.49	0.941	2.69	0.946
1.University top management has knowledge about Quality Management System (QMS) and its implementation	0.510				3.26	
2. University top management is well aware of the quality related concepts, new work environment and new skills in the implementation of QMS	0.620				3.05	
3. University top management allocates adequate resources on education and training of academic and administrative employee	0.713				2.60	
4. University top management discusses many quality-related issues on QMS in their management meetings	0.648				3.24	
5. University top management focuses on how to improve the performance of students and employees apart from relying on financial criteria	0.711				3.20	
6. University has well defined academic and administrative processes and performance measures as well as policies	0.718				2.98	
7. Employees from different levels are involved in developing our policies and plans	0.731				2.49	
8. University regularly audits practices according to policies and strategies	0.807				2.68	
9. University benchmarks our academic and administrative processes with other	0.705				2.83	

Table 7. Total Quality Management (TQM) Factor Analysis (N=390)

	Factor Loading	Eigen value	Variance Explained (%)	Cronbach's Alpha	Mean Score	KMO
institutions						
10. University meets the expectations of our students and employees	0.786				2.58	
11. Facilities of university (e.g. classrooms, laboratories, computers, heating systems and air conditioners) are maintained in good condition according to periodic maintenance plans	0.693				2.55	
12. University collects statistical data (e.g. error rates on student records, course attendances, employee turnover rates) and evaluates them to control and improve the processes	0.768				2.63	
13. Students' requirements are thoroughly considered in the design of curriculum	0.791				2.56	
14. The needs and suggestions from the business world are thoroughly considered in the design of curriculum and new academic program	0.739				2.44	
15. University facilities (e.g. laboratories and hardware) and resources (e.g. Finance and human resources) are considered in the development and improvement of the curriculum and programs	0.796				2.66	
16. University regularly conducts surveys on job satisfaction of the employees	0.740				2.25	
17. University follows up the career path of our graduates	0.716				1.90	

As shown in Table 8, factor analysis is performed for the indicators of Unlimited Improvement (UI). The KMO factor is 0.908, which shows the reliability of the factor analysis. All of the factor loadings are above 0.4, which indicates that all indicators are interrelated in a correct manner. The total variance explained is 76.348% indicating the percentage of indicators considered in the factor analysis. Factors above 60% validate the factor analysis (Küçük, 2016). The overall mean score of Unlimited Improvement is 2.75, showing a moderate implementation of its dimensions in the higher education institutions in Libya.

Table 8. Unlimited Improvement (UI) Factor Analysis (N=390)

		Factor Loading	Self-value	Total Variance Explained (%)	Cronbach's Alpha	Mean Score	KMO
Unlimited Improvement (UI)			6.108	76.348	0.955	2.75	0.908
1	All university management participate in training	0.723				2.62	
2	All university management participate in quality improvement	0.820				2.66	
3	All university organizational structure is involved in the overall improvement	0.845				2.78	
4	All positions are included in the improvement process	0.897				2.85	
5	All tools are used in the improvement process	0.913				2.78	
6	All processes are used for optimization	0.926				2.81	
7	All applications are included in the optimization	0.939				2.82	
8	All suppliers are included in the improvement	0.906				2.72	

Table 9 shows the regression analysis of Unlimited Improvement based on TQM dimensions, where the R square value is 0.381 and the positive relationship is found between the two concepts with a significance level of 0.000 < 0.05. Table 10 shows the regression analysis of Total Quality Management based on UI dimensions, where the R square value is 0.408, confirming the results of the first regression model. Based on these results, the research hypothesis stating

"H1: There is a statistical influence between the Total Quality Management (TQM) and Unlimited Improvement (UI) or their sub-dimensions in the higher education in Libya." is accepted.

Table 9. Unlimited Improvement regression model for TQM

Model	R Square	F	Standardized Coefficient Beta	t	Sig.
Unlimited Improvement	,381	39,327	,505	6,183	,000

a. Predictors: (Constant), SF, L, ME, PCI, V, PDRA

b. Dependent Variable: UI Mean

Table 10: Total Quality Management regression model for UI

Model	R Square	F	Standardized Coefficient Beta	t	Sig.
Total Quality Management	,408	52,938	,638	12,193	,000

a. Predictors: (Constant), SUP, MGT, EMPL, ORS, MT

b. Dependent Variable: TQM Mean

8. Result

The research showed the acceptance of the tested hypothesis based on the regression analysis performed between unlimited improvement and total quality management. The regression models indicate a positive relationship and infleunce between UI and TQM with R square values of 0.381 and 0.408, which shows a moderately influential relationship between the two concepts on both directions. The results are discussed along with literature research on the subject that confirms the findings of the research.

9. Discussion

Organizational performance is one of the key measurements for the success in any institution, corporation or business. Therefore, establishing a correlation with performance could indicate further relationships and influences. As there were no previous studies that correlated the concept of Unlimited Improvement to total quality management (TQM), it is challenging to compare the current study's results directly with any reference in the literature. Nevertheless, there are several studies that established the correlations of the studied concepts with organizational performance. The relationship between total quality management and performance has been studied in several researches. Akhtar, Zameer and Saeed (2014) studied this relationship through interviews in several sectors; healthcare, banking, communication, education and transportation, where the outcomes indicated the relationship between the two variables. Ngambi and Nkemkiafu (2015) performed an empirical study between the dimensions of TQM and performance. The correlational analysis shows medium to strong correlations between the several dimensions of TQM and the ANOVA testing showed a significance less than 0.05 of the impact of total quality management on performance. Positive relationships were found through the regression analysis for the influence of TQM on performance, with leadership commitment and quality control being the most influential dimensions. Centindere, Duran and Yetisen (2015) studied the same correlations and relationships in Turkey. Total quality management was examined through five dimensions; training, leadership, continuous improvement, internal customer and external customer. The correlational analysis showed medium to strong coefficients with business performance, while the regression analysis yielded an R square value of 0.584. All of the above studies confirm the relationship between total quality management (TQM) and performance.

Moreover, the relationship between the concept of Unlimited Improvement (UI) and performance has been established in a few studies. Ay and Nurov (2017) researched the effect of unlimited improvement on performance through a regression analysis, where the ANOVA analysis showed a significance level of 0.000. The regression analysis indicated a positive relationship with an R value of 0.322. Benshina (2018) studied the same relationship on the Libyan iron and steel sector. The correlational analysis showed a correlation coefficient of 0.77, which indicates a strong relationship. The current study adds to this research through studying the relationship between the concept of Unlimited Improvement (UI) and the concept TQM through the tested hypothesis. The established relations between each of the two concepts and performance suggest that there is a relationship between them. Therefore, the correlational analysis performed show medium to strong relationships between unlimited improvement and TQM. Moreover, the regression analysis yielded an R square value 0.408 for the effect of unlimited improvement and Total Quality Management (TQM).

10. Suggestions

Based on the results found through the case study performed in this research and the established relationships between Total Quality Management (TQM) and Unlimited Improvement (UI), the researcher provides the recommendations and suggestions to the Libyan higher education institutions to:

- Perform a systematic implementation of total quality management guidelines and dimensions shall be reviewed to enhance the overall quality. While some indicators showed a fair implementation of the TQM concept, there are several areas that need further development to reach a good level
- Unlimited improvement concept focuses on different aspects of quality, which are not fully covered in the TQM concept. Thus, its implementation ensures a comprehensive coverage for the quality aspects in the Libyan higher education institutions.
- The two concepts shall be considered in quality enhancement strategies in order to increase the efficiency of the TQM concept and decrease the time required for the development.
- Future studies should focus mainly on confirming the results of the current research through on different Libyan and international institutions.

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