



Impact of Total Quality Management and Environmental Management System on Sustainable Performance of Selected Industries in Pakistan



ABSTRACT

The concept of sustainability has gained due attention and recognition over the years, which has fundamentally broadened the scale of organizational mission in three dimensions of sustainability. To attain sustainable performance, organizations have been using various strategies, among which is Total Quality Management (TQM) that is recognized as the most famous. The ISO 14001 Environmental Management System (EMS) standard can also be beneficial to address sustainability concerns among organizations. This study identifies both TQM and ISO 14001 as important strategies to examine influence on sustainable performance including economic, social and environmental sustainability. Through a survey of 92 organizations, it was found out that high-TQM organizations were better in performance and sustainability. On the other hand, EMS standard implementation does not significantly influence economical and social sustainability but significantly influences environmental sustainability and overall sustainability performance. The study brought clarity to the matter that TQM can outperform within each sustainability dimension, and that EMS is more influential to environmental performance.

Key words: Sustainability, sustainable development, environmental management system, total quality management, ISO 14001

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INTRODUCTION

The world is threatened by various challenges due to the effects of unprecedented industrial growth and competition. Climate change is the one of the most daunting challenges in the 21st century. There are more floods and storms due to drastic climate changes and deforestation (Malaki 2013). The natural resources are becoming scarce, while demands for energy are increasing day by day. There are more challenges to the nature and life on land, air and in water due to environmental deterioration. The world is endangered because of global warming, environmental devastation, economic and social injustice, and waste of resources (Elmholt and Sondrup 2013).

Sustainability of the planet is a matter of exigency and a crucial aspect to be considered and addressed. The emphasis on adopting the sustainability principles and practices has been increased (Pojasek 2007). Sustainability is now high on the international agenda and its importance has been propagated at various forums. The United Nations (UN) has set 17 Sustainable Development Goals (SDGs) aiming for the transformation towards a sustainable world. The World Economic

Forum (WEF) provides guidelines and reporting on the estimation of country wide sustainability index. Leaders and business managers in the dynamic world are willing to adapt reformed systems that can meet the needs of today and tomorrow in response to latest imperatives and prospects. In many countries, there is a developed public opinion that organizations are responsible for more things than just creating economic value (Hubbard 2009).

The concept of 'sustainable development' attracted considerable attention since its introduction under the title 'Our Common Future' by the Brundtland Report (1987). The report attracted the world to envisage a future where the risks of environmental degradation are minimized and the people are enjoying economic stability with social equity within and between generations (Christofi et al. 2012). In 1987, the World Commission on Environment and Development (WCED), in 1987, brought forward the commonly used definition: "Sustainable Development is a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".

Elkington (1999) introduced the 3P perspective as characteristics of a sustainable organizations to attain certain performance in three 'p-areas'; Profit, People and Planet. several authors have described this concept with the notion of Triple Bottom Line (TBL) that categorizes the sustainability performance in three pillars; economic, social and environmental performances (Elkington 1999; Walker 2000).

Sustainability in the Industrialized World

The concept of sustainability in industries has gained much recognition in past few years (Linnenluecke and Griffiths 2010). Academicians and professionals both are emphasizing to adopt best practices concerning sustainability within the organizational system that should ensure social integrity and protection of environment. The emergence of sustainability concepts has fundamentally changed the outlook and perspective of organizational mission and operations (Garvare and Johansson 2010). Generally, economic progress has been measured as a key driver for success, but alongside fulfilling the social responsibility and compliance to environmental regulations drive sustainable development and growth of the organization (Zairi and Peters 2002). The organizations that realize their role for social and environmental integrity implement sustainable initiatives strategically and seek sustainable performance in operations and growth parameters. To attain long term performance, organizations have been using various strategies, models and techniques.

Total Quality Management (TQM) can be accounted as one of the most renowned and successful philosophy (Zakuan et al. 2010). The TQM is a paradigm shift towards business excellence aiming to satisfy the needs of customers and all stakeholders (Enquist et al. 2015). The word 'total' incites visioning and making improvement in all concerns; everything within the system and outside the system that come directly or indirectly in contact with organizational business and activities. Proponents have presented various TQM models. However, Business Excellence (BE) frameworks such as the Malcolm Baldrige National Quality Award (MBNQA) and the European Quality Award (EQA) are considered the best known (Arumugam et al. 2009). These frameworks can promote operational performance and corporate sustainability practices with emphasis on sustainable results (Zink 2007; Talwar 2011), while others think that these models do not comprehensively address sustainability issues (Asif et al. 2011). However, these TQM based frameworks are in consistent with both the instrumental and rightful ethical sides of corporate

sustainability (McAdam and Leonard 2003; Talwar 2011).

Sustainability practices can also be adopted by fully implementing either ISO or other national or regional standards. Among various standards, well known standards are ISO 9001 Quality Management System (QMS), ISO 14001 Environmental Management System (EMS), ISO 26000 Social Responsibility, OHSAS 18001 and ISO 9004 Guidelines for managing sustained success for an organization. Authors have linked three major international management systems standards ISO 9001 (QMS), ISO 14001 (EMS), and OHSAS 18001 with the three pillars of sustainability practices. Qi et al. (2013) viewed ISO 9001 as an important foundation for a sustainable economic performance of the firms, while ISO 14001 improves firm's environmental management performance and OHSAS 18001 assists to generate and maintain a safe and healthy work environment for employees. It is implied that TQM and management system standards synergize sustainability practices and can potentially outperform within three dimensions. However, it can be determined through empirical research whether TQM alone is advantageous to economic performance only or substantially impacts all sustainability dimensions. It can also be determined whether the three major standards impact corporate sustainability or specific standard influence the respective dimension only, or can all or few of these standards be united with TQM to gain sustainable performance. TQM frameworks are more holistic than ISO 9001 quality management system (Elmholt and Sondrup 2013). Some authors have argued that TQM offers a much more complete quality management system with clear implications for benefits, whereas ISO 9000 reflects a mere quality assurance system (Martinez-Costa et al. 2009) and is a subset of TQM program (Vaxevanidis et al. 2006). In recent study by Ferreira and Gerolamo (2016), results have shown a weak relationship between corporate sustainability and the ISO 9001 and OHSAS 18001 standards; while a moderate relationship with ISO 14001 is observed.

Therefore, the extended scope is constricted to TQM and EMS only in this current study, as to bring more clarity to the issue how importantly and significantly these strategies influence sustainable performance and its three dimensions.

Total Quality Management (TQM)

Early in 1980s, the USA launched TQM practices to compete with quality movement of Japan. After the

1990s, the European market also realized the focus on quality and adopted TQM as a driving element. However, the 'road to TQM' was not easy as expected because of the unclear understanding of TQM elements and its implementation approach. The TQM philosophy was quite abstract in research literature. However the clarity then unfolded and the vagueness vanished through the development and introduction of quality award models. These quality award models have been worldwide accepted as TQM or Business Excellence (BE) models. These TQM models mainly comprise elements of leadership, strategic planning, process management, customer and workforce focus practices, knowledge and information management and business results as key dimensions (Prajogo and Sohal 2003; Arumugam et al. 2009).

The Synergy between TQM and Sustainability

Considerable efforts has been publicized on the importance and significance of sustainable development and its perspective has been determined with quality approach and TQM. Reed et al. (2000) pointed that TQM brings advantage and its practices raise sustainability. Breja et al. (2011) advocated that sustainability is linked with quality strategy and the positive effect of TQM. Isaksson (2006) asserted that TQM must have synergies in pursuit of sustainable performance.

Similarly, various other authors and researchers have discussed the need and proposed different options to synergize TQM and sustainability practices. Talwar (2011) recommended to integrate more criteria related to sustainability into contemporary TQM/BE models to support long term growth and sustainability. Edgeman (2000) and McDonald et al. (2002) suggested that TQM/BE models need to be further modified for integrating the sustainability strategy for a right balance based on the Triple Bottom Line. Asif et al. (2011) suggested that sustainability criteria to be added into the MBNQA and EQA Excellence model. Pojasek and Hollist (2011) suggested a hybrid model gathering the best from renowned TQM/BE models coupled with an EQA CSR module. Edgeman and Eskildsen (2012) proposed comprehensive framework based on different principles of sustainability and BE criteria coupled with the assessment guidelines and schemes to follow. Elmholt and Sondrup (2013) suggested the other way of adding the BE criteria into a sustainability framework.

The reasons to couple TQM model and sustainability approaches can be numerous. First reason is intuitive; both quality and sustainability carry positive meanings. The goals related to the achievement of best quality and long-

term sustainability are the need of the time and appeal to everybody. Second, both concepts focus on stakeholder value rather on shareholder value. Sustainable development supplements to create value not only for the present stakeholders, but also for the generations of stakeholders yet to come (Latham 2012). Third, both concepts demonstrate mechanism to create and assess 'impacts' and 'results' vital to business activities. The organizational performance is measured in non-financial areas as well. However the extent, focus and scope carry dissimilarities between each model to certain degrees. On the basis of similarities between TQM and BE models, Zink (2007) proposed to use these models united with the concept of corporate sustainability.

ISO 14001 - (EMS) Standard

Authors related the impact of environmental characteristic with TQM and performance (Fuentes-Fuentes et al. 2004) and suggested to progress sustainable development by using ISO 14001 standard (MacDonald 2005). The ISO 14000 is a family of standards that cover environmental management concerns where ISO 14001 represents the environmental management system (EMS). The ISO 14001 is well recognized EMS framework and has been adopted as a national standard by a large number of ISO member countries.

The Synergy between EMS and Sustainability

The EMS implementation leads firm's improvement in environmental sustainability in particular, and sustainability practices, in general. The EMS implementation not only improves organizational environmental performance (Potoski and Prakash 2005), but can allow firms to achieve higher organizational efficiency and effectiveness by reducing costs and environmental impacts. The EMS has been linked to improve corporate image, gain access to new markets, and improve the firm's operational efficiencies and economic gains (Russo and Fouts 1997). Its certification can result in competitive advantage and higher financial returns (Ferreira and Gerolamo 2016). Maletic et al. (2015) have investigated and suggested that through reciprocal causal mechanism organizations can shift to more sustainable patterns using the EMS that links the environmental performance and economic performance.

The literature review suggested that both TQM and EMS synergize sustainability practices. As discussed, authors asserted to use these strategies for organizational sustainable performance. However, some empirical studies on the impact of both TQM and EMS on sustainability

performance, including all its three dimensions, are not present. The objective of this study is to present a discourse on the contemporary synergies for sustainability practices based on TQM and EMS strategies and to examine interrelated impacts in the context of a developing country. No previous research on the subject study was done in Pakistan.

MATERIALS AND METHODS

Pakistan is a developing country having progressive economic conditions due to industrial reforms and growing number of industries and business opportunities. In recent time, more and more organizations are getting certifications to ISO 9001 and ISO 14001 standards for the attainment of foreign business and to comply with the requirements of internal regulating bodies. Moreover awareness and implementation of environmental protection laws and sustainability measures is getting spread due to social responsiveness, standardization and quality programs. However it is still to ameliorate the situation across organizations of each kind. Hence this study rests its purpose to the establishment of premise that implementation of quality and environmental activities in the industries can synergize and foster sustainability performance. The case is structured as a scientific study with research objectives to explore the association through literature review and empirical examination, and then to comprehend the findings for the practical need.

The study proceeds through the development of research questions, literature review, questionnaire design, data collection through research survey and performance of data analysis. Mainly quantitative method is applied for statistical analysis and results, while the synergies among the concepts were determined through literature study.

During the research survey industries of different sectors, sizes, nature of operations and locations were contacted for participation. Organizations selected for survey were searched through business library of the Federation of Pakistan Chambers of Commerce and Industry (FPCCI) and Small and Medium Enterprises Development Authority (SMEDA) registered with Securities and Exchange Commission of Pakistan (SECP).

Research Questions

Following research questions were established for this study:

- RQ1. Does TQM has synergy with sustainability practices?
- RQ2. Does EMS has synergy with sustainability practices?
- RQ3. Does TQM influence organizational sustainable performance, and its three dimensions?
- RQ4. Does EMS influence organizational sustainable performance, and its three dimensions?

Research Design

The first two questions (RQ1 and RQ2) were related to qualitative part of the research study and have been discussed and answered in the literature of this paper. It has been imparted that sustainability is an emergent vital concept that can be synergized with TQM and EMS models.

The last two questions (RQ3 and RQ4) were identified as quantitative in nature and were explored through primary data. The research was carried out through survey with a questionnaire design. The questionnaire had three main sections; first section was pertaining to questions related to information on company profile. For example, its size, type, location, EMS certification status. The second section was related to the opinion of the respondents on the extent of six TQM practices (leadership, strategic planning, customer & market focus, workforce focus, process management, information management) being followed in the company. These six TQM dimensions, including corresponding question items, were adopted from previous works of *Prajogo and Sohal (2003)* and *Arumugam et al. (2009)*. The third section was related to the respondents' perception on the level of company's sustainable performance in terms of economic sustainability, social sustainability and environmental sustainability. These three sustainability dimensions, including corresponding question items, were adopted from work of *Muhamad et al. (2014)*. The responses to all questions in sections two and three were obtained using a five-point Likert scale ranging from '1' to '5'. Where '5' corresponded to the highest level while '1' corresponded to the lowest level of implemented practices or perception about the performance elements.

Research Survey

A survey was carried out through random sampling of 320 organizations in different cities in Pakistan. The organizations were different in sector (government, public and private), size (large, medium, small), industry type (automotive, textile etc.), TQM implementation level (high, moderate, low) and certification status of ISO

Table 1. Percentage of responses against type of contextual factors.

Type	%	Type	%	Type	%
Industry					
Aerospace	7.6	Process	8.7	Oil, Gas & Power	5.4
Automotive	6.5	Pharmaceutical	9.8	Sports goods	7.6
Manufacturing	19.6	Chemical	6.5	Cutlery	8.7
Textile	8.7	Food	8.7	Other	2.2
Sector					
Government	19.6	Public	14.1	Private	66.3
Size					
Large	44.6	Medium	31.5	Small	23.9
TQM Implementation Level					
High TQM (H)	27.2	Moderate TQM (M)	34.8	Low TQM (L)	38
ISO 14001 Certification					
Yes	32.6	No	67.4		

14001 EMS (**Table 1**). A set of questionnaire supplemented with a cover letter and self-addressed envelope was mailed to the concerned management personnel of different organizations. The promptness on the response was also alerted and requested through emails and telephone calls. After discarding 12 incomplete survey forms and eight for extreme outliers, the survey yielded 92 utilizable responses, or a 28.8% effective response rate. Such response rate is acceptable as it is greater than the suggested cut off of 20% (*Ojha and Gokhale 2009*).

TQM Levels

This study did not take the formal distinction of organizations as a TQM or non-TQM organization based on discrete response on question whether the organization has implemented TQM or not. TQM achievement is progressive, and a TQM company may not be different from non-TQM company (*Ahire et al. 1996*). Since TQM models contain general best practices, the extent and effectiveness of these practices vary organizations to organizations. An excellent company may have implemented more TQM practices with effective results, while others have initiated the process or could be moderate. The organizations have been categorized in three level of TQM implementation; “High” or H-TQM organizations, “Moderate” or M-TQM organizations and “Low” or L-TQM organizations.

“High” or H-TQM organizations were those respondent organizations for which three or more dimensions (out of six TQM dimensions) ranked high because of the more number of responses marked with higher values against each item than the median value of the items in each of those dimensions. Similarly, “Low” or L-TQM organizations were those that have three or more dimensions ranked low because of the more number of response items marked with lower values than the

corresponding median value of the items in the dimensions. “Moderate” or M-TQM organizations are those with equal number of dimensions fell in specified ranks. The percentages of organizations that have been determined and categorized as “High”, “Moderate” or “Low” TQM organizations (**Table 1**).

Reliability and Validity

Reliability is referred to as the ability of an instrument to provide consistent results in repeated uses (*Rahman 2001*). Cronbach’s alpha statistic is used to test reliability of questionnaire across various items (*Cortina 1993*). The alpha value ranges from 0 to 1 where higher value depicts higher level of internal consistency (*Cronbach 1951*). Value of 0.7 is a common benchmark and can be used to imply that the items measure the same construct (*Nunnally 1988*). All values achieved greater than 0.7, thus ensures the consistency of items. The content validity of the questionnaire was assured through peer review and review feedback from the consultants and professionals of the field.

RESULTS AND DISCUSSION

Descriptive Statistics

In this study, TQM has six factors while Sustainability Performance (SP) has three factors. Each factor was composed of multiple questions or items. The descriptive statistical results included number of items, mean, standard deviation (SD) and Chronbach’s alpha values (**Table 2**).

The mean score was highest for ‘leadership’ which was ‘4.01’, while it had the lowest score of ‘3.66’ for the ‘workforce focus’ factor (**Table 2**). The standard deviation values for each factor were less than ‘1’ which

is in acceptable range. Similarly, alpha value is achieved greater than benchmark value (0.7) for each factor, so none of the items of any factor was eliminated from the study.

Analysis

The data formed a non-normal distribution so non-parametric tests were applied for further analysis. It was determined that Kruskal-Wallis was more suitable to examine the significance of the difference of medians of TQM results and SP between ISO 14001 certified and

non-certified organizations, and to examine the significance of the difference of medians of TQM results and SP between High, Moderate and Low TQM organizations. The Kruskal-Wallis test is a nonparametric alternative to a one-way analysis of variance (ANOVA). The test does not require the data to be normal, but instead uses the rank of the data values rather than the actual data values for the analysis (**Table 3**).

Main Effects Plot

The graphical presentation of SP values with regard to TQM levels and ISO 14001 EMS certification status was depicted through main effects plot (**Figure 1**). A horizontal line was drawn at the grand mean of SP. The effects were the differences between the means and the reference line. The plot takes grand mean value of SP as reference line against which mean data points of variables have been evaluated.

DISCUSSION

The significance has been determined at alpha value of 0.05. It can be seen that ISO 14001 EMS certification is insignificant with regard to TQM results (p-value 0.107) and does not associate stronger influence in achieving TQM results. With regard to SP, ISO 14001 EMS certification was found significant though it did not show significant p-value for economical sustainability (p-value 0.083) and social sustainability (p-value 0.093). However ISO 14001 EMS certification was significant in case of

Table 2. Descriptive statistics.

Factors	Statistics			
	No. of Items	Mean	SD	Cronbach's alpha
Total Quality Management (TQM)				
Leadership	7	4.01	0.61	0.77
Strategic Planning	6	3.93	0.67	0.75
Customer Focus	7	3.96	0.81	0.86
Workforce Focus	7	3.66	0.76	0.79
Process Management	6	3.86	0.74	0.78
Information Management	5	3.88	0.82	0.81
Sustainability Performance (SP)				
Economical Sustainability	5	3.97	0.75	0.78
Social Sustainability	6	3.86	0.78	0.82
Environmental Sustainability	7	3.83	0.87	0.83

Table 3. Kruskal-Wallis test results: Impact of ISO 14001 certification and TQM levels on TQM and sustainability performance.

ISO 14001 Certification ----> TQM Results ---> Sustainability Performance					
	Median		p-value	Result	
	with-out ISO 14001 certification	with ISO 14001 certification			
TQM	3.971	4.012	0.107	Insignificant	
Economical Sustainability	3.933	4.133	0.083	Insignificant	
Social Sustainability	3.975	4.095	0.093	Insignificant	
Environmental Sustainability	3.875	4.125	0.021*	significant	
Overall SP	3.866	4.193	0.009*	significant	
TQM Level -----> TQM Results -----> Sustainability Performance					
	Median			p-value	Result
	H-TQM	M-TQM	L-TQM		
TQM	4.428	4.022	3.411	0.000*	highly significant
Economical Sustainability	4.667	4.067	3.467	0.000*	highly significant
Social Sustainability	4.020	4.040	3.760	0.029*	significant
Environmental Sustainability	4.250	4.000	3.875	0.036*	significant
Overall SP	4.198	4.000	3.659	0.000*	highly significant

* significant at $p < 0.05$

environmental sustainability (p-value 0.021) and overall SP (p-value 0.009). These results were consistent with the findings of *Ferreira and Gerolamo (2016)* pertaining to the relationship of ISO 14001 with sustainability dimensions.

The TQM levels (High, Moderate, Low) are found significant (p-value 0.000) with regard to TQM results and overall SP, which means that H-TQM organizations perform better in TQM results and SP in part to M-TQM or L-TQM organizations as depicted from their median values. There was significant difference of medians between H-TQM, M-TQM and L-TQM organizations for economical sustainability (p-value 0.000), social sustainability (p-value 0.029) and environmental sustainability (p-value 0.036), thus, indicating that higher performance in TQM significantly influences and improves sustainability performance, including in all its three dimensions, of the firms. These results were found consistent with previous work on the associated relationship between TQM and sustainability performance (*Tasleem et al. 2015*).

The graphical presentation of results through main effects plot was more evident. It can be observed that organizations with ISO 14001 EMS certification status have higher mean value than reference grand mean value of SP, while non-certified ISO 14001 have lower than the grand mean value of SP (**Figure 1**). Similarly, it can be observed that the mean value of High-TQM organizations was much higher than grand mean value of SP, mean value of Medium-TQM organizations and mean value of Low-TQM organizations (**Figure 1**). There was noticeable and significant change in mean values of SP due to ISO 14001 certification status and TQM levels (**Figure 1**).

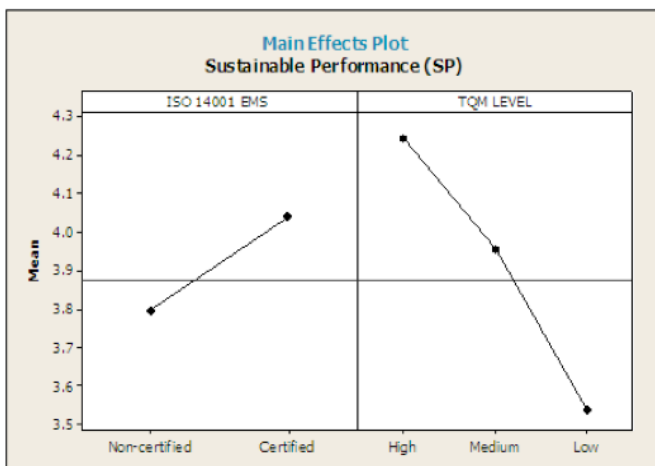


Figure 1. Main effects plot illustrating the magnitude of main effects of ISO 14001 EMS certification status and TQM level implementation in reference to grand mean of SP.

CONCLUSIONS AND RECOMMENDATIONS

From literature, three dimensions of sustainability i.e. economic, social and environmental were identified to be equally addressed in pursuit of sustainable performance (*Elkington 1999*). It has been argued that TQM and business excellence models can be used to implement sustainability practices but it is imperative to modify existing TQM models in order to incorporate sustainability principles in totality (*Talwar 2011*). Various standards can also be used by the organizations to address sustainability concerns. Among ISO 14001 EMS standard is internationally best known to address environmental practices and measures. Previously authors have related the impact of environmental characteristic with TQM and performance and have suggested to progress sustainable development by using ISO 14001 standard.

This study overviewed the sustainability concept to describe its importance and need to implement in perspective to TQM and ISO 14001 EMS. The study carried out and revealed that TQM significantly influenced within each dimension of sustainability performance. The impact of TQM is highly significant in case of economic sustainability performance while it is significant for social and environmental performances. High-TQM organizations perform far better than Low-TQM and Moderate-TQM organizations in achieving TQM results and sustainable performance. It was also revealed that ISO 14001 EMS certification improves environmental sustainability and overall sustainable performance, but does not significantly influence economic and social sustainability. These results were consistent with the findings of previous works of *Qi et al. (2013)*; *Tasleem et al. (2015)* and *Ferreira and Gerolamo (2016)*. It can be asserted that TQM substantially impacts sustainability performance, however, ISO 14001 EMS can also be used as a helping system in managing firm's environmental footprints and performance.

This study can be proved a significant contribution to the field of TQM, EMS and sustainability. It is first empirical investigation and a kind of unique work with the prescribed scope of a developing country. Results of this study can be used by work managers and researchers for future work in this field.

Future research may be carried out with more data from different organizations of other countries. There is also need to identify necessary elements or requirements pertaining to sustainability practices that can be added in the existing TQM/BE models.

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