Integrated Quality Environmental Management Practices and its Impact on Operational and Environmental Performances in Food Processing SMEs

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Abstract

Sustainability issues and environmental pollution influenced organizations to reduce their environmental burden and more focus on sustainable production, therefore, sustainability is becoming hot debating topic for industries and its stakeholders. Previous studies revealed that Integrated Quality Environment Management (IQEM) provides cost savings, avoid duplication of tasks, improves corporate image and performance, and provide higher customer satisfaction. Food processing industry is growing fast, as the demand for processed foods is increasing from lifestyle and health conscious customers. Besides the advantages of processed food, this industry consumes abundant resources of water, energy, raw material, and considered as one of the sources which pollutes the environment through solid waste and waste water. Based on the European Foundation for Quality Management (EFQM), this study aims to test the impact of the model on the operational and environmental performance of food processing SMEs in Pakistan. A structured questionnaire was employed for data collection from the respondents selected using snowball sampling technique. IBM SPSS version-23 and Smart- PLS 3 were used for data analysis. It is believed that, this study will help food manufacturers of Pakistan in improving their operational and environmental performance by practicing the elements of EFQM model.

Keywords

Integrated Quality Environmental Management, Food Processing, SMEs, Performance, Pakistan

1. Introduction

Inefficient production practices posturing negative impact on environment, and being cause of resource depletion. The industrial sector is considered as one of the major sources, that pollutes the environment through solid waste, water wastages, air pollution and noise pollution. Therefore, researchers and practitioners are more focusing on this sector, to make it more sustainable (Alayón et al. 2017). Previous studies revealed that, sustainable manufacturing practices such as recycling, remanufacturing, and environmental design have an impact on company performance and helps towards organizational sustainability.

Moreover, to fulfill the social, environmental and financial responsibilities, triple bottom line concepts people, planet and profit were introduced. Manufacturers need to be more aware about these concepts and get maximum benefits. In addition, quality and environmental management systems were acknowledged as important tools to achieve the sustainable production principles into practice. Quality management focuses on process improvement, reduction of wastages and continuous improvement, whereas environmental management more focuses in reduction of pollution, air emissions and solid and hazardous waste (Alayón et al. 2017).

Small and Medium-Sized Enterprises (SMEs) are considered as a key source for economic development of any country. Similarly in Pakistan, SMEs are considered as back bone of the country, and contributing significant share in socio economic development. Food and beverage industry of the country is growing rapidly and have a great export potential (SMEDA 2010). Highlighting the issues of SMEs, Khan and Khalique (2014) stated that SMEs in Pakistan are at their initial stages and behind in competitive environment, due to lack of infrastructure, lack of education and training, financial support from government and unavailability of quality and environmental certification. These issues are hindering the performance of SMEs. Therefore, this sector need to be more focused.

Several studies conducted on TQM practices in different sectors such as Kureshi et al. (2009) in the manufacturing sector, Kureshi et al. (2010) in service sector, and the study of Imran et al. (2018) in manufacturing sector. There is a dearth of studies in the food processing sector in Pakistan. Therefore, present study is focused in food sector and examines the impact of EFQM model on operational and environmental performances on food processing SMEs. It is believed that integrated management system have an impact on operational and environmental performance.

2. Literature Review

Being an agrarian country, the food and allied products industry is considered the largest industry. According to SMEDA (2010), 16% of the total manpower of manufacturing industry is employed in food sector. Pakistan’s food processing industry is growing rapidly as the demand for processed food is increasing. This industry mainly produces dairy products, bakery products, beverages, cereal products, fruit and vegetable products, and edible oils. Food sector needs more attention, as the demand for quality food is increasing globally and being more competitive.

2.1 Integrated Quality Environmental Management (IQEM)

Competitive environment and sustainability issues brought companies in challenging position. Therefore, management systems and its important standards have become a key part of the organization’s lifeline, and considered as a prerequisite for survival in the twenty-first century (Zutshi and Sohal 2005). An Integrated Management System (IMS) is a combination of two or more systems that works together in a single efficient system (Nunhes et al. 2016). Moreover, IMS helps in cost reductions, easier compliance of legislations, improves external image of the company, avoid the duplication of tasks, and improves communication between all organizational levels (Santos et al. 2011). The integration of QM and EM has become an important topic for researchers and practitioners. By integrating QM and EM, a single integrated quality and environmental management (IQEM) system has found effective for the quality and environmental concerns (Molina-Azorín et al. 2009).

IQEM system can be evaluated using the outcome criteria of the European Foundation of Quality Management (EFQM) framework. The EFQM framework can be used to develop an integrated management system (Tarí and Molina-Azorín 2010). The EFQM model is composed of five elements namely, leadership, people, strategy, partnership and resources, processes, products and services. In addition, author suggested that it can be used as a measurement system that generates information to support learning, and consequently improves the organizational performance (Tarí and Molina-Azorín 2010). The present study took EFQM framework with its five elements. Table 1 shows the EFQM core elements, related elements in previous literature, and researcher’s element.

Table 1: Core Elements of EFQM Model

Elements of EFQM Model	**Some Related Constructs**	**Related Elements of Researcher Framework**
Leadership	Management leadership (Yusof and Aspinwall 2000) management commitment and support (Lakhal et al. 2006); Leadership (Talib et al. 2014), Leadership (Ismyrlis et al. 2015)	Leadership

People	Employee relations (Saraph et al. 1989) Human resource development (Yusof and Aspinwall 2000), Human resources management (Talib et al. 2014), People-workforce management (Ismyrlis et al. 2015), Involvement of people (Sumaedi and Yarmen. 2015)	Employee management
Strategy	Corporate planning (Talib et al. 2014), Strategy (Ismyrlis et al. 2015), Continuous improvement/quality assurance (Kharub and Sharma 2016), Strategic planning and the role of the quality department (Aquilani et al. 2017)	Strategic planning
Processes, products and services	Process management (Saraph et al. 1989), Process and data quality management (Psomas and Fotopoulos 2010), process management (Talib et al. 2014), Process management (Kharub and Sharma 2016) Process management (Aquilani et al. 2017)	Processes management
Partnership and resources	Supplier focus (Talib et al. 2014), Supplier quality management (Ismyrlis et al. 2015), Supplier relations (Sumaedi and Yarman 2015), Supplier management (Kharub and Sharma 2016)	Supplier management

Table 1 shows the elements of the EFQM model and author's related element such as leadership (LS), employee management (EM), strategic planning (SP), process management (PM) and supplier management (SM), based on EFQM framework these elements are considered most important. Therefore, this study took these elements, and their impact on the operational and environmental performance in food processing SMEs will be examined. Moreover, EFQM is more applicable in the evaluation of the firm function. Prominent quality researchers, such as Deming, Crosby, and Juran, support a positive association between quality implementation and organizational performance (Jafari 2013; Shafiq et al. 2017).

Hence the study proposes the following hypothesis:

H_1: There is a relationship between IQEM and operational performance in food processing SMEs of Pakistan.
H_2: There is a relationship between IQEM and environmental performance in food processing SMEs of Pakistan.
Moreover, Figure 1 presents the framework of the study.

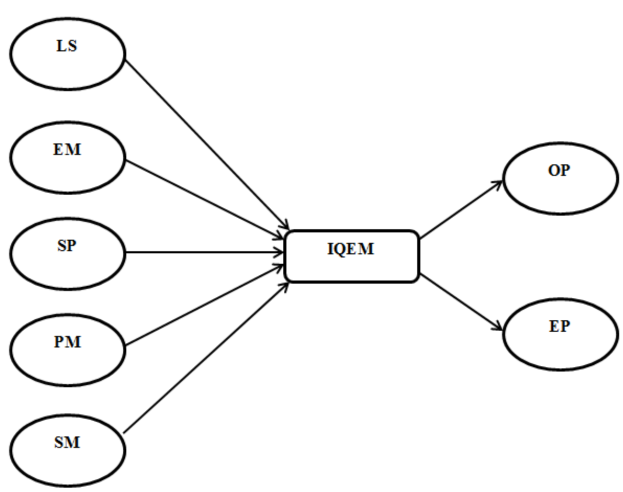

Fig 1: Study framework

The primary goal of the present research is to examine the effect of the interaction between IQEM and the operational and environmental performances in food processing SMEs of Pakistan. Therefore, underpinning resource-based view (RBV) supports the present study, as it provides competitive advantage (Akio 2005; El Shenawy et al. 2007; Imran et al. 2018).

3. Methodology

Primary data from 288 foods processing SMEs were collected through snowball sampling technique. The questionnaire mainly derived from empirical studies related to quality and environmental management. Initial lists were acquired from Chamber of Commerce and Industries (CCI), and Small and Medium Enterprise Development Authority (SMEDA). "G*Power" calculator was used to determine the sample size as consistent in the PLS literature (Muhammad et al. 2017; Tehseen et al. 2017). IBM SPSS software version -23 was used to check the reliability of the instrument, and also for the demographics of respondents and SMEs. Amongst the 288 SMEs, 137 were involved in food processing, 77 were involved in beverages processing, and 74 SMEs were manufacturing both food and beverages products. Amongst the 288 respondents, 102 were from the quality department, 27 from the engineering department, 83 from the production unit, and 76 were the owners/managers, out of 288 respondents, 89 having 1-5 years' experience, 80 had 6-10 years' experience, 67 had 11-20 years and 52 had more than 20 years' experience in SMEs.

3.1. Assessment of Measurement Model

Partial Least Square-Structure Equation Modeling (PLS-SEM) was used to evaluate the measurement and structural model. In first step, reflective model was evaluated for convergent validity through factor loadings, composite reliability (CR), and average variance extracted (AVE) as recommended by Hair et al. (2017). The value of 0.6 and above is suggested for factor loadings (Chin 1998). A value of 0.70 and above for composite reliability and, value of 0.5 and above for AVE are recommended by Hair et al. (2017). All the variables involved in this study fulfilled the desired criteria as shown in Table 2.

Table 2: Measurement Model (First Order, Reflective)

Constructs	**Items**	**Loadings**	**Alpha**	**CR**	**AVE**
Employee Management	EM1	0.721	0.814	0.866	0.519
	EM2	0.778			
	EM3	0.722			
	EM4	0.704			
	EM5	0.712			
	EM6	0.681			
Environmental Performance	EP1	0.754	0.871	0.898	0.526
	EP2	0.742			
	EP3	0.642			
	EP4	0.728			
	EP5	0.728			
	EP6	0.752			
	EP7	0.736			
	EP8	0.710			
Leadership	LS1	0.685	0.801	0.858	0.502
	LS2	0.740			
	LS3	0.738			

	LS4	0.720			
	LS5	0.691			
	LS6	0.674			
Operational Performance	OP1	0.745	0.816	0.867	0.521
	OP2	0.715			
	OP3	0.712			
	OP4	0.691			
	OP5	0.716			
	OP6	0.749			
Process Management	PM1	0.742	0.771	0.845	0.522
	PM2	0.709			
	PM3	0.719			
	PM4	0.699			
	PM6	0.741			
Supplier Management	SM1	0.669	0.762	0.839	0.511
	SM2	0.727			
	SM3	0.722			
	SM4	0.708			
	SM5	0.745			
Strategic Planning	SP1	0.711	0.803	0.859	0.504
	SP2	0.730			
	SP3	0.699			
	SP4	0.728			
	SP6	0.748			
	SP7	0.640			

Discriminant validity was assessed by using Fornell-Larcker criterion (Fornell and Larcker 1981). In Fornell-Larcker criterion the square root of AVE of each of the latent variables should be greater than its correlation with other latent variable. By using this approach, it was found that square root of AVE of each of the latent variables was greater than its correlation as shown in Table 3.

Table 3: Fornell- larker criterion

	EM	**EP**	**LS**	**OP**	**PM**	**SM**	**SP**
EM	**0.720**						
EP	0.614	**0.725**					
LS	0.566	0.691	**0.709**				
OP	0.626	0.713	0.678	**0.722**			
PM	0.567	0.569	0.598	0.624	**0.722**		
SM	0.500	0.556	0.539	0.585	0.516	**0.715**	
SP	0.629	0.654	0.626	0.684	0.651	0.552	**0.710**

Note: Bolded items are square root of the AVE

The second and recent approach called Heterotrait-Monotrait ratio (HTMT), introduced by (Henseler et al. 2015). The HTMT shows the estimation of the true correlation between two latent variables. A threshold value of 0.85 has been suggested for HTMT; above 0.85 shows a lack of discriminant validity (Henseler et al. 2015). The results in Table 4, shows the values of HTMT are below the threshold.

Table 4: Heterotrait-Monotrait ratio (HTMT)

	EM	EP	LS	OP	PM	SM	SP
EM							
EP	0.725						
LS	0.697	0.827					
OP	0.759	0.847	0.832				
PM	0.713	0.690	0.754	0.784			
SM	0.625	0.674	0.678	0.729	0.657		
SP	0.773	0.780	0.775	0.841	0.826	0.694	

Moreover, Figure 1 shows the factor loadings, and path coefficients, that have obtained from PLS-Algorithm.

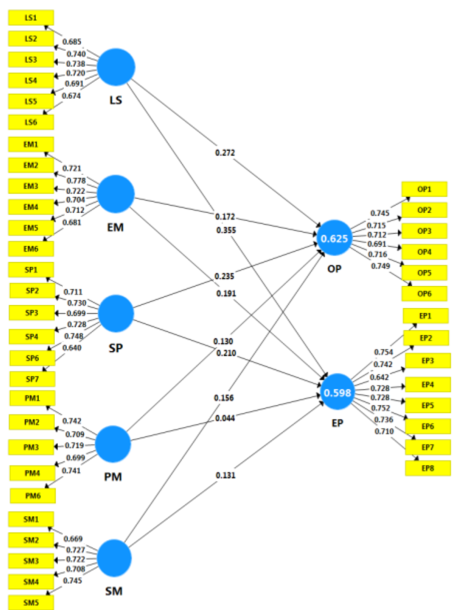

Fig 2: Algorithm for Reflective Model

3.2. Assessment of Second Order Construct (IQEM)

Since IQEM is second order formative construct, therefore its measurement should be given a due consideration. The two stage approach was used to calculate the latent score of formative construct IQEM (Ogbeibu et al. 2018). At first stage all the dimensions (LS, EM, SP, PM, SM), were loaded on IQEM. In second stage, we run the PLS algorithm to retrieve the latent score of all dimensions. The latent score represented each dimension of the IQEM in the structural model. Furthermore, we assessed the model for collinearity and significance of formative dimensions.

The high correlation between formative items indicates collinearity. The collinearity between the formative dimensions and the construct was examined by the Variance Inflation Factor (VIF). The VIF value of less than 5 is a threshold, as suggested by Hair et al. (2017). Table 5 shows the value of VIF of all the predictor constructs. The results shows collinearity was not an issue in this study.

Table 5: Variance Inflation Factor (VIF)

Formative constructs of IQEM	VIF Values
EM	1.900
LS	2.011
PM	2.053
SM	1.657
SP	2.369

Significance of formative dimensions can be evaluated through bootstrapping procedure available in Smart-PLS. Bootstrapping with 5000 resamples were used to assess the significance of dimensions with formative construct, as suggested by Hair et al. (2017). The results from bootstrapping procedure presented in Table 6, which shows that all dimensions of the IQEM having significant t-values. Therefore, all of the dimensions were retained.

Table 6: Testing of Significance of Dimensions

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
LS -> IQEM	0.262	0.262	0.016	16.050	0.000	Supported
EM -> IQEM	0.267	0.266	0.019	14.298	0.000	Supported
SP -> IQEM	0.275	0.276	0.016	16.743	0.000	Supported
PM -> IQEM	0.224	0.224	0.014	16.095	0.000	Supported
SM -> IQEM	0.197	0.197	0.019	10.749	0.000	Supported

Note: Critical t-values 2.57(Significance 1%)

Moreover, figure 3 shows the significance of relationship from the output of bootstrapping procedure.

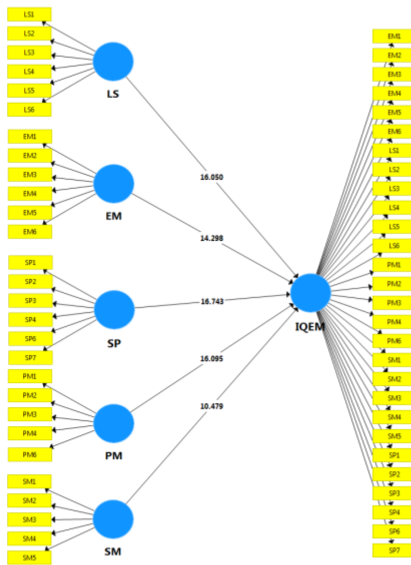

Figure 3: Evaluation of Significance of the Dimensions

3.3. Assessment of the Structural Model

According to Hair et al. (2017), the most commonly used measure to evaluate the structural model is the coefficient of determination R^2. The values 0.75, 0.50, and 0.25 for endogenous latent variables are substantial, moderate and weak. The results explained 62% variance on operational performance and 57% variance on of the environmental performance. That shows substantial and moderate R^2 for the model. Moreover, to obtain the t-values, p-values, and demonstrate the path coefficients, bootstrapping with 5000 replications was employed. Table 7 and Figure 4 shows the results from PLS output for structural model.

Table 7: Summary of Structural Model

Hypothesis	**Path**	**Path coefficient**	**Standard Error**	**t-values**	**p-values**	R^2	**Decision**
H_1	IQEM -> OP	0.787	0.032	24.540	0.000	0.62	Supported
H_2	IQEM -> EP	0.761	0.039	19.540	0.000	0.57	Supported

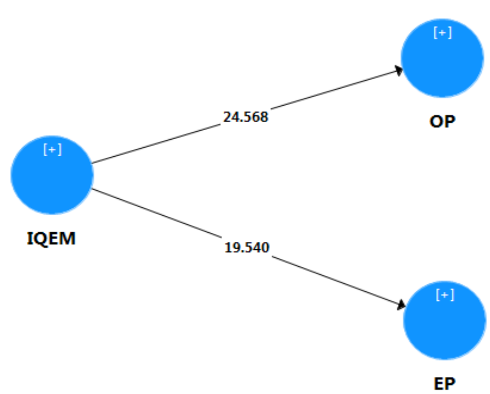

Figure 4: Bootstrapping Results

4. Conclusion and Discussion

The results of the study have shown that IQEM model elements leadership (LS), employee management (EM), strategic planning (SP), process management (PM) and supplier management (SM), have a positive and strong relationship with operational performance (β = 0.784; t-value= 24.54; p-values=0.000), and environmental performance (β = 0.76; t-value= 19.54; p-values=0.000). Thus, H_1 and H_2 are supported. These results are consistent with previous studies such as Imran et al. (2018) in manufacturing SMEs, Shafiq et al. (2017) in textile industry, and Abeykoon and Alwis (2015) export performance. Moreover, TQM has the ability to maintain all business functions according to target customers, which is the key to achieve sustainable competitive advantage (El Shenawy et al. 2007). This study has further confirmed and validated the research conclusion of statistically significant relationship between IQEM, and operational and environmental performance of food processing SMEs in Pakistan. In general, the result provides further support for the assertion of the RBV, and theory confirming the positive influence. Hence, leadership, employee management, strategic planning, process management and supplier management found to be the critical factors, and had an impact on firm's overall performance. By practicing these factors food players can get a competitive advantage and improve their SMEs operational and environmental performance and expand their trade with rest of the world and get maximum benefits.

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