Integrated quality environmental management implementation in food processing SMEs

A case study of a developing country

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Abstract

Purpose – The purpose of this paper is to identify the critical success factors (CSFs) of integrated quality environmental management (IQEM) and analyze their impact on operational performance (OP) and environmental performance (EP) in food processing Small and medium-sized enterprises (SMEs) in Pakistan.
Design/methodology/approach – The study is based on collecting data using a survey questionnaire through snowball sampling technique. A total of 302 food processing SMEs operating in Punjab, Pakistan, responded to the survey. SPSS version-23 and SmartPLS-3 were used for data analysis.
Findings – The literature review identified leadership (LS), employee management (EM), strategic planning (SP), information management (IM), process management (PM), supplier management (SM) and customer focus (CF) as CSFs of IQEM. The results of this study found a significant relationship of all identified CSFs with operational performance in food processing SMEs whereas EM, IM, PM and SM were insignificant with the EP in the food processing SMEs.
Research limitations/implications – Although this study has collected data from one province, the Punjab province, it still relevant in identifying the CSFs for IQEM implementation within food processing SMEs to improve performance.
Originality/value – Despite the wide spread of integrated systems practices in the developed countries, little attention has been placed to implement and assess the IQEM initiatives by organizations in the developing countries. Thus, this study identified CSFs of IQEM based on empirical studies and analyzed their impact on OP and EP of food processing SMEs.

Keywords Critical success factors, Food processing, Pakistan, SMEs
Paper type Research paper

1. Introduction

Small and medium-sized enterprises (SMEs) are important source for economic development in any country. Similarly, in Pakistan, SMEs are considered as back bone of the country and 90 percent of business comes under the SME category (Hussain *et al.*, 2015). According to SMEDA (2007), there are approximately 3.2m enterprises in Pakistan and categorized in three main sectors, namely: the wholesale and retail trades; hotels and restaurants, with a share of 53 percent; community and social services, 22 percent; and manufacturing, 20 percent. The food and beverage sector makes up 20.09 percent of manufacturing, second only to the textile sector (SMEDA, 2009). SMEs of the country has a great export potential, but currently facing different kinds of challenge such as unavailability of resources, obsolete technologies, a lack of education and training, corruption, energy crisis and the absence of quality and environmental certifications. These issues and challenges are hindering the performance of SMEs (Sherazi *et al.*, 2013).

This study is focused on Punjab province, which is the second largest and most populous province of the country. Punjab has a population of 110m people and an area of 205,345 square kilometers, which is 25.8 percent of the total area of Pakistan (Bureau of Statistics Punjab, 2017). Punjab's economy is mainly agricultural though industry makes a significant

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contribution. According to SMEDA (2009), 65.27 percent of SMEs are located in Punjab province, 17.83 percent in Sindh, 14.21 percent in Khyber Pakhtunkhawa and 2.10 percent in Baluchistan province.

Augustin *et al.* (2016) highlighted that, the world population is growing fast and estimated to be 9bn in 2050, thus the production of food is believed to be one of the biggest challenges. Chukwu (2009) stated that, food processing is considered to be one of the solutions to meet this challenge, since it reduces the food wastage and increases the shelf life of products thereby adding value. Furthermore, Talib *et al.* (2014) mentioned that, the demand for processed food is increasing due to demographics, changes in life styles and also increased health consciousness.

Numerous studies conducted in food sector, such as the study of Talib *et al.* (2014), identified the critical success factors (CSFs) of quality management, the study of Kafetzopoulos and Gotzamani (2014) focused on food quality management, and the study of Sumaedi and Yarmen (2015) highlighted the importance of quality management in food manufacturing industry. Similarly, several studies have been conducted on environmental management practices in food sector, such as the study of Massoud *et al.* (2010) highlighted drivers, barriers and incentives to implementing environmental management system, Djekic (2015) focused on the environmental impact of food industry, and the study of Saad *et al.* (2016) investigated national environmental factors for TQEM implementation.

There is a dearth of studies in food processing sector, especially in SME sector related to integrated quality environmental management (IQEM) system. It is believed that this is the first kind of study which identifies the CSFs of IQEM and their impact on the operational performance (OP) and environmental performances (EP) in food processing SMEs in Pakistan. The food sector of the country is an important segment, and has a great export potential. Thus, there is a dire need for developing a greater understanding of quality and environmental management systems in Pakistani SMEs.

2. Hypothesis development

2.1 Problem statement

Government of Punjab (2015) report stated that the constraints such as access to international markets, the lower level of standardization of quality assurance and corruption are hindering the industrial performance. The poor quality control mechanisms and applied standards are creating difficulties in exporting products, whilst firms seeking certification are using labs outside Pakistan in order to meet international requirements for their export orders.

Highlighting the quality problem in food sector, the State Bank of Pakistan (2017) report stated that, maintaining quality in food products is a major challenge for food processing industry, thus, organizations need to adopt quality standards throughout their supply chains to achieve a competitive environment along with customer satisfaction. In addition, Kureshi *et al.* (2010) stated that, SME sector is reported to be less involved in QM practices and most of the SMEs in the country have minimal quality systems and their product quality is either not being ensured or being ensured with some informal practices. At the same time, SMEs are also subjected to environmental regulations and certifications. Ortolano *et al.* (2014) found that SMEs in Pakistan are faced with problems of, lack of awareness and weak implementation of environmental regulations and certifications.

According to Goot *et al.* (2016), the current food production practices have a large impact on environment such as inefficiencies in food production by producing more waste and pollution. Food processing industry is considered as one of the major sources of pollution in the environment. Therefore, this study is crucial to identify the CSFs for IQEM, and examine their impact on OP and EP in food processing SMEs.

2.2 Quality management

Quality has been recognized as one of the competitive strategies for improving the performance. In today's competitive environment the survival of manufacturing companies depends on the production of high quality products (Zakuan *et al.*, 2010). Numerous authors have highlighted the importance of QM such as, QM improves organizational effectiveness, provides competitiveness, innovativeness and customer satisfaction (Kaynak, 2003; Sila and Ebrahimpour, 2005; Terziovski and Samson, 2000). Several empirical studies investigated the relationship between QM practices and the firm performance (Ebrahimi and Sadeghi, 2013; Kumar *et al.*, 2014; Samson and Terziovski, 1999), and found a significant relationship. Hence, based on the literature, QM is an essential component for organizational success and has an impact on organizational performance.

2.3 Environmental management

Increasing proportion of environmental pollution and global warming has influenced organizations for the reduction of environmental pollution (Zutshi and Sohal, 2004). Moreover, Rio Declaration on Environment and Development Summit singed in 1992, which enforced organizations to reduce their environmental impacts and to focus on sustainable development, and to make, sustainable development an integral part of every country policy (Mezinska and Strode, 2015). Numerous authors have highlighted the importance of EM such as important tool for organizations to handle the environmental issues, improves corporate image and reduces waste (Campos *et al.*, 2015; Quader *et al.*, 2016; Zutshi and Sohal, 2004).

Furthermore, EM practices enhance the EP by reducing the usage of natural resources and by using energy efficient technologies (Tung *et al.*, 2014). Highlighting the importance of EM in food sector, Massoud *et al.* (2010) stated that, EM practices provide clean and effective operations, improves productivity and enhance relationship with stakeholders. Djekic (2015) stated that EM practices improve the EP of all environmental aspects, and helps in water usage especially best for waste water management.

2.4 Integrated quality environmental management (IQEM)

Competitive environment brought companies in a challenging position, where management systems and standards are key parts of the organization's lifeline, and a prerequisite for survival in the twenty-first century (Zutshi and Sohal, 2005). An integrated management system is a combination of two or more systems that works together in a single efficient system (Nunhes *et al.*, 2016). Several, authors highlighted the importance and benefits of integration such as cost reductions, easier compliance of legislations, improves external image of the company, helps in resource optimization, improves internal communications, provides operational benefits and provides higher customer satisfaction (Abad *et al.*, 2014; Santos *et al.*, 2011; Simon *et al.*, 2012).

QM systems focus on customer demands, needs and satisfaction whereas EM systems are more concerned about stakeholders such as regulators, government departments, general public and environmental organizations. By integrating QM and EM, a single IQEM system works more efficiently. IQEM system provides perceived benefits to organizations in term of reduction in costs, increases productivity, reduction of bureaucracy, alignment of goals and processes, reduction in duplication of policies and procedures, improve technology development, improves operational performance (OP), provide synergies and increases the company positive image in the market (Tarí *et al.*, 2010; Karapetrovic and Willborn, 1998; Bernardo *et al.*, 2009; Tarí and Molina-Azorín, 2010). Furthermore, QM and EM systems have several similarities such as cost and defect reduction, efficiency improvement, similar roots and objectives, harmonization and unified problem solving capability. Therefore, IQEM is a full single system where quality and environmental issues

are taken into account at the same time (Tarí and Molina-Azorín, 2010; Karapetrovic and Willborn, 1998).

Table I highlights the CSFs of QM and EM including leadership (LS), employee management (EM), strategic planning (SP), information management (IM), process management (PM), supplier management (SM) and customer focus (CF), as in the literature, along with their related constructs.

The literature has shown that the factors in Table I are the most common and important both in QM and EM. Therefore, this study has selected them as CSFs of IQEM, and their impact will be examined on the OP and EP of food processing SMEs in Pakistan. Moreover, the studies of Molina-Azorín *et al.* (2009) and Tarí and Molina-Azorín (2010) considered them important factors for QM, EM and QEM practices.

Table I. Construct measurement and related constructs

CSFs of IQEM	Quality management	Environmental management
Leadership	The role of management leadership (Saraph *et al.*, 1989), management leadership (Yusof and Aspinwall, 2000), leadership (Talib *et al.*, 2014), leadership (Ismyrlis *et al.*, 2015), top management commitment (Kharub and Sharma, 2016)	Leadership (Hutchinson, 1992) top management commitment and support (Chin *et al.*, 1999), top management commitment (Zutshi and Sohal, 2004), top management role (Wulandari *et al.*, 2012), management commitment (Cassells *et al.*, 2014)
Employee management	Employee involvement (Ahire *et al.*, 1996), human resource management (Yusof and Aspinwall, 2000), employee involvement and commitment (Fotopoulos and Psomas, 2010), people-workforce management (Ismyrlis *et al.*, 2015), employee involvement (Kharub and Sharma, 2016)	Employee relations (Chin *et al.*, 1999), employee involvement (Zutshi and Sohal, 2004), total involvement of employees (Wee and Quazi, 2005), employee training (Wulandari *et al.*, 2012), employee involvement (Cassells *et al.*, 2014) involvement of employees (Diana *et al.*, 2017)
Strategic planning	Efficiency improvement (Fotopoulos and Psomas, 2010), corporate planning (Talib *et al.*, 2014), strategy (Ismyrlis *et al.*, 2015), strategic planning and role of quality department (Aquilani *et al.*, 2017)	Strategy (Hutchinson, 1996), strategy (Corbett and Cutler, 2000) production process enhancement (Chin *et al.*, 1999), conducting cost benefit analysis (Zutshi and Sohal, 2004), strategy (Cassells *et al.*, 2014)
Information management	Measurement and feedback (Yusof and Aspinwall, 2000), information management (Talib *et al.*, 2014), data management (Ismyrlis *et al.*, 2015) information and analysis (Kharub and Sharma, 2016), information and analysis (Aquilani *et al.*, 2017)	Communication (Chin *et al.*, 1999), information and communication (Zutshi and Sohal, 2004), information management (Wee and Quazi, 2005), communication (Diana *et al.*, 2017)
Processes management	Process management (Saraph *et al.*, 1989), systems and processes (Yusof and Aspinwall, 2000), process management (Talib *et al.*, 2014), process and data management (Ismyrlis *et al.*, 2015), process management (Kharub and Sharma, 2016)	Documentation and control (Chin *et al.*, 1999), document control system (Zutshi and Sohal, 2004), green product/process design (Wee and Quazi, 2005), documentation (Wulandari *et al.*, 2012)
Supplier management	Supplier quality management (Yusof and Aspinwall, 2000), supplier focus (Talib *et al.*, 2014), supplier quality management (Ismyrlis *et al.*, 2015), supplier management (Kharub and Sharma, 2016)	Partnership and resources (Johannson, 1993), supplier awareness and training (Zutshi and Sohal, 2004), supplier management (Wee and Quazi, 2005)
Customer focus	Customer focus (Ahire *et al.*, 1996), customer focus (Fotopoulos and Psomas, 2010), customer focus (Talib *et al.*, 2014), customer focus (Kharub and Sharma, 2016)	Market pressure (Chin *et al.*, 1999), stakeholders (Zutshi and Sohal, 2004), customer focus (Diana *et al.*, 2017)

2.5 Description of the variables: independent variables

Leadership. Leadership plays a vital role in any organization, and considered as one of the significant factors for organization's success. Several authors highlighted the importance of top management commitment such as, leadership is the first element in successful implementation of quality framework, major driver for QM implementation and plays a significant role in building a sustainable organizational culture (Aquilani *et al.*, 2017; Talib *et al.*, 2014; Khurshid *et al.*, 2018). The role of leadership is not only important for implementing QM practices, it also considered as a major element for EM implementation. According to Zutshi and Sohal (2004) the role of top management involvement and leadership was emphasized during each stage of the EM adoption process. This will only happen if top managers understand the significance of adopting an EM for their organization.

Therefore, this study has selected this important factor to further examine the relationship of leadership with OP and EP of the food processing SMEs in Pakistan. Hence, on the basis of the above literature, the following hypotheses are proposed:

H1a. Leadership is statistically significant in influencing the OP of food processing SMEs.

H1b. Leadership is statistically significant in influencing the EP of food processing SMEs.

Employee management. EM is a key factor that helps in improving the organizational performance. EM includes employee involvement, responsibility of employees for quality and environment awareness, employee participation in quality and environmental decisions (Molina-Azorín *et al.*, 2009). Furthermore, Ahire *et al.* (1996) suggested that organizations must develop a proper system to encourage and reward employee's involvement.

According to Kharub and Sharma (2016), employee's participation in quality disciplines or quality circles not only enhances the knowledge, it also lead them toward effective implementations of quality practices. Discussing the role of employees in EM practices Wulandari *et al.* (2012) stated that all employees need to be trained and improve their knowledge about environmental management. Thus, this study believes that EM is important factor for the organization's performance. On the basis of above literature, the following hypotheses are proposed:

H2a. EM is statistically significant in influencing the OP of food processing SMEs.

H2b. EM is statistically significant in influencing the EP of food processing SMEs.

Strategic planning. SP is an important factor which examines how the company develops, communicates, implement and improves its strategy and policy to achieve the organizational goals (Molina-Azorín *et al.*, 2009). Furthermore, Talib *et al.* (2014) mentioned that effective SP is crucial for the successful implementation of quality management. According to Zakuan *et al.* (2010) SP have significant impact on organizational performance. Moreover, Winder (2000) explained that, planning needs to include mechanisms that can recognize how any change process can encounter unexpected challenges. SP is considered an important factor that helps in fulfilling the future demands and significant for the competitive environment. Therefore, this study is interested in this element. Thus, following hypotheses are proposed:

H3a. SP is statistically significant in influencing the OP of food processing SMEs.

H3b. SP is statistically significant in influencing the EP of food processing SMEs.

Information management. The availability of quality and environmental data is highly important for the measurement and analysis. Quality and environmental management data help organizations in decision-making process and related problem solving (Molina-Azorín *et al.*, 2009). According to Talib and Rahman (2010), an organization must hold strong acceptance and

maintenance of quality measurement and information. Furthermore, Talib *et al.* (2014) highlighted that the organizations must create capabilities especially in the use of measurement and information for the performance measurement. Kharub and Sharma (2016) stated that, knowledge about data management is one of the dynamic components for managers in decision-making process. Thus, this study desires to further examine this important factor. Hence, on the basis of the above literature, the following hypotheses are proposed:

H4a. IM is statistically significant in influencing the OP of food processing SMEs.

H4b. IM is statistically significant in influencing the EP of food processing SMEs.

Process management. According to Molina-Azorín *et al.* (2009), PM is related to clarity of process ownership, boundaries, steps, process improvement and mainly based on quality and environmental data. Moreover, Kharub and Sharma (2016) stated that PM is a systematic approach in which all available resources of an organization are used in most efficient manner. In addition, the study of Talib *et al.* (2014) highlighted that, PM encompasses the systems and procedures for establishing quality in the many shop-floor activities involved in manufacturing. Hence, the literature reveals that PM is an important factor. Thus, the following hypotheses are proposed:

H5a. PM is statistically significant in influencing the OP of food processing SMEs.

H5b. PM is statistically significant in influencing the EP of food processing SMEs.

Supplier management. The role of supplier is critical in any organization, especially for the quality and environmental improvement. The quality of arriving material should accomplish quality standards and norms as ordered by the buyer organization, and supplied material should accomplish buyer needs (Ahire *et al.*, 1996). In addition, Talib *et al.* (2014) mentioned that, the relationship between buyer and supplier is important in achieving the organizational goals; thus, firms must reinforce their relationship with suppliers in order to manage their processes more efficiently. Therefore, the study is interested in this factor to further examine the important role of SM. Hence, the above arguments led to the following hypotheses:

H6a. SM is statistically significant in influencing the OP of food processing SMEs.

H6b. SM is statistically significant in influencing the EP of food processing SMEs.

Customer focus. Ahire *et al.* (1996) stated that, quality must be incorporated into all activities with a clear CF. Furthermore, Talib *et al.* (2014) highlighted that CF has a direct effect on performance. Talib and Rahman (2010) stated that, organizations that understand what customers really wants and provide a product or service to meet these requirements can gain competitive advantage and profit. According to Kharub and Sharma (2016) producing the products as per customer's needs and requirement is the ultimate goal of organization, and customer satisfaction is a major responsibility of any organization. Therefore, this important factor is considered to be investigating the impact on OP and EP of SMEs. Hence, the above arguments led to the following hypotheses:

H7a. CF is statistically significant in influencing the OP of food processing SMEs.

H7b. CF is statistically significant in influencing the EP of food processing SMEs.

2.6 Dependent variable: performance

Company's uses performance measures for evaluating, controlling and improving their processes, to achieve the organizational goals. Performance measurement is mainly divided into financial and non-financial performance (İlkay and Aslan, 2012). Moreover, organization's performance can be evaluated such as profit, cost reduction and product development, thus,

organization performance is the way through which organization gain competitive advantage (Choudhary *et al.*, 2013). This study has selected OP and EP as a measure of organizational performance in food processing SMEs in Pakistan.

Operational performance. OP is defined as capability of manufacturing units to optimize the production process, improve product quality and assure on time delivery (Zhang and Yang, 2016). Furthermore, Ahire *et al.* (1996) says, OP is ability of firms to ensure quality into their operations. Kafetzopoulos and Gotzamani (2014) found a positive relationship between OP and financial performance. To analyze the performance of SMEs, OP is required to further examined.

Environmental performance. EP is defined as the ability of firms to reduce their environmental impact by decreasing the consumption of hazardous materials, air emissions, waste water and solid wastes (Zhang and Yang, 2016). Furthermore, EP also has an impact on economic performance, and provides new ways for value addition especially in business operations (Laari *et al.*, 2016).

2.7 Conceptual framework

The poor OP and EP indirectly affect the firm's financial performance. Therefore, this study identifies the CSFs of IQEM, and analyzes their impact on OP and EP in food processing SMEs in Pakistan. Thus, after detailed literature review and problem identification, the conceptual framework was finalized for this study. The conceptual framework shows the CSFs of IQEM practices with seven factors namely; LS, EM, SP, IM, PM, SM and CF, and their overall impact on OP and EP in food processing SMEs in Pakistan will be examines, as shown in Figure 1.

2.8 Theoretical background

This study in underpinned by two theories, resource-based view (RBV) and stakeholder theory (SHT). RBV is the most widely accepted theory that focuses on internal resources and capabilities of an organization. According to this theory, internal resources are the

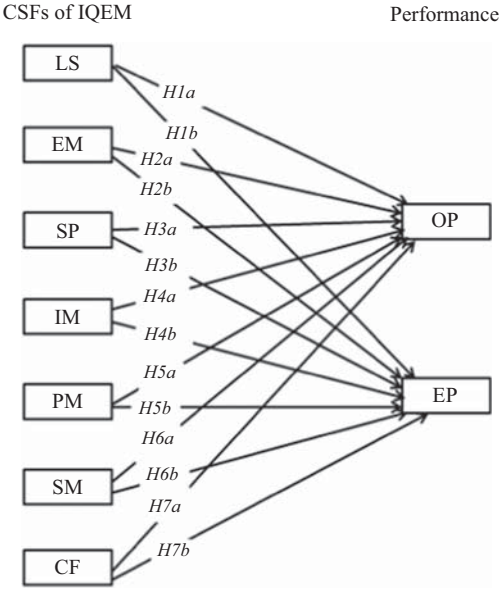

Figure 1.
Conceptual framework

main source of an organization's success (Akio, 2005). In addition, RBV provides competitive advantage to organizations (Imran *et al.*, 2018). However, the theory does not address critical external factors such as market dynamism and stakeholders. Therefore, this research is also anchored by SHT; Freeman defined stakeholders as, any group or individual who can affect or is affected by the achievement of the organization's objectives (Hadi *et al.*, 2015). According to this theory, organizations do not operate in a vacuum they are influenced by stakeholders in various ways (Bremmers *et al.*, 2007). Likewise, Rasi *et al.* (2014) stated that, in any organization, stakeholders may have significant power to influence the efficiency and effectiveness of corporate activities. The stakeholder's involvement with the SME may induce a strong influence to the development of proactive environmental practices.

3. Methodology

3.1 Data collection methods

There are several methods for data collection such as web-based surveys, electronic mail, by post and by personell appearance. This study used quantitative research design by self-administrated questionnaire survey and collected the data through structured questionnaire. Data were collected from Lahore, Faisalabad, Sheikhupura, Multan, Rawalpindi and Gujranwala industrial zones in Pakistan.

3.2 Questionnaire design

For this study the developed questionnaire was adapted from the studies such as, Quazi and Padibjo (1998), Lakhal *et al.* (2006), Valmohammadi (2011), Hietschold *et al.* (2014), Kafetzopoulos and Gotzamani (2014), Wu (2015), Graham and McAdams (2016) and Zhang and Yang (2016). The content validity of developed questionnaire was validated by academic and industrial experts. After getting expert opinions the questionnaire was further improved, modified, and had ambiguity removed in the context of food processing SMEs of Pakistan. The reliability of the questionnaire was measured through Cronbach's α and values range of 0.793 and 0.871, which are greater than 0.7 (Nunnaly, 1978). The unit of analysis was the SME through the owners/manager's or the persons who were knowledge about quality and environment management, and performances of the company. The answers were given on a five-point Likert scale ranging from strongly disagrees as "1" and strongly agree as "5."

3.3 Sample size

The target population of this study was SMEs operating in Punjab province. Since there were no complete population list or publication that contained a complete record of the manufacturing SMEs in Pakistan (Hyder and Lussier, 2016); therefore, snowball sampling technique was employed for this study. This is in line with previous studies related to Pakistan's SMEs such as studies conducted by Kureshi *et al.* (2010) and Wahga *et al.* (2018). Thus, snowball ball sampling found appropriate for this study because it require by asking the respondent to propose another respondent to participate. The data were collected from 302 SMEs, however, only 288 were usable for the analysis.

To decide on sample size, G*Power calculator was used to calculate minimum sample size required for this study. By considering the guidelines, the model having seven predictors; the effect size was 0.15, power needed was 0.95 and the required sample was 153. This approach to calculating the required sample size is advantageous and is used in the literature (Muhammad *et al.*, 2017). However, this study set to collect more data than the minimum required sample size (Tehseen *et al.*, 2017).

3.4 Data analysis methods

IBM-SPSS is used for primary data analysis including detection of outliers, missing values and normality assessment. PLS–SEM is used for hypothesis testing; PLS is considered as the most suited data analysis tool, especially for those studies which aim to predict the relationship between constructs (Hair *et al.*, 2017; Muhammad *et al.*, 2017). SmartPLS-3 with two stage approach was used to evaluate the measurement model and structural model as recommended by Anderson and Gerbing (1988).

4. Results and discussion

4.1 Common method bias

Common method bias (CMB) can be considered a threat to the validity of survey research, and common method variance (CMV) exists when one factor explains more than 50 percent of the variance (Podsakoff *et al.*, 2012). Thus, Harman's single factor test was employed as suggested by Podsakoff *et al.* (2003). The outcome of this test indicated that none of the constructs explained more than 50 percent of the total variance. Therefore, it was argued that CMB was not a problem in this study. Furthermore, the non-response bias was also not an issue, as the data were collected by the researcher through face-to-face interaction with the target respondents.

4.2 Assessment of the measurement model (outer model)

Reliability and validity are the main criterion's used for the assessment of a measurement model (Ramayah *et al.*, 2011). Reliability of the measurement model is assessed by loadings and composite reliability. The outer loading is used for item's reliability, whereas the composite reliability is used for construct's reliability. According to Chin (1998), items loadings should be 0.60 and above. The composite reliabilty should be 0.70 and above, as suggested by Hair *et al.* (2017). Moreover, the validity of the measurement model is assessed by convergent validity and discriminant validity. The convergent validity is assessed by average variance extracted (AVE), the value 0.5 and above shows an acceptable convergent validity (Hair *et al.*, 2017). All latent variables of the study fulfilled the desired criteria as shown in Table II.

Discriminant validity was assessed by using Fornell–Larcker criterion as recommended by Fornell and Larcker (1981). In Fornell–Larcker criterion the square root of AVE of each latent variable should be greater than its correlation with other latent variable. By using this approach, the results reveled that square root of AVE were greater than its correlation as shown in Table II.

In addition, Henseler *et al.* (2016) introduced a new criterion for assessing the discriminant validity called Heterotrait–Monotrait Ratio (HTMT). This recent approach

Const.	CR	AVE	CF	EM	EP	IM	LS	OP	PM	SM	SP
CF	0.863	0.514	*0.717*								
EM	0.866	0.519	0.587	*0.720*							
EP	0.898	0.526	0.701	0.614	*0.725*						
IM	0.864	0.515	0.606	0.657	0.646	*0.718*					
LS	0.858	0.502	0.577	0.566	0.691	0.651	*0.709*				
OP	0.867	0.521	0.645	0.626	0.713	0.660	0.678	*0.722*			
PM	0.845	0.522	0.547	0.567	0.568	0.605	0.598	0.624	*0.722*		
SM	0.839	0.511	0.578	0.500	0.556	0.525	0.539	0.585	0.516	*0.715*	
SP	0.859	0.504	0.613	0.629	0.654	0.666	0.626	0.684	0.651	0.552	*0.710*

Notes: CR, composite reliability, AVE, average variance extracted. Italic items are square root of the AVE

Table II. Measurement model

shows the estimation of the true correlation between two latent variables. A threshold value of 0.85 has been suggested for HTMT (Henseler *et al.*, 2016). Values above 0.85 show a lack of discriminant validity. Table III shows all values found to be below threshold, thus HTMT criterion has been fulfilled for this measurement model.

Moreover, Figure 2 shows the items loadings and path coefficients that have been obtained through PLS algorithm.

Table III. Heterotrait–Monotrait Ratio (HTMT)

Const.	CF	EM	EP	IM	LS	OP	PM	SM	SP
CF									
EM	0.721								
EP	0.833	0.725							
IM	0.744	0.806	0.765						
LS	0.712	0.697	0.827	0.805					
OP	0.790	0.759	0.847	0.809	0.832				
PM	0.687	0.713	0.690	0.762	0.754	0.784			
SM	0.723	0.625	0.674	0.660	0.678	0.729	0.657		
SP	0.757	0.773	0.780	0.827	0.775	0.841	0.826	0.694	

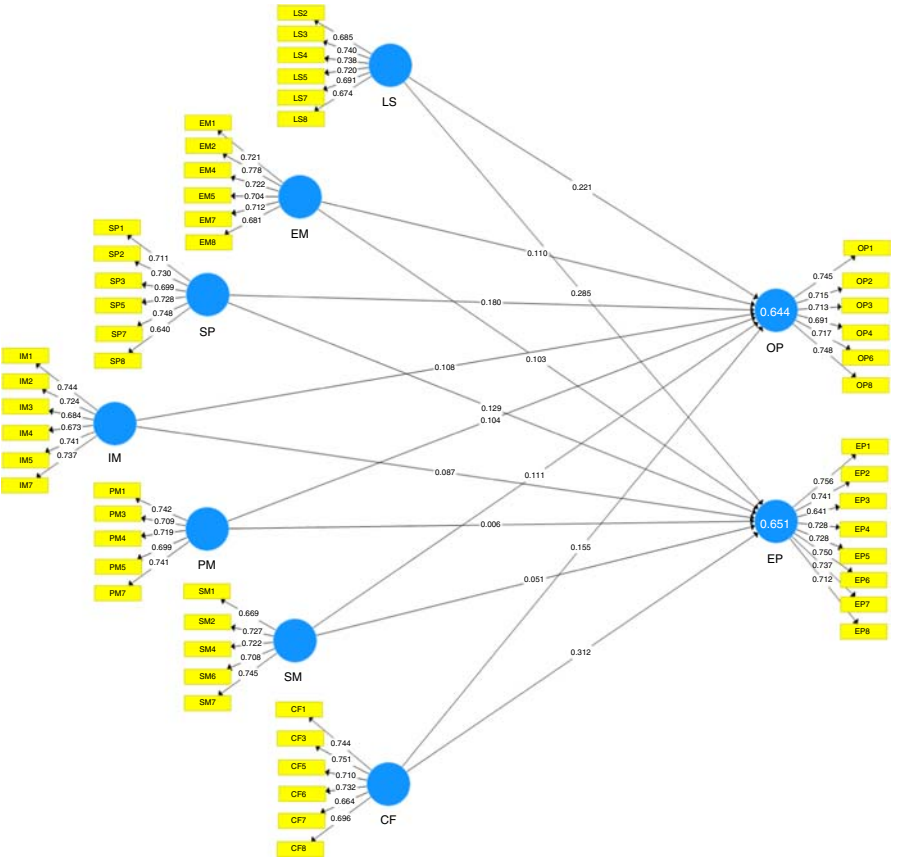

Figure 2. Measurement model through the PLS algorithm

4.3 Assessment of structural model (inner model)

Structural model represents the theoretical relationship between latent construct in the inner model (Mohammad *et al.*, 2016). According to Hair *et al.* (2017), the most commonly used measure to evaluate the structural model is the coefficient of determination R^2. The R^2 value represents the combined effect of the exogenous latent variables on the endogenous variables. The rule of thumb is that R^2 values of 0.75, 0.50 and 0.25 for endogenous latent variables are substantial, moderate and weak, respectively (Hair *et al.*, 2017). The R^2 values of 0.64 and 0.65 shows a 64 and 65 percent variance thereby showing the endogenous variables OP and EP are substantial for this model. In order to determine the path coefficients, *t*-values and *p*-values, a bootstrapping procedure with 5000 replications was employed, as recommended by Hair *et al.* (2017). The bootstrapping procedure produced path coefficients and their corresponding *t*-values and *p*-values. Since all hypothetical relationships developed in this study were positive and in direct relationship, therefore, the one-tailed test was applied (Mohammad *et al.*, 2016). Critical *t*-values for one-tailed test are 1.28 ($p < 0.10$), 1.65 ($p < 0.05$) and 2.33 ($p < 0.01$). Table IV shows the results of the PLS output for the structural model.

The results from the bootstrapping output shows that leadership was found to be significantly associated with OP ($\beta = 0.221$, $t = 3.615$) and EP ($\beta = 0.285$, $t = 4.372$), EM was significant with OP ($\beta = 0.110$, $t = 1.785$), but was not significant with EP ($\beta = 0.103$, $t = 1.620$). SP was also found to be significant with OP ($\beta = 0.180$, $t = 3.105$) and EP ($\beta = 0.129$, $t = 1.983$), IM was significant with OP ($\beta = 0.108$, $t = 1.673$), but was not significant with EP ($\beta = 0.087$, $t = 1.246$), PM also found to be significant with OP ($\beta = 0.104$, $t = 1.806$), but was not significant with EP ($\beta = 0.006$, $t = 0.117$). The results shows that SM was significant with OP ($\beta = 0.111$, $t = 2.110$), but was not significant with EP ($\beta = 0.05$, $t = 0.800$) and CF was found significant with both performances OP ($\beta = 0.155$, $t = 2.441$) and EP ($\beta = 0.312$, $t = 4.023$). Thus *H1a*, *H1b*, *H2a*, *H3a*, *H3b*, *H4a*, *H5a*, *H6a*, *H7a*, *H7b* were supported. However, EM, IM, PM, and SM with EP, were to be non-significant; therefore, *H2b*, *H4b*, *H5b* and *H6b* were not supported.

Moreover, the demographic details of the SMEs and respondents are provided in Table V. Among the 288 SMEs, 45 were working on a partnership, 173 were working on sole proprietorship, 7 were registered as public limited and 63 were registered as private limited. Out of 288 SMEs, 137 were involved in food processing, 77 were beverage processing and 74 SMEs were involved in both, food and beverages. Among the 288 respondents, 102 were

Hypt.	Path	Path coefficient	SE	*t*-values	*p*-values	Decision
H1a	LS → OP	0.221	0.061	***3.615	0.000	Supported
H1b	LS → EP	0.285	0.065	***4.372	0.000	Supported
H2a	EM → OP	0.110	0.062	**1.785	0.037	Supported
H2b	EM → EP	0.103	0.063	1.620	0.053	Not supported
H3a	SP → OP	0.180	0.058	***3.105	0.001	Supported
H3b	SP → EP	0.129	0.065	**1.983	0.024	Supported
H4a	IM → OP	0.108	0.065	**1.673	0.047	Supported
H4b	IM → EP	0.087	0.070	1.246	0.106	Not supported
H5a	PM → OP	0.104	0.057	**1.806	0.035	Supported
H5b	PM → EP	0.006	0.052	0.117	0.454	Not supported
H6a	SM → OP	0.111	0.053	**2.110	0.017	Supported
H6b	SM → EP	0.051	0.063	0.800	0.212	Not supported
H7a	CF → OP	0.155	0.064	***2.441	0.007	Supported
H7b	CF → EP	0.312	0.078	***4.023	0.000	Supported

Notes: Critical *t*-values; **1.65 (significance level 5 percent); ***2.33 (significance level 1 percent)

Table IV. Summary of structural model

Demographics	No. of participants (288)	%
About SME		
Nature of ownership		
Partnership	45	15.6
Sole proprietorship	173	60.1
Public limited	7	2.4
Private limited	63	21.9
SME engagement		
Food processing	137	47.6
Beverages processing	77	26.7
Food and beverages (both)	74	25.7
About respondent		
Working department/unit		
Quality	102	35.4
Engineering	27	9.4
Production	83	28.8
Others (Owner/CEO/MD)	76	26.4
SMEs experience (years)		
1–5	89	30.9
6–10	80	28.8
11–20	67	23.3
More than 20	52	18.1

Table V. Demographics of SMEs and respondents

from the quality department, 27 from 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.

The results of this study has found LS, SP and CF to be the most important success factors with EM, IM, PM and SM also identified as critical factors, especially for the food processing SMEs in Pakistan. The study also tested their impact on the OP and EP of SMEs. All the above-mentioned CSFs were found to be significant with OP whereas EM, IM, PM and SM were not found to be significant with EP.

The study results are contradictory to previous studies, may be due to the cultural differences and the developed and developing country scenario. However, EM is considered as one of key factors in achieving the environmental goals. Employee's awareness regarding environmental issues, employee's participation and by using their abilities SMEs can improve their EP. Therefore, owner/manager of food processing SMEs needs to empower their employee in decision-making processes, keep them aware about environmental issues and regulation, and should organize trainings and workshops for quality and environmental awareness because without employees involvement SMEs cannot achieve the organizational goals. Similarly, IM is a critical factor for organizational success, quality and environmental information leads toward the problem solving and for product improvement. It was found that (during the time of data collection) there is a communication gap and a lack of information sharing among the SME staff/members, especially related to the new initiatives and innovations. Furthermore, a lack of educated staff, absence of latest technologies, unavailability of internet sources and the energy crisis were the major problems faced by SMEs. However, the study of Samson and Terziovski (1999) also found a non-significant relationship of IM and performance.

Moreover, PM relates to customer-focused design, products and delivery processes, and the using available resources in a better manner. PM is important critical factor for any organization; therefore, food processing SMEs needs to focus on quality and environmental aspects, establish quality in shop-floor activities and ensure the quality in

production process. Though, PM was also found non-significant in the studies of Samson and Terziovski (1999) and Nair (2006).

Similarly, supplier performance is considered as one of the determining factors for the company's success. The aspects such as trust, product quality level, costs of product, quick response time, truthful and frequent communication have been regarded as the most important for selecting a supplier. According to the SMEs owners/managers point of view (during the time of data collection), only selecting the supplier base on the provision of quality products is not sufficient because if a supplier provides good quality of products but not deliver on time, ultimately the organizations will suffer and lose their customers. Therefore, on-time delivery, trust, product quality level are equally important for selecting a supplier. Thus, SMEs and suppliers need to collaborate and cooperate for successful relationship, since, in many cases SMEs are the primary supplier to the large organizations. Therefore, collaboration, communication and cooperation are important for successful partnership. However, SM was also found non-significant in the study of (Carolyne *et al.*, 2015). All identified CSFs have an impact on organization's performance, important for competitive environment, and more valuable for developing country such as Pakistan.

5. Conclusions

Quality management is highly emphasized in the quality literature; however, QM alone not fulfills the customer requirements. The customer's demand for environmental management is increasing due to the increasing proportion of environmental issues. Therefore, this study is focused on identifying the CSFs of IQEM that cover both quality and environmental aspects. The empirical results provided evidence that the identified CSFs of IQEM such as leadership with *p*-values (0.000), EM (0.037), SP (0.001), IM (0.047), PM (0.035), SM (0.017) and CF with *p*-value (0.007) are significantly associated with the OP. Similarly, LS, SP and CF with *p*-values (0.000), (0.024) and (0.000) were found significant on the EP of food processing SMEs, respectively.

5.1 Implications of the study

The results of this study offer valuable insights for the owner/managers of food processing SMEs that by practicing certain identified CSFs of IQEM such as strong and visionary leadership, employee involvement, with clear SP, information and knowledge sharing, with continuous process improvement, good relationship with supplier, and more importantly focusing on customer demands and needs, food manufacturers not only improve OP and EP, also get competitive advantage with good market image. In addition, both OP and EP have an impact on financial performance. Second, by practicing IQEM food players enhances their trade with rest of the world, especially European Union, where currently country is facing hindrances due to the quality and environmental concerns.

Furthermore, the study helps food manufacturers by practicing IQEM, they can reduce the excessive consumption of water and energy, and it also help them in reducing the solid and water wastes thereby increase the production with more sustainable way. Pakistan food industry has a great export potential and important segment of economy; therefore, food manufactures need to more focus on quality and environmental issues, and by practicing IQEM they can produce high quality products with maximum benefits.

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