The role of quality management practices in operational performance
An empirical study in a transitional economy

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Abstract

Purpose: This research was conducted to recognize quality management (QM) practices which have relationship with operational performance.

Design/methodology/approach: Based on the extensive literature review, a set of quality management practices were identified and a conceptual model was built to explore their relationship with operational performance. An empirical testing at Vietnamese garment enterprises was carried out.

Findings: The results of this research showed that four main practices including top management support, human resource management, reporting and analysis of quality data, product/service design and process management are directly and indirectly related to operational performance. In addition, 57.1% variance of operational performance was explained by the QM practices above mentioned.

Research limitations/implications: Within the scope of this study, there are some aspects that haven't been yet considered: (i) there are many other factors that might also have impact on operational performance which are not incorporated in this study, such as, external environment, capital, technology, equipment, information flow, oursourcing, etc., (ii) generalized ability of results would be higher if extending the sample scope to other industries and other countries. These imply directions for further research.

Practical implications: To increase operational performance, the QM practices should be applied simultaneously and the structural model was used in this study could play as "a guideline" to orient for the implementation of these practices.

Originality/value: This study tried to address some issues that have not been fully examined in the literature. Not only fill these voids, the research model presented the relationship among QM practices and operational performance, along with the measurement instrument validated in this study also provided some insights to the theory system of QM and operational performance.

It is also a valuable contribution for the next empirical studies, especially for countries having the transitional economy as Vietnam.

Keywords: Quality Management, Quality Management practices, Operational performance, garment industry, transitional economy, Vietnam.

Article Classification: Research paper

1. Introduction

As competition among firms becomes fierce, it is required that managers need to identify practices which improve capacity and competitive advantage. In organizational context, operational performance brings advantages in all aspects (Demeter, 2014; Prajogo et al., 2012; Samson and Terziovski, 1999). Increased operational performance leads to a cost reduction (Heizer et al., 2008), improved product/service quality (Samson and Terziovski, 1999) financial performance (Kaynak, 2003; Kaynak and Hartley, 2008; Ou et al., 2010) and customer satisfaction (Ou et al., 2010). It is useful to gain and maintain competitive edge (Reed et al., 2000). But how can we improve operational performance?

Related to this issue, a lot of academic studies were carried out. Flynn et al. (1995) took into account the relationship between quality management (QM) and operational performance. He is known as one of the pioneers to suggest the improvement of operational performance by QM practices. Flynn divided QM practices into two groups: (1) core QM practices and (2) infrastructure QM practices. Several empirical studies were conducted after Flynn's study and proved the importance of QM practices in operational performance.

As we know, investment on research projects able to leverage the performance of the industrial sector plays an important role in the economy of countries. This is particularly relevant in the Vietnam garment sector, which is one of industries with larger social and economical impact, whereas operational performance is still very low. Thus, carrying out a study to help garment industry to improve operational performance is one of main objectives of this study.

According to Vietnam Textile and Apparel Association, characteristics of Vietnam garment industry are a labor-intensive industry, high production costs, ineffective in design and manufacturing and low product quality as well. To improve operational performance of garment sector, hence, based on the extensive literature review, the practices of top management support, human resource management, reporting and analysis of quality data, product/service design and process management are suggested.

The importance of these practices have been partly recognized and applied in some companies. However, this implementation is not widespread. Pershap, it is the main reason leading to low operational performance. To verify this, this study will examine the relationship between the QM practices and operational performance. We aim at providing further insight into this subject in order to create an understanding on the way to a more efficient industry.

The structure of this paper is organized as follows: after the introduction, QM practices used in this research are presented. Research model and hypotheses, then, are suggested. Section 3 describes development of the instrument measurement. Next, results are presented and discussed. Implications and directions for further research are mentioned at the end of this paper.

3. Background and research model proposal

Five of the QM practices investigated in this study – top management support, human resource management, reporting and analysis of quality data, product/service design and process management have been documented in both measurement studies and the studies that have investigated the relationship between QM practices and various dependent variables, as shown in Table 1.

In the literature, the classification of these practices still remains unclear. It is important because this classification acts as "an orientation" that the relationships among practices are identified. In this study, based on the taxonomy of Flynn et al. (1995), the QM practices are grouped into two sectors: (1) core QM practices which are technique- and methodology-oriented practices such as reporting and analysis of quality data, product/service design; process management, (2) and support QM practices such as top management support; human resource management which are people- and culture-oriented practices and create an environment that supports effective use of the core QM practices.

Table 1: QM practices

QM practices	Description
Reporting and analysis of quality data	The collection of quality data. Display of quality data, control charts... at work stations. Delivery feedback of quality data to employees. Availability of quality data. Use of quality data in employees' tasks. *By (Forker, 1997)*
Product/service design	Use of modular design of component parts. Use of standard components. The simplification of products. Review of new product/service design. Clarity of product/service specifications. *By (Kannan and Tan, 2005)*
Process management	Use of fool-proof for process design, statistical techniques, automation, preventive equipment. Clarity of work or process instructions. Identification of problem easily. *By (Forker, 1997; Kaynak, 2003; Saraph et al., 1989)*
Top management support	Offer of innovation and continuous improvement policies. Provision of necessary resources for processes. Promotion of partners' involvement in firm's activities. Participation of top management in quality improvement process. Review of quality issues in top management meetings. Responsibility for operational performance. *By (Flynn et al., 1995; Kaynak, 2003; Saraph et al., 1989)*
Human resource management	The relationship between human resource objectives and strategic. The role of environment on the development of all employees. Responsibility in employees' tasks. Promotion in the motivation of employees. Training program for employees timely. The measurement methods of employee satisfaction. The effectiveness of employee problem resolution program. Involvement in determining training needs. *By (Adam, 1994; Choi and Eboch, 1998; Park et al., 2001; Powell, 1995; Samson and Terziovski, 1999)*

The relationship between QM practices and operational performance receives much attention in the literature. However, results have shown to have low consistency. Some authors employed the same dimensions to test the relationship between QM practices and operational performance but they obtained different results. For instance, in the relationship between process management and performance, the direct impact of process management on performance has been proved in several studies (Feng et al., 2006; Fening et al., 2008; Kaynak, 2003; Kaynak and Hartley, 2008; Prajogo and Brown, 2004; Sila and Ebrahimpour, 2005; Terziovski, 2006; Zu, 2009). However, according to Tarí et al. (2007), they have an indirect relationship (Tarí et al., 2007). Conversely, Flynn et al. (1995) argued that process management has a negative direct influence on performance, or even they are not associated (Powell, 1995; Samson and Terziovski, 1999).

An explanation to these contrasting scenarios can be given by the use of different data analysis techniques. By using multiple regression (Adam et al., 1997; De Cerio, 2003; Fening et al., 2008; Flynn et al., 1994; Samson and Terziovski, 1999; Zehir and Sadikoglu, 2010) or correlation (Powell, 1995), it is restrictive to test the relationships among constructs, especially, indirect effects (Kaynak, 2008).

Otherwise, Kaynak (2003) suggested that future research should take into account the the interaction among QM practices that is able to indicate the indirect relationship between QM practices and operational performance. However, it has not been yet properly addressed in the literature. In fact, the empirical studies testing this interaction are still limited (Dow et al., 1999). Therefore, to fill these voids, the following structure equation model is proposed (Figure 1).

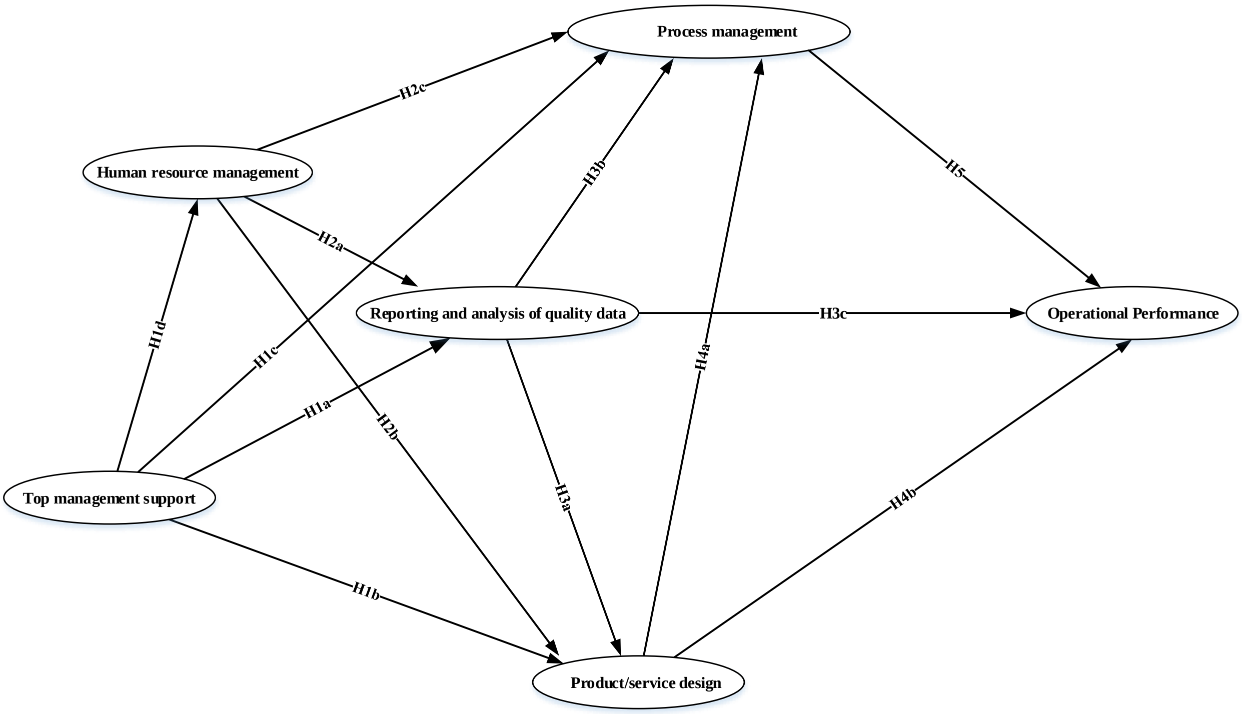


Figure 1: Research model

The relationships in figure 1 will be tested by applying Structural equation modeling (SEM). It is one of modern and complex methods, however, it gets the highest accurate in the quantitative research (Bollen, 1989). In the next part, hypotheses on the paths were developed.

3.1. Top management support:

As stated by previous studies of Ahire and O'Shaughnessy (1998), Anderson et al. (1995), Flynn et al. (1995), Kaynak (2003), Shin et al. (2000), top management support plays an extremely important role in QM implementation. By impacting on other QM practices, it can improve operational performance. For instance, in order to increase the effectiveness in the use of quality data, top management provides the necessary resources in collecting quality data and ensures that they are always available in work stations. Moreover, by supporting to display quality data in control charts at employee's work stations, it would be easier to spot existing issues in the manufacturing processes. The relation of top management support to reporting and analysis of quality data is well established in the literature (Flynn et al., 1995; Kaynak, 2003; Lakhal et al., 2006; Sila and Ebrahimpour, 2005). Hence, we suggest the following hypothesis:

H1a: Top management support is positively related to reporting and analysis of quality data.

Nowadays, products become increasingly complex and differentiated, so design for new products/ services needs to integrate more information and techniques. A design team from different departments, known as cross-functional team, could help improving design process through overall consideration of organization's issues. Top management mobilizes human resource of departments for the team and creates good conditions in their tasks. In the traditional perspective, moreover, design and manufacturing activities mainly took place within a firm and even considered as technological secrets. However, as competition moves from firms to supply chains, key suppliers and customers need to be involved in these activities in order to increase the competitive advantage of supply chain (Petersen et al., 2003). Support of top management is a prerequisite for this integration (Kaynak and Hartley, 2008).

Top management offers policies which encourage innovations and continuous improvement in design and production. For instance, the support for initiatives in the use of standard component, modular design of component parts makes design activities more simple. The effectiveness of design is improved as a result (Kaynak, 2003; Kaynak and Hartley, 2008; Ou et al., 2010). In addition, supports for continuous improvement in manufacturing activities, such as, by increasing level of automation and using statistical techniques, fool-proof of process design and preventive equipment maintenance can minimize chances of employee errors and reduce variance in processes (Flynn et al., 1995; Forker, 1997; Kaynak, 2003; Lakhal et al., 2006; Saraph et al., 1989; Sila and Ebrahimpour, 2005). Hence, the following hypotheses are suggested:

H1b: Top management support is positively related to product / service design.

H1c: Top management support is positively related to process management.

Additionally, top management creates an environment conducive to the development of all employees and promotes their motivation. By empowering, employees could make their own decisions in their tasks. Top management, moreover, supports employees to involve in determining training needs and have training program to improve quality-related skills and knowledge for employees. There are some studies that found a positive relation of top management support to human resource management (Kaynak and Hartley, 2008; Ou et al., 2010; Sila and Ebrahimpour, 2005; Singh, 2008; Tarí et al., 2007). Hence, the following hypothesis is proposed:

H1d: Top management support is positively related to human resource management.

3.2. Human resource management:

Human resource is considered as the most important resource in any firms and it is a key factor on the success of companies. This is always right even when a company has high technological level (APO, 2000). Human resource management refers to create a good environment for employees that are trained and empowered to deliver their tasks (Adam, 1994; Choi and Eboch, 1998; Park et al., 2001; Powell, 1995; Samson and Terziovski, 1999).

In daily activities, employees are required to interact with quality data. An effective training program helps employees know how to collect and use quality data in their tasks (Ahire and Dreyfus, 2000; Ho et al., 1999; Kaynak, 2003), such as display quality data, control charts, etc., at their work stations (Forker, 1997). In addition, empowerment makes employees more active, easier in cooperation with other departments to collect quality data. In contrast, human resource management is not effective if employees do not receive quality data accurately and timely. In the studies of Kaynak (2003), Kaynak and Hartley (2008) and Ou et al. (2010), the relation of human resource management with reporting and analysis of quality data is proved. So, the following hypothesis is proposed:

H2a: Human resource management is positively related to reporting and analysis of quality data.

Employees are those who transfer market and consumer needs into designs. Training programs are to ensure that employees have knowledge and skills to design products/services as required. In addition, empowerment allows employees freely in creating innovations. Consequently, the effectiveness of product/ service design is improved. Hence, we suggest the following hypothesis:

H2b: Human resource management is positively related to product/service design.

Quality-related training programs help employees know how to use quality improvement tools, fool-proofing for process design, the preventive equipment maintenance, etc. (Ahire and Dreyfus, 2000; Ho et al., 1999). As a result, employees could reduce unnecessary or excess motions, errors as well as process variance (Sila and Ebrahimpour, 2005; Tarí et al., 2007; Zu et al., 2008). Hence, the following hypothesis is given:

H2c: Human resource management is positively related to process management.

3.3. Reporting and analysis of quality data

For an effective design, it is required to consider a wide range of information about customer needs, raw materials, supplier capacity, production and distribution processes, etc. Therefore, quality data collected timely and accurately could improve design efficiency and support cross-functional teams in their tasks (Flynn et al., 1995; Iii, 1998). The relationship between reporting and analysis of quality data and product/service design is found in the previous studies of Kaynak (2003), Kaynak and Hartley (2008) and Ou et al. (2010). Hence, we suggest the following hypothesis:

H3a: Reporting and analysis of quality data is positively related to product/service design.

Quality data displayed in control charts, histograms, etc., could help organizations to easily and timely identify issues in processes (Ho et al., 1999), allowing employees to have corrective actions quickly before products are made. It ensures that production processes are operated smoothly (Flynn et al., 1995; Ho et al., 1999). Kaynak (2003), Kaynak and Hartley (2008) and Ou et al. (2010) also showed the relation of reporting and analysis of quality data to process management in their studies. Hence, the following hypothesis is offered:

H3b: Reporting and analysis of quality data is positively related to process management.

In addition, available quality data provides historical information about: (1) customers, (2) supplier quality, (3) distributors, (4) manufacturing process. These information is useful for reducing order-time and rate of late delivery, improving quality of inputs, detecting potential problems faster, making operating activities smoothly and reducing lead-time and other expenses as well (Kaynak, 2003; Kaynak and Hartley, 2008; Ou et al., 2010). Hence, we propose the following hypothesis:

H3c: Reporting and analysis of quality data is positively related to operational performance.

3.4. Product/service design

Practice of product/service design refers to simplify products, reduce component parts per product and increase the level in the use of standard components (Chase et al., 2006; Kannan and Tan, 2005). Reduction of component parts per product and high level of standardization make manufacturing processes more effective, reduce process complexity and variance (Ahire and Dreyfus, 2000; Flynn et al., 1995). Employees quickly get acquainted with their works that makes low rate of errors, lead-time is shorter and output is increased (Tan, 2001). The cost of repair and rework also is significantly reduced (Ahire and Dreyfus, 2000; Anderson et al., 1995). Moreover, simple components and products make delivery easier, rate of late delivery is decreased as a result. Hence, the following hypotheses are given:

H4a: Product/service design is positively related to process management.

H4b: Product/service design is positively related to operational performance.

3.5. Process management

Process management refers the use of statistical techniques, increasing automatic level of processes and fool-proof in designing process (Flynn et al., 1995; Forker, 1997; Kaynak, 2003; Saraph et al., 1989). These activities are helpful to decrease process variance (Flynn et al., 1995) and minimize chances of employee errors (Forker, 1997; Kaynak, 2003; Saraph et al., 1989). As a consequence, rate of damaged materials and late delivery, lead-time, unnecessary costs are reduced (Ahire and Dreyfus, 2000, Anderson et al., 1995), output increases and uniformity of products get higher (Anderson et al., 1994; Forza and Flippini, 1998). Futhermore, the use of preventive equipment maintenance make manufacturing process operate smoothly by improving reliability of equipment and restricting disruption in production (Ho et al., 1999). The relation of process management to operational performance is founded in the studies of Ahire and Dreyfus (2000); Forza and Filippini (1998). Hence, the following hypothesis is proposed:

H5: Process management is positively related to operational performance.

3.6. Operational performance

Operational performance refers to the ability of a company in reducing management costs, order cycle time – meet orders, improving raw material efficient use and distribution capacity (Heizer et al., 2008). Operational performance has an important meaning to firms, it improves effectiveness of production, creates high quality products, customers are more satisfied, leading to increased revenue and profit for companies (Kaynak, 2003; Kaynak and Hartley, 2008; Ou et al., 2010).

4. Development of the measurement instrument

The scales of QM practices and operational performance were validated in 4 steps: (1) Identify and develop the initial instrument, (2) personal interview and Q-sort, (3) large-scale data collection and (4) large-scale analysis.

4.1. Identify and develop the initial instrument

The effective measurement instrument should cover all content domain of constructs (Parasuraman, 1991), measurement items of each construct should converge with other items statistically (Garver and Mentzer, 1999). In other words, two constructs which are similar in theory, are also the same in practical and vice versa. Constructs should have high level of reliable, short and easy to use (Li et al., 2005).

Based on an extensive literature review and definition of QM practices in table 1, the scales of constructs were developed (table 2). A seven-point Likert scale was employed with a score of 1, indicating "strongly disagree", and 7, representing "strongly agree", to extract the different attitudes of respondents.

4.2. Personal interview and Q-sort

A structural interview of academicians who have a lot of experiences in this area was conducted. These discussions were recorded, analyzed, modified and added some items, variables. Q-sort method, then, was applied with the participation of some managers to assess initial construct validity, reliability and unidimensionality.

In the process of Q-sort method, some managers, who are working at garment companies, were invited to review the scales of constructs in order to indicate which items need to keep, modify, drop or add. Based on the feedback from experts, items were adjusted, and then, the official questionnaire was established.

4.3. Large-scale data collection

The target population in this study is Vietnam-based companies which are working in garment industry. The target respondents are Presidents, Vice presidents, Directors, Managers, Coordinators who have information and experience in QM. In the list of General Statistics Office in 2008, there are 3.174 garment enterprises. Contact information of companies was searched from website of *nhungtrangvang.com.vn*, which provides address, email, phone… of companies in Vietnam. A total of 2.147/ 3.147 garment enterprises were collected. The link of the official questionnaire was sent to these 2,147 firms via email addresses. In order to increase the response rate, an electrical postcard was sent after the initial mailing to remind non-respondents. Depending on their requirements, a copy of questionnaire was mailed by post-office or the link of survey was sent to their email. One month later, the survey link once again was emailed. To encourage the cooperation of respondents, the survey results would be sent to them. A total of 246 questionnaires were received, resulting in the response rate of 11.5%. This is a significant rate with the method of email survey (Tse et al., 1995).

An estimate of non-response bias with T-test procedures was conducted in order to test the difference in variables between early and late respondents (Armstrong and Overton, 1977). Results showed that no significant differences on the average scores of all observed items were found (in the internal confidence of 99%). It means that non-response bias exists between early and late respondents.

These of 246 questionnaires were checked before analyzing in order to reduce errors in data entry process and detect missing values. After filtering data, there were 179 valid questionnaires, which were used for the next steps.

In addition, independent and dependent variables were obtained from the same respondent in each firm. This could lead to the presence of common method variance (CMV). Harman's single-factor test was calculated to test this existence (Podsakoff et al., 2003). Unrotated factor analysis was performed with all observed items. If only one factor emerges, in other words, if a general factor could explain most of covariance in all variables, it is rational to conclude that a significant CMV is existed. Results indicated that eight factors was appeared. However, when the number of items are too much, this way of testing is not really exact (Podsakoff et al., 2003). Therefore, in this case, items in each of the independent construct (QM practices) were factor analyzed with items in the dependent construct's scale (operational performance). For each case, the results of factor analysis showed that two and more than two factors were emerged, meaning that there is no significant CMV.

Most of respondents are presidents, directors, vice directors, manager, etc., who had more than 5 years of working experience in the current company. Among them, 32.4% are retailers, 40.2% of manufacturing companies, 14.5% of distribution centers, fabric firms account 10.6% and the remaining is design-related companies. Approximately 26.8% of the firms had 10 or fewer employees, 35.8% of the firms employed between 10 and 49 workers, 19.6% of the firms had from 50 to 249 employees, and 17.8% of the firms had more than 250 employees.

4.4. Large-scale data analysis process

Firstly, Cronbach's Alpha coefficient was used for evaluating reliability of each construct (Antony et al., 2002). Cronbach's Alpha coefficient is a statistical test about the consistent degree to which observed items in a construct are correlated. Otherwise, to improve Cronbach's Alpha coefficient, items which are low in item – total correlation coefficient will be deleted. Coefficient of item – total correlation expresses correlation among an item and the average score of other items in the same construct. Thus, the higher this coefficient is, the higher the correlation among items are and consequently, the reliability of this construct is high (Hair et al., 1995; Nunnally, 2010).

Then, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to assess unidimensional and validity of constructs, including: convergent validity, discriminant validity and criterion-related validity.

Additionally, the distribution of observed items is the normal distribution. Most of Kurtosis and Skewness range from (-1, +1), which is in acceptant range (Kline, 1998). Thereby, the method of ML (Maximum Likelihood) is appropriate to estimate parameters in research model (Muthen and Kaplan, 1985).

If measurement items are unidimensional, reliable and valid, the analysis of structural equation model is carried out to test the hypotheses developed in the research model. In contrast, the process will turn back to literature review to redefine the constructs as well as the measurement instrument.

5. Results

5.1. Test results of the measurement instrument

Cronbach's Alpha and EFA were calculated with the support of SPSS (**S**tatistical **P**ackage for the **S**ocial **S**ciences) in advance. Extraction method was used in EFA is principal component – rotation method of Varimax. The breakpoint is at Eigenvalue ≥ 1 for all constructs in theory model. The results, in the table 2, indicated that six items were deleted because they could not get the target value. The remaining items have the coefficient of item-total correlation range from .462 to .775 (greater than 0.35), the minimum of Cronbach's Alpha is 0.748 (greater than 0.7), factor loadings range from .683 to .904 (greater than 0.4), Eigenvalue is greater than 1, the average variance extracted is greater than 50.

Then, CFA was carried out by AMOS software. After removing 4 items which do not get the target values, the measurement model including five constructs of QM is tested with the following results: χ^2 = 163.058; p = .132 (greater than 0.05); df = 144; χ^2/df = 1.132 (less than 3.0); GFI = .911, TLI = .985, CFI = .987 (greater than 0.9); RMSEA = .027 (less than 0.08), indicating that the QM measurement model is appropriate with the collected data (Bollen, 1989; Byrne, 1998; Carmines and McIver, 1981; Hair et al., 1995; Jaccard and Wan, 1996; Joreskog and Sorbom, 1993).

For the dependent construct, $\chi 2$ = 6.977, p = .222 (>0.05); df = 5; $\chi 2$/df = 1.395 (<3.0); GFI = .985, TLI = .988, CFI = .994 (>0.9); RMSEA = .047 (<0.08), indicating that the measurement model of the dependent construct is appropriate with the collected data.

Standardized Regression Weights of all items are greater than 0.6 (the minimum value is .656) and significant (p<0.05). The composite reliability of all items ranges from .721 to .872, greater than the acceptant level of 0.6 and the average variance extracted ranges from 51,1% to 69.5% (>50%) (Table 2). In addition, the correlation coefficient between pairs of constructs ranges from .417 đến .648 in the significant level of p = .000 (table 3). In other words, constructs have discriminant validity (Steenkamp and van Trijp, 1991). Likewise, each QM practices has high and positively related to operational performance, indicating that constructs have criterion-related validity (Chen and Paulraj, 2004; Kaynak, 2003; Li et al., 2005) (table 3). It is concluded that scales of constructs have unidimensional, reliability and validity (Bollen, 1989; Byrne, 1998; Carmines and McIver, 1981; Hair et al., 1995; Jaccard and Wan, 1996; Joreskog and Sorbom, 1993).

Table 2: Test results of measurement instrument

		Cronbach's Alpha and EFA with SPSS					CFA with AMOS		
Constructs	Observed items	Factor loadings	Item – total correlation	Eigen value	Variance extracted	Cronbach's Alpha	Standardized Regression Weights	Composite reliability	Variance extracted
Reporting and analysis of quality data	The collection of quality data.	.879	.731	2.387	79.562	.871	.810	.872	.695
	Display of quality data, control charts… at work stations.	.893	.757				.840		
	Delivery feedback of quality data to employees.	.904	.775				.850		
	Use of quality data in employees' tasks.	Deleted					Deleted		
	Availability of quality data.	Deleted					Deleted		
Product/service design	Use of modular design of component parts.	.721	.504	2.287	57.167	.748	Deleted	.721	.564
	Use of standard components.	.683	.462				Deleted		
	The simplification of products.	Deleted					Deleted		
	Review of new product/service design.	.825	.634				.775		
	Clarity of product/service specifications	.787	.576				.726		
Process management	Use of statistical techniques.	.803	.647	2.721	68.014	.843	.713	.844	.575
	Use of automatic processes.	.847	.710				.792		
	Use of fool-proof for process design.	Deleted					Deleted		
	Use of the preventive equipment maintenance.	.803	.649				.757		
	Clarity of work or process instructions.	.845	.706				.769		
Top management support	Offer of innovation and continuous improvement policies.	.761	.640	3.429	57.142	.850	.723	.809	.514
	Provision of necessary resources for processes.	.800	.686				.734		
	Promotion of partners' involvement in firm's activities.	.761	.639				.703		
	Participation of top management in quality improvement process.	.749	.625				.707		
	Review of quality issues in top management meetings.	.740	.615				Deleted		
	Responsibility for operational performance.	.722	.593				Deleted		
Human resource management	The relationship between human resource objectives and strategic.	.782	.669	3.548	59.135	.862	.735	.862	.511
	The role of environment on the development of all employees.	.744	.624				.661		
	Promotion in the motivation of employees.	.79	.679				.728		
	Involvement in determining training needs.	.768	.653				.730		
	Training program for employees timely.	.804	.697				.765		
	Responsibility in employees' tasks.	.721	.600				.660		
	The measurement methods of employee satisfaction.	Deleted					Deleted		
	The effectiveness of employee problem resolution program.	Deleted					Deleted		
Operational performance	Reduction of management costs.	.768	.626	3.080	61.594	.844	.656	.868	.517
	Reduction of lead-time.	.780	.643				.670		
	Reduction of order-time.	.793	.661				.764		
	Reduction of rate of damaged materials.	.827	.705				.779		
	Reduction of rate of late delivery.	.754	.612				.697		

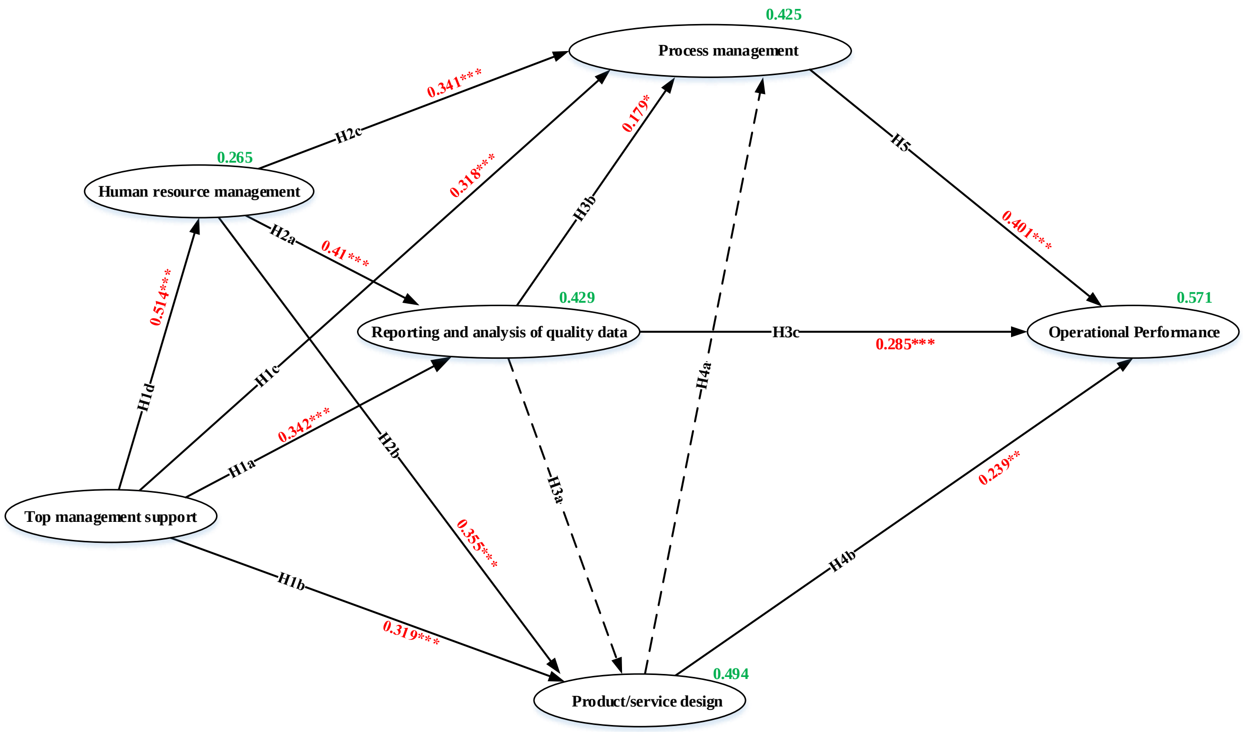
Table 3: Test results of correlation among constructs

Practices	1	2	3	4	5	6
1. Top management support	1					
2. Human resource management	.514	1				
3. Reporting and analysis of quality data	.556	.578	1			
4. Product/service design	.594	.592	.544	1		
5. Process management	.551	.548	.513	.417	1	
6. Operational performance	.475	.648	.617	.542	.640	1

5.2. Test results of hypotheses

The theoretical model was tested by method of Structural Equation Modeling (SEM) with the support of AMOS 5.0 software (Byrne, 1998). Test results of the structural model showed that χ^2 = 259.797 (p = .193 > 0.05); df = 241, χ^2/df = 1.078 (<3.0); TLI = .989, CFI = .990 (>0.9); RMSEA = .021 (<0.8), indicating that the structural model is an appropriate fit with the collected data.

Figure 2 describes the SEM results of relationships among QM practices and operational performance. Parameters on the arrows are Standardized Regression Weights and P-value. Test results indicated that all paths in the model, with the exception of the paths pertaining to H3a and H4a, are supported by the collected data (Standardized Regression Weights (β) ranges from .179 to .514 at the significant level, p<0.035).



*Notes: *p<0.1; **p<0.05; ***p<0.01*

Figure 2: Test results of SEM

The R^2 for operational performance explained by the QM practices is 0.571, indicating that the QM practices can explain a large amount of variance in operational performance. Therefore, it can be said that QM practices suggested in this study have important role in improving operational performance.

6. Discussion

This study determines the multidimensionality of QM constructs (Adam et al., 1997; Ahire and O'Shaughnessy, 1998; Anderson et al., 1995; Das et al., 2000; Dow et al., 1999; Flynn et al., 1995; Forza and Filippini, 1998; Kaynak, 2003; Kaynak and Hartley, 2008; Mohrman et al., 1995; Powell, 1995; Rungtusanatham et al., 1998; Samson and Terziovski, 1999; Shin et al., 2000). QM is identified as a multidimensional construct including different practices: top management support, human resource management, reporting and analysis of quality data, product/service design and process management. Operational perforamance will be improved remarkably if these practices are implemented as an integrated system instead of independent practices. In this system, they interact with each other and improve operational performance. The interaction among QM practices and the relationship between those and operational performance are presented as follows:

- The support practices consisting of top management support and human resource management are directly related to the core practices: reporting and analysis of quality data, product/service design and process management. The support practices create an environment that supports effective use of the core quality management practices. In particular, by maintaining the support and commitment of top management, encouraging the participation of employees in quality activities throughout empowerment and training program, an organization could create studied- and cooperated-based environment that can improve the efficiency of reporting and analysis of quality data, product/service design and process management.
- Reporting and analysis of quality data is both directly related to operational performance and indirectly through the relationship with process management. Quality data, which is collected and displayed in control charts, histograms, etc., and timely delivered to employees, is useful to identify problems in production processes. Based on them, preventive solutions and innovations are offered and operational performance is improved as a consequence. In addition, the relation of the support QM practices to reporting and analysis of quality data indicated that reporting and analysis of quality data is a mediating factor in the relationship between the support QM practices and operational performance.
- Product/service design is directly related to operational performance. By reviewing new product/service designs before they are produced and making clear specifications (Kannan and Tan, 2005), employees know clearly about products and what they need to do. They quickly get acquainted with their works that drives to low rate of errors, shorter lead-time and improve output. The cost of repair, rework also is significantly reduced. In addition, the relation of the support QM practices to product/service design indicated that product/service design is a mediating factor in the relationship between the support QM practices and operational performance.
- The relationship between process management and operational performance is supported in this study. When an organization can manage its processes effectively, manufacturing processes operate smoothly. Process variance and chances of employee errors are also minimized. Consequently, operational performance is improved. In addition, process management is also proved to have relationship with the support QM practices and reporting and analysis of quality data. It indicated that the role of process management is as a mediating factor in the relation of the support QM practices and reporting and analysis of quality data to operational performance.
- Human resource management is directly related to reporting and analysis of quality data and process management.

In Vietnam, garment is a labor-intensive industry (5% in the total of national workforce). Productivity and product quality are almost decided by direct labors. Human resource management throughout training programs and empowerment can enhance work performance of employees. Specifically, an effective training program helps employees know how to collect and use quality data and quality improvement tools in their tasks. In addition, empowerment makes employees more active, easier in their tasks, e.g. cooperation with other departments to collect quality data or even suggest continuous improvement initiatives at their workplace. It is useful to improve the efficiency of quality data and business processes.

To improve efficiency of QM practices and operational performance, therefore, it is necessary to build up a high quality human resource which needs to be considered as the most important factor to gain competitive advantage. In doing so, based on the research results, some following solutions are proposed:

- Human resource objectives should be integrated into firm's strategies.
- Companies need to organize training programs timely and employees are involved to determine training needs.
- Firms pay attention to create a work environment conductive to the development of employees and empower for them in their tasks.

In addition, the research results indicated the relation of top management support to human resource management. It proves the mediating role of human resource management in the relationship between top management support and other QM practices.

- Top management support plays the driving force for the implementation of other QM practices. It indirectly improves operational performance throughout paying attention to (1) training programs and create a good environment for employees, (2) collection and use of quality data, (3) effectiveness of product/service design, and (4) process management. The research results showed that successful implementation of top management support practice required the participation of top management actively in the quality improvement process. Top management, who has responsibility for quality performance, needs to create quality-related policies and objectives as well as conveys them to employees.

In an enterprise, top management could be Board of Directors. Widenly, it could be associations or governments in an industry or in a country. Therefore, the support of top management could create a good environment helping companies to improve their operational performance.

The relationship among product/service design and other practices, including reporting and analysis of quality data and process management is not supported by data in this study. The reason can be that Vietnamese garment enterprises, currently, mainly work at cutting & sewing stages - the lowest value-added segment in global apparel value chain. Others, such as design, input materials and distribution, etc., are nominated by customers. The use of quality data in the design process, therefore, is not concerned. And the passive attitude in design activities leads to the lack of attention in the establishment of cross-functional teams, in the use of standard components and modular design of component parts to improve process. Thus, in the context of Vietnam garment industry, product/service design is not related to reporting and analysis of quality data and process management. This result is contradictory with the studies of (Kaynak, 2003; Kaynak and Hartley, 2008; Ou et al., 2010). Hence, future research should test this result in different contexts to consolidate the statements about relationship among them.

6. Conclusion

This research project aimed at exploring the relationships between QM practices and operational performance. A conceptual model was developed and an empirical study was carried out to validate the model. The results showed that operational performance is impacted by QM practices under two groups: support practices (including: top management support, human resource management) and core practices (including: reporting and analysis of quality data, product/service design and process management). These factors interact with each other to improve operational performance, so it's better if these practices are implemented as an integration system rather than independent. Therefore, in order to improve operational performance, practitioners and researchers could not simply choose some practices mentioned in this study to apply in their context. These practices should be applied simultaneously and the structural model was used in this study could play as a "guideline" to the implementation of QM practices.

It was noted that operational performance is not only impacted by QM practices as suggested in this study, but also by many factors such as: external environment, capital, technology, equipment, information flow, etc. However, QM practices suggested in this study could explain 57.1% variance of operational performance, which is a remarkable value. Enterprises which have limitations in resources for equipment investment and technological innovations could still improve operational performance remarkably by the implementation of these QM practices. In other words, in the same conditions of finance, capital, technology, equipment, information, etc., firms which could implement QM practices successufully will have higher operational performance.

Finally, the proposed research model is also a valuable document for next empirical studies, especially for countries having the transitional economy as Vietnam.

Within the scope of this study, there are some aspects that haven't been yet considered including a wider sample, which extends to other industries and countries, will allow the generalization of the main findings. Also, it will be more comprehensive if future researches incorporate other critical factors such as external environment, capital, technology, equipment, information flow, oursourcing, etc. These imply directions for further research.

Acknowledgment

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

This work was also financed with FEDER funds by Programa Operational Fatores de Competitividade (COMPETE) and national funds by Fundação para a Ciência e Tecnologia (FCT) through Project: FCOMP-01-0124-FEDER-022674.

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