

# The Impact of TQM Practices in Improving Product Quality: Bangladesh Garment Organizations as a Case<sup>+</sup>

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## Abstract

The increase in competition, changes in import and export policies, and increased customer consciousness have resulted in organizations focusing on the use of TQM practices to remain competitive. This study identifies the practices of TQM. In addition, this study also examines the association between TQM practices and product quality. It uses data obtained from 133 garment organizations. Results reveal that TQM practices, including leadership (employee empowerment, resource allocation), employee participation (cross-functional teams, employee authority), supplier relationship (supplier audit), and customer focus (customer survey) have positive association with product quality. These findings lead to the conclusion that if sample organizations can achieve quality improvement thorough TQM practices, then other garment organizations of Bangladesh may also do so. It is important to create right awareness for all organizations to realize these improvements.

**Keywords:** TQM practices, Developing country, Product quality.

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## 1. Introduction

The increase in competition, changes in import, export policies and increased customer consciousness have resulted in organizations focusing on the use of various strategic tools to survive in this increasingly competitive market (Wanderi et al., 2015; Lakhe and Mohanty, 1994). In response, researchers and practitioners have directed their focus on the use of management techniques such as Total Quality Management (TQM) (Cheng, 2009; Wayhan and Balderson, 2007).

The concept of TQM was introduced in the 1920's when a statistical approach was first used for the quality control in the factories in USA (Islam

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and Mustafa, 2008). It is a management approach that focuses on incorporating quality in all organizational processes (Savolainen, 2000). TQM involves systematic activities to efficiently manage all processes of organizations and contribute to the achievement of organizations' goals in order to provide quality goods and services (Khan et al., 2011). It is also an organization-wide philosophy that ensures continuous improvement of products and service quality while simultaneously reducing costs (Grill and Whittle, 1992). It works through quality circles to encourage and meet quality at all levels in order to improve production and reduce wastage (Talib et al., 2011). It is a set of techniques and procedure used to reduce or eliminate variation from production processes. As mentioned by Pheng and Jesmine (2004), the practice of TQM brings several benefits for organizations including higher customer satisfaction, better quality products and higher market share. The use of TQM can change organizational culture and management approaches as compared to the traditional way of managing an organization and quality (Njie et al., 2008). TQM practices can enhance quality in order to increase customer satisfaction (Garrison and Noreen, 2003).

While in developed countries like UK, USA and Japan, TQM has been the common issue for many years in all business sectors, particularly, in manufacturing industry (Chowdhury, 2010), in a developing country like Bangladesh, TQM is also a vital tool for improving quality. While a large number of studies have focused on the practices of TQM (Jaca and Psomas, 2015; Zhang et al., 2012; Haar and Spell, 2008; Sila, 2007; Witcher, 1994; Taylor and Wright, 2003; Gilson et al., 2002; Ismail and Hashmi, 1999; Edwards et al., 1998; Mohrman et al., 1995), there are some studies that focus on the use of TQM from a developing country (Al-Omiri, 2012; Saleheldin, 2009; Turner et al., 2000) perspective. It is important to conduct research on developing countries as they are different from developed countries in many aspects including their political, economic, social and cultural environments. Accordingly, in order to provide further insight into TQM, this study focuses on examining its practices from a developing country perspective.

While various studies have focused on the association between TQM and performance (Basu and Bholap, 2016; Zehir et al., 2012; Corredor and Goni, 2011; Fotopolous and Psomas, 2010; Gadenne and Sharma, 2009; Kumar et al., 2009; Pinho, 2008; Vijande and Gonzale, 2007; Prajogo and Sohal, 2006; Feng et al., 2006; Demirbag et al., 2006; Prajogo, 2005; Seth and Tripathi, 2005; Prajogo and Brown, 2004; Fuentes et al., 2004; Prajogo and Sohal, 2003; Watson et al., 2003; Montes et al., 2003; Rahman, 2001) they have been mainly focused on quality performance (Talib et al. (2013); Zehir et al. (2012), financial performance (Demirbag et al. (2006); Agus and

and Abdullah (2000); Vijande and Gonzale (2007), and non-financial performance (Abusa (2011); Fotopolous and Psomas (2010); Vijande and Gonzale (2007)). There are only a few studies that measure performance in terms of product quality (Zhang et al., 2012). Considering the export orientation of Bangladesh garment industry where ensuring product quality is key to satisfying its buyers, this study considers product quality as an important indicator of measuring performance.

Therefore, the study focused on the following research objectives:

1. To examine the practices of TQM in the garment organizations of Bangladesh.
2. To examine the association between TQM practices and product quality in the garment organizations of Bangladesh.

## **2. Literature and Hypothesis Development**

The developments in the management of quality during the 1980s led increasingly to the use of the practices of TQM (Manni et al., 2003). While several studies (Jaca and Psomas, 2015; Zhang et al., 2012; Haar and Spell, 2008; Sila, 2007; Witcher, 1994; Taylor and Wright, 2003; Gilson et al., 2002; Ismail and Hashmi, 1999; Edwards et al., 1998; Mohrman et al., 1995) have measured TQM practices in terms of leadership, top management commitment, customer focus, employee involvement, employee empowerment, supplier quality management, reward and recognition and culture, this study have chosen four TQM practices, namely leadership, employee involvement, customer focus and supplier quality. These factors were chosen as they have been strongly supported in several studies (Zhang et al., 2012; Fotopoulos and Psomas, 2010; Saleheldin, 2009; Sharma and Gadenne, 2002; Basu and Bholap 2016; Zehir et al., 2012; Kapuge and Smith, 2007; Karim, 2009). Further, this study examines the association of TQM practices with product quality, which is measured in terms of product conformity rate. This performance indicator has been identified from the study by Zhang et al. (2012). The following section discusses the association between TQM practices and product quality.

### **2.1 Leadership**

There is no alternative to effective leadership to successfully attain TQM. According to Ugboro and Obeng (2000), top management commitment plays an vital role in achieving customer satisfaction. The European Quality Award (1994) and the Malcolm Baldrige Quality Award (1999) emphasized the importance of leadership in pursuit of quality improvement. In this study, the concept of leadership is measured in terms of top management

commitment, top management participation, top management encouragement and top management empowerment.

### **2.1.1 Top Management Commitment**

It is evident that the top management support and commitment play a critical role in TQM effectiveness (Mersha, 1997). It is important to provide unwavering support to ensure quality and excellence through promoting initiatives among managers and workers. Garvin (1983) suggests that higher levels of quality performance are always attained by an organization's commitment and high product quality which is facilitated by the strong commitment of top management. Top management commitment to enhancing quality enables an organization to engage in continuous improvement and facilitate the organizations quality improvement efforts (Gibson, 1990). There must be certain quality policies developed by the top managers that contribute to organizations in improving product quality (Motwani et al., 1994).

### **2.1.2 Top Management Participation**

It is very difficult to improve product quality if top managers do not lead and participate (Zhang et al., 2012). It is essential to ensure top managers' direct participation in improving product quality. Top management participation is crucial to an organization's quality improvement efforts (Dale, 1999) in particular, product quality (Zhang et al., 2012).

### **2.1.3 Employee Empowerment through Top Management**

Empowered employees are expected to perform more effectively. Empowered employees are more confident that results in quality improvement. Employee empowerment through top management is considered as one of the critical practices of TQM. Zhang et al. (2012) showed a direct association between employee empowerment and product quality. Based on above discussion, the following hypothesis is developed:

*H1: The higher the leadership the greater the product quality.*

## **2.2 Employee Participation**

Employee participation indicates the extent to which employees in an organization engage in various quality related activities. Employee participation attributes include teamwork, employee suggestions, and employee commitment. Teamwork (e.g., cross-functional teams and within-functional teams), considered an important characteristic of employee participation and focuses on the improvement at the input and output of any stage. Cross-functional quality teams and task forces are common in quality-oriented organizations (Hackman and Wageman, 1995). Organizations emphasize quality control (QC)

circle (a group of workforce-level people, usually from within one department, who volunteer to meet weekly to address quality problems that occur within the department (Juran and Gryna, 1993). Cooke (1992) reveals that there is a significant effect of employee participation on product quality. Many studies also show that there is a relationship between employee suggestion and product quality. Therefore, the following hypothesis is proposed:

*H2: The higher the employee participation the higher the product quality.*

### **2.3 Supplier Quality Management**

In the current competitive market, the dependence of buyers on suppliers has increased to a great extent. There is a relationship between buyers and suppliers that have emerged in the form of supplier partnership (Juran and Gryna, 1993). It has been referred that working with suppliers as a partner and maintaining a long-term relationship with them help improve product quality (Deming, 1986). It is important therefore to ensure incoming material from a competent and reliable supplier to ensure the quality of the finished product (Juran, 1981). In manufacturing organizations where quality is the key developing a long term cooperative relationship with suppliers participating regularly in supplier quality activities and giving them feedback on the performance of their product are necessary to the continuous improvement of product quality (Zhang, et al., 2012). Zhang (2000) also suggests that improving supplier quality management will contribute to the improvement of the organization's product quality. Therefore, the following hypothesis is developed:

*H3: The higher the supplier quality management the higher the product quality.*

### **2.4 Customer Focus**

Customer focus can be defined as the degree to which an organization continuously satisfies customer needs and expectations (Zhang et al., 2012). The key to quality management is to maintain a close relationship with the customer in order to understand the customer's requirements as well as to receive feedback on the extent to which those needs are being met. Organizations can focus on customer complaint, thereby improving product quality. It is important to identify the serious complaints that require thorough consideration to identify causes and to provide solutions (Juran and Gryna, 1993). It is also important to examine the quality of finished products as it works as a useful predictor of customer satisfaction. Such information includes data on field failures or service-call rates, and analysis and reporting of customer attitude trends regarding product quality. Therefore, the following hypothesis is developed:

*H4: The higher the customers focus, the higher the product quality.*

## 2.5 Product Quality

Product quality is key to the success of any organization. It has been seen that the quality image enables an organization to compete for success (Pfau, 1989). DuBrin (1995) notes that organizations must place a high priority on product quality in order to remain their competitive positions. Ahire et al. (1996) suggest that improving product quality must be the core concern of an organization's quality management efforts. Organizations are increasingly recognizing the strategic importance of product quality (Anderson et al., 1994). In the past while different studies measured product quality in terms of factors such as reliability, durability and conformity (Zhang et al., 2012), this study measures product quality in terms of product conformity.

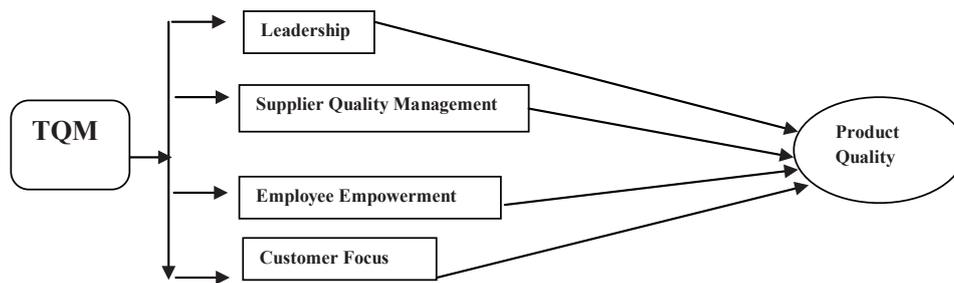


Figure 1: The association of TQM practices with product quality

## 3. Methodology

A quantitative approach was used to conduct the study. A sampling frame was developed using the lists of garment units obtained from the Bangladesh Garment Manufacturers and Exporters Associations (BGMEA), Bangladesh Knit Manufacturers and Exporters Association (BKMEA), and Bangladesh Export Processing Zone Authority (BEPZA). This sampling frame has been

Table 1: Distribution of sampling units

Places/location	Total number of units in a location	Proportion (%)	Selected units in each location
Dhaka	3058	87.67	128
Gazipur	163	4.67	7
Narayanganj	131	3.76	5
Savar	75	2.15	3

Chittagong EPZ	35	1.00	2
Dhaka EPZ	26	0.75	2
Total	3488	100.00	133

used to determine sample size and respondents. Using a purposive sampling technique, a survey questionnaire was sent to 133 garment organizations. A total of 59 organizations participated in the survey. Due to response biases and inconsistencies in the responses, 11 garment firms were excluded. Finally, 48 organizations were used.

The respondents were the head of organizations, functional managers such as the production manager, and the quality control manager.

Table 2: Measurement of Variables

Independent Variables	Indicators	Measurement Scale
Leadership	Top management participation (LS_parti)	Interval
	Quality related concepts & skills (LS_skills)	Interval
	Encourage employee involvement (LS_encr)	Interval
	Vision for employee empowerment (LS_empw)	Interval
	Resource allocation for TQM application (LS_resrs)	Interval
	Meeting about TQM updates (LS_meet)	Interval
	Prime focus on product quality (LS_fcus)	Interval
	Long term focus of business (LS_long)	Interval
Employee Participation	Cross-functional team (Ep_cftem)	Interval
	Quality control circle (EP_QCcir)	Interval
	Involvement in quality related activities (EP_inv)	Interval
	Suggestion inputs from employees (EP_sug)	Interval
	Implementation of employee suggestions (EP_imp)	Interval
	Employee commitment to quality (EP_compt)	Interval
	Employees can fix problems by themselves (EP_fix)	Interval
	Employee reporting to top management is encouraged (EP_report)	Interval

Supplier Quality Management	Long-term relationship with suppliers (SQ_long)	Interval
	Product quality is the primary concern in supplier selection (SQ_pq)	Interval
	Supplier participation in quality programs (SQ_part)	Interval
	Feedback from suppliers (SQ_feedback)	Interval
	Written quality documentation for supplies (SQ_written)	Interval
	Conducting supplier audit (SQ_audit)	Interval
Customer Focus	Collects complaints from customer (CF_compln)	Interval
	Priority for quality related complaints (CF_prior)	Interval
	Customer satisfaction survey (CF_survey)	Interval
	Long term customer focus (CF_long)	Interval

## 4. Analysis and Discussion of Results

### 4.1 Descriptive Statistics

Table 4 provides the descriptive statistics for independent and dependent variables. All Cronbach alpha coefficients exceeded the 0.7 threshold (except one) considered acceptable for scale reliability (Nunnally, 1978, p.245). A five point Likert scale was used in measuring the dependent and independent variables. Variables were measured using measures from Zhang (2000). In addition, a validity analysis was also conducted. Validity is concerned with how well a concept is defined by its measures. This study uses content validity. The main purpose of content validity is to ensure that the selection of construct items extends to all past empirical issues, theories, as well as practical considerations (Robinson et al., 1991). This study used content validity. The development of measurement items was based on an extensive review of the existing literatures and detailed evaluations undertaken by industry personnel. Moreover, a pretest indicated that the content of each factor was well represented by the measurement items employed.

Table 3: Summary of Reliability Test: Internal consistency analysis for individual factors

Variable	No of items	No of items deleted	Cronbach's Alpha
Leadership	8	None	0.737
Employee Participation	8	None	0.835
Supplier Quality Management	6	None	0.688
Customer Focus	4	1	0.779
Product Quality	3	None	0.922

Table 4: Implementation of TQM in organizations

Existence of Department	Frequency	Total	Percentage response
Independent quality control department	23	48	11.04%
Assigned manager (single) for quality control	19	48	9.12%
Common managerial position deals with quality iss	06	48	2.88%

Table 5 indicates that little over one in tenth (11.04%) of the organizations have individual quality control department. Only 9.12% of the organizations showed to have minimum one assigned quality control manager. Only 2.88% of respondents agreed to have designated positions responsible for quality activities.

#### 4.2 Cross Tabulations

However, while interaction between variables would be useful to gain managerial insight, for the analysis a cross-tabulation was used. Table 5 shows the percentages calculated row wise based on column totals:

- Among organizations reporting high empowerment, the majority (96.6%) reported about high allocation of resources. Among organizations reporting low empowerment, half of the cases (52.6%) reported low allocation of resources.
- Among organizations reporting low empowerment, 47.4 percent reported high allocation of resources. This figure indicates that resource direction is not toward employee empowerment.
- Only one respondent among 48 reported low level of resource allocation as well as high level of employee empowerment.

Table 5: Cross-Tabulation: Employee Empowerment\* Resource Allocation

		Resource allocation for quality issues		
		Low resource allocation	High resource allocation	Total
<b>Empowering Employees</b>	Low level of empowerment	10 52.6%	9 47.4%	19 100%
	High level of empowerment	1 3.4%	28 96.6%	29 100%
<b>Total</b>		11 22.9 %	37 77.1 %	48 100 %

Result of Chi-square test:

Category	Observed Value	Expected Value	(Obs-Exp)	(Obs-Exp) <sup>2</sup>	(Obs-Exp) <sup>2</sup> /exp
Low level of empowerment	10	4.35	5.65	31.9225	7.338505747
High level of empowerment	1	6.65	-5.65	31.9225	4.80037594
Low resource allocation	9	14.65	-5.65	31.9225	2.179010239
High resource allocation	28	22.35	5.65	31.9225	1.428299776
				Chi-square=	15.7461917

The calculated value is 15.75 and table value P=3.48 at .05 significant level and DF is 1. From the Chi-square test it is found that the association is statistically significant.

The table 6 shows the percentages calculated column wise based on column totals:

- Among organizations reporting high employee authority to fix problems by themselves, the majority (88.9%) reported about high empowerment. Among organizations reported low employee authority to fix problems, less than half of the organizations (46.2%) reported low empowerment.

Table 6: Cross-Tabulation: Empowering Employees\*Employees Authority

		Empowering employees		Total
		Low level of empowerment	High level of empowerment	
<b>Fix problem by themselves</b>	Low level of employee authority	18 46.2%	21 53.8%	39 100.0%
	High level of employee authority	1 11.1%	8 88.9%	9 100.0%
<b>Total</b>		19 39.6%	29 60.4%	48 100.0%

- Among organizations reporting low employee authority, 53.8 percent reported high employee empowerment, a figure that is not consistent.

Result of Chi-square test:

Category	Observed Value	Expected Value	(Obs-Exp)	(Obs-Exp) <sup>2</sup>	(Obs-Exp) <sup>2</sup> /exp
Low level of employee authority	18	15.44	2.56	6.5536	0.424455959
Low level of employee authority	1	3.56	-2.56	6.5536	1.840898876
Low level of empowerment	21	23.56	-2.56	6.5536	0.278166384
High level of empowerment	8	5.44	2.56	6.5536	1.204705882
				Chi-square=	3.748227101

The calculated value is 3.75 and table value P=3.48 at .05 significant level and DF is 1. The result shows that the relationships among the variables are statistically significant.

		Resources for employee training		
		Low resource allocation	High resource allocation	Total
<b>Customer satisfaction survey</b>	Occasional customer survey	8 61.5%	5 38.5%	13 100.0%
	Regular customer survey	3 8.6%	32 91.4%	35 100.0%
<b>Total</b>		11 22.9%	37 77.1%	48 100.0%

- Among organizations reporting high resource allocation, less than half of the organizations (38.5%) reported occasional/ irregular customer surveys-which indicates allocation of resources to address quality issues have not been customer focused.

Result of Chi-square test:

Category	Observed Value	Expected Value	(Obs-Exp)	(Obs-Exp) <sup>2</sup>	(Obs-Exp) <sup>2</sup> /exp
Occasional customer surveys	8	2.98	5.02	25.2004	8.456510067
Regular customer surveys	3	8.02	-5.02	25.2004	3.142194514
Low resource allocation	5	10.02	-5.02	25.2004	2.51500998
High resource allocation	32	26.98	5.02	25.2004	0.93404003
				Chi-square=	15.04775459

The calculated value is 15.05 and table value P=3.48 at .05 significant level and DF is 1. The result shows that there is an association between resource allocation and customer surveys.

The table 8 shows percentages calculated column wise, based on column totals:

- Among organizations reporting regular customer surveys, a majority of the cases (94.3%) reported regular collection of customer complaints. Among organizations reporting occasional/ irregular customer surveys, 23.1 percent reported occasional customer surveys.
- Among cases reporting regular customer surveys, a very few (5.7%) reported occasional collection of customer complain.

Table 8: Cross-Tabulation: Collection of Customer Complaint \* Customer Survey

		Collects complaints from customer		
		Occasional collection of customer complaints	Regular collection of customer complaints	Total
<b>Customer Satisfaction Survey</b>	Occasional customer surveys	3 23.1%	10 76.9%	13 100.0%
	Regular customer surveys	2 5.7%	33 94.3%	35 100.0%
<b>Total</b>		5 10.4%	43 89.6%	48 100.0%

### Result of Chi-square test

Category	Observed Value	Expected Value	Obs-Exp	(Obs-Exp) <sup>2</sup>	(Obs-Exp) <sup>2</sup> /exp
Occasional customer surveys	3	1.35	1.65	2.7225	2.01666667
Regular customer surveys	2	3.65	-1.65	2.7225	0.745890411
Occasional collection of customer complaints	10	11.65	-1.65	2.7225	0.233690987
Occasional collection of customer complaints	33	31.35	1.65	2.7225	0.086842105
				Chi-square=	3.08309017

The calculated value is 3.08 and table value P=3.48 at .05 significant level and DF is 1. The result shows that there is an association between occasional customer surveys and regular customer surveys.

### 4.3 Multivariate Analysis

*Logistic Regression:* Logit Regression Model estimates the probability of an observation belonging to a particular group. The regression model predicts the logit, that the natural logs of the odds have made one or the other decision. That is,

$$\log_e(p/1-p) = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + \dots + a_ix_i$$

Where,

$$\log_e(p/1-p) = \ln(\text{ODDS}) = \log \text{ of odds}$$

p= probability to have high product quality

a<sub>i</sub> = parameter to be estimated

x<sub>i</sub> = independent variable

In logistic regression, the log odds that  $\log e (p/1-p)$  is a linear function of the estimated parameters. Thus, if  $x_i$  is increased by one unit, the log odds will increase by  $a_i$  unit(s), when the effect of other independent variables is held constant. Thus  $a_i$  is the size of the increase in the log odds of the dependent variable even when the corresponding independent variable  $x_i$  is increased by one unit and the effect of the other independent variables are held constant.

*Estimated Logit Regression Model:* This study estimates the logit regression model in the following way:

Each error term assumes only two values. Here, If  $y=0$ , the error is  $p$  and if  $y=1$ , the error is  $1-p$ . Therefore, the parameter is estimated in a way that the estimated values of  $p$  would be close to 0 when  $y = 0$  and close to 1 when  $y=1$ . The model is constructed by an iterative maximum likelihood procedure. The program starts with arbitrary values of the regression coefficients and constructs an initial model for predicting the observed data. It then evaluates errors in such prediction and changes the regression coefficients so as make the likelihood of the observed data greater under the new model. This procedure is repeated until the differences between the new model and the previous model are trivial.

#### 4.4 Model Fit

In binary logistic regression, commonly used measures of model fit are based on the likelihood function and are Cox & Snell R square and Nagelkerke R square. If estimated probability is greater than 0.5 then the predicted value of Y is set to 0. Findings show that the -2 Log Likelihood statistics is 23.934. This statistic measures how poorly the model predicts the decisions -- the smaller the statistic the better the model. Therefore, the statistic is quiet satisfactory. The Cox & Snell R2 can be interpreted like R2 in a multiple regression, but cannot reach a maximum value of 1. The Nagelkerke R2 can reach amaximum of 1. Cox & Snell R square (0.331) and Nagelkerke R square (0.558) measures indicate a reasonable fit of the model to the data.

#### 4.5 Significance of Testing

Table 10: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	19.320	9	.023
	Block	19.320	9	.023
	Model	19.320	9	.023

Moreover, Omnibus Tests of Model Coefficients shows that a Chi-Square of 19.320 on 9 *df*, significant beyond .05. This is a test of the null hypothesis

that adding variables to be considered to the model has not significantly increased the ability to predict the decisions made by the subject that is rejected and justify the research as per the expectation.

Moreover, the variables in the Equation output shows that the regression equation is  $\log_e (p/1-p) = a_0 + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_ix_i$

Here,

$\log_e (p/1-p) = \ln (\text{ODDS}) = \log$  of odds,  $p$ = probability to have high product quality,  $a_i$ = parameter to be estimated,  $x_i$  = independent variable.

Table 11: Variables in the Equation

	B	S.E.	Wald	df	Sig.	Acceptance/rejection of hypotheses	Exp(B)
LS_empw(1)	.984	.491	4.013	1	.038	accepted	2.675
LS_resrs(1)	.427	.216	3.901	1	.043	accepted	1.534
EP_cftteam(1)	.051	.026	3.841	1	.050	accepted	1.052
EP_QCcir(1)	75.288	1.747E4	.000	1	.997	Not accepted	4.980E32
EP_fix(1)	.800	.401	3.982	1	.041	accepted	2.225
SQ_written(1)	-.120	1.025	.014	1	.907	Not accepted	.887
SQ_audit(1)	.912	.456	4.005	1	.021	accepted	2.489
CF_cmpln(1)	-.535	1.618	.109	1	.741	Not accepted	.586
CF_survey(1)	.814	.363	5.016	1	.027	accepted	2.257
Constant	.195	1.081	.032	1	.857	Not accepted	1.215

a. Variable(s) entered on step 1: LS\_empw, LS\_resrs, EP\_cftteam, EP\_QCcir, EP\_fix, SQ\_written, SQ\_audit, CF\_cmpln, CF\_survey.

Result reveals that the ODDS is 0.215. Moreover, the Variables in the Equation output also show the Exp (B). The model presenting the interpretation of odds ratios in the following way:

***Leadership- employee empowerment and product quality***

If organizations have employee empowerment, then the ODDS= 2.675. That means an organization having a high level of product conformity is 2.675 times higher for higher level of employee empowerment than for low level of employee empowerment.

***Leadership- resource allocation for TQM implementation and product quality***

If the organizations have resources for TQM deployment, then the ODDS= 1.534. That means an organization having a high level of product conformity is 2.675 times higher for higher level of resource allocation than for low level of resource allocation.

***Employee participation in cross-functional team(s) and product quality***

If organizations participate in cross-functional team, then the ODDS= 1.052. That means an organization having regular cross-functional team is 1.052 times more likely to have a high level of product conformity than an occasional cross functional team.

***Employee authority to fix problem and product quality***

If organizations enjoy authority to the quality problems, then the ODDS= 2.225. That indicates that an organization's perceived high level of employee authority is 2.225 times likely to have a high level of product conformity than low level of employee authority.

***Supplier audit and product quality***

If organizations report routine and frequent supplier audit, then the ODDS= 2.489. That reveals that an organization having regular and frequent supplier audit is 2.489 times more likely to have a high level of product conformity than infrequent and occasional audit.

***Customer survey and product quality***

If organizations report regular consumer surveys, then the ODDS= 2.257. That indicates that an organization having frequent consumer survey is 2.257 times more likely to have a high level of product conformity than an occasional customer survey.

**5. Conclusion**

The objectives of this study were to identify TQM practices and to examine the association of TQM practices with product quality in the garment firms of Bangladesh. Results reveal that TQM practices, including leadership (employee empowerment, resource allocation), employee participation (cross-functional teams, employee authority), supplier relationship (supplier audit), and customer focus (customer survey) have positive association with product quality. The result indicates that in the sample garment organizations associations exist among the measures of TQM practices, such as resource allocation with employee empowerment, resource allocation with customer survey's employee empowerment with fixing problems, and customer complaints with customer surveys. Therefore, it is important for managers to ensure employee empowerment in order to improve quality. The results also indicate that adequate resource allocation is a crucial factor for quality improvement. The findings suggest that while, high level of resources are allocated to and directed for a quality improvement, that will yield improvement as much as 1.5 times higher than that of organizations where resource allocations are low. Therefore, managers need to carefully allocate adequate resources to influence quality. regular use of cross functional team. Those who have regular teams in the workplace have showed 1.05

times higher product conformity than occasional users of cross-functional teams. Considering the importance of teams in quality improvement, managers must create several cross-functional teams.

In addition, the findings reveal the advantages of conducting regular audits for supplier quality management, which allows generation 2.5 times more conformity in products than those that do not have regular supplier audit. Therefore, in order to ensure product quality, managers should conduct regular audits through developing a trustworthy relationship with the suppliers. In addition, managers should develop periodic customer surveys in order to ensure higher product conformity, as the customer is the key source of knowing about product quality. These findings reveal that organizations that adopted TQM as a working philosophy within their organizations can make improvement in product quality.

Therefore, it can be assumed that if sample organizations can achieve quality improvement through TQM practices, then other garment organizations of Bangladesh may also achieve the same. It is important to create right awareness for all organizations to realize these improvements.

## **6. Limitations and Suggestions for Future Research**

The study has some limitations. Firstly, data was gathered from only 48 organizations. Although the samples were drawn using the Stratified Random Sampling Technique and obtained 133 as samples, due to time and cost limitations finally, 48 firms were chosen using purposive sampling techniques. While multivariate analysis requires probability sampling, this study conducted logistic regression using non-probability sampling.

Secondly, in this study only the management level was considered as samples while shop floor workers were directly related to the quality activities.

Thirdly, while there are several measures of product quality, including features, aesthetics, performance reliability, conformance durability etc, this study used only “conformity” to measure product quality as it is found to be the most commonly used measure in the literature (Zhang et al., 2000; Karim, 2009). Future research may consider these limitations and conduct similar kind of research on large number of organizations. Moreover, future research may consider all the other dimensions for measuring product quality.

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