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## IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT IN BANGLADESH: A STUDY ON MEGHNA CEMENT MILLS LIMITED

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### Abstract

Total Quality Management is a broad based systematic approach for achieving higher level of product or service quality. TQM emphasizes some principles. Through the proper application of these principles a higher level of product or service quality could be achieved. This study assumed that quality, satisfaction and strategic business performance are dependant variables and leadership, process management, evaluation, supplier quality management, customer focus, education and training, recognition and reward etc. are independent variables. The study finds positive relationships among the constructs. That is employee satisfaction has a positive effect on product quality and customer satisfaction, product quality has a positive effect on customer satisfaction and strategic business performance. Finally, some suggestions are put to maintain proper relationship among the constructs.

### Introduction

Meghna Cement Mills Ltd (MCML) is a part of Bashundhara group. MCML is located in the south-western part of Bangladesh at Mongla Port Industrial Area, in Mongla, Bagerhat under the Khulna Division.

The Mongla Port is the second-largest seaport of Bangladesh. The Jetty of MCML is situated on the eastern side of the river 'Possur'. This river is also connected with many other rivers of the country. The factory stands close to the Mongla-Khulna Highway as well. Given this favorable geographical scenario; it is easy to implement a year-round delivery and raw material transportation to and from the MCML factory site to remote corners of Bangladesh. The Meghna Cement Mills Ltd. is the largest domestic cement-producing unit in Bangladesh. Its excellent quality-control standards have helped the Company acquire the ISO-9001 certification. The product of the Mill is being marketed under the trademark of 'King Brand Cement'. This brand now has a steady market share. The Mill was set up in 1995 on 10.5 acres of land and went into commercial production in January 1996. Bashundhara's "King" Brand cement is well-known throughout Bangladesh. The weight of each marketed bag is always perfect due to the adoption of an automated packaging system. There is a laboratory, equipped with modern equipment within the Mill premises to conduct tests at each hour for every shift covering every stage of the production process. The most recent quality standards, namely BS and ASTM, have also been incorporated in this brand of cement. The present study focuses on the various independent factors affects the total quality management of MCML.

### Literature Review

Total Quality Management is still somehow dependent on its environment. In cases customer and quality performance incentive pay increases the positive effects of TQM which is illustrated by management accounting systems (MCSs), Sim and Killough (1998). Reward systems depend on timely problem solving information and flexible revisions and Ittner and Larcker (1995) demonstrated the linkage between product focused TQM was linked to timely problem solving information and flexible revisions. "TQM is associated with broadly based MCSs including timely, flexible, externally focused information; close interactions between advanced technologies and strategy; and non-financial performance measurement." this notation by Chendall (2003) was result of his findings from contingency-based research concerning management control systems and TQM. The theoretical essence of the Deming approach to TQM concerns the creation of an organizational system that fosters cooperation and learning for facilitating the implementation of process management practices, which, in turn, leads to continuous improvement of processes, products, and services as

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well as to employee fulfillment, both of which are critical to customer satisfaction, and ultimately, to firm survival (Anderson et al., 1994a). A number of important practices and principles for a successful quality improvement program, which include, reduction of the cost of quality, management responsibility for quality education, management participation, , employee recognition, which is found by Crosby (1979) has focused on prevention rather than after-the-event inspection, doing things right the first time, and zero defects. According to Crosby lack of knowledge and lack of attention are the main two reasons for doing mistakes. Crosby described the quality management maturity grid which can play an important role in case of assessing firm's quality management maturity. In the year 1991 Feigenbaum found out that the quality chain starts with the identification of all customers' requirements and ends when the customers are satisfied with the availability of the product and proper/timely service. Hence all functional activities, such as marketing, design, purchasing, manufacturing, inspection, shipping, installation and service, etc play an important role and have a great impact on the attainment quality.

### Conceptual Framework

*Definition of TQM:* TQM is a broad based systematic approach for achieving higher level of product and service quality. It emphasizes some principles (mentioned in the principles of TQM section of the present discussion). Through the proper application of such principles higher levels of product and service quality can be achieved. (ISO 8402:1994), defined, "TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society." Feigenbaum (1991) defined TQM as: An effective system for integrating the quality development, quality-maintenance, and quality-improvement efforts of the various groups in a firm so as to enable marketing, engineering, production, and service at the most economical levels which allow for full customer satisfaction

*Principles of TQM:* Many authors prescribed various principles of TQM. Ho and Fung (1994) identified ten TQM elements: Leadership, commitment, total customer satisfaction, continuous improvement, total involvement, training and education, ownership, reward and recognition, error prevention, and cooperation and teamwork. Ahire et al. (1996) mentioned twelve principles are (1)

Top management commitment; (2) Customer focus; (3) Supplier quality management; (4) Design quality management; (5) Benchmarking; (6) SPC usage; (7) Internal quality information usage; (8) Employee empowerment; (9) Employee involvement; (10) Employee training; (11) Product quality; (12) Supplier performance. Ishikawa (1985) identified TQM principles are: Quality first-not short-term profits first; Customer orientation-not producer orientation; The next step is your customer-breaking down the barrier of sectionalism; Using facts and data to make presentations-utilization of statistical methods; Respect for humanity as a management philosophy, full participatory management; Cross-functional management. Flynn et al. (1994) emphasizes 11 principles are (1) Quality leadership; (2) Quality improvement rewards; (3) Process control; (4) Feedback; (5) Cleanliness and organization; (6) New product quality; (7) Inter functional design process; (8) Selection for teamwork potential; (9) Teamwork; (10) Supplier-relationship; (11) Customer involvement.

### Objectives of the Study

Based on the current quality management system at MCML, this study aims at achieving the following objectives:

1. To provide a conceptual framework of TQM.
2. To obtain the effects of current quality management on overall business performance in Meghna Cement Mills Limited.
3. To provide specific suggestions for solving total quality management problems.

### Methodology of the Study

This study is based on both primary and secondary data. The secondary data have been collected from various publications like, books, articles, the daily news papers, and the Internet. Primary data were collected from senior officer and officer level because the nature of the study requires educated and senior personnel as respondents. This study has been conducted at MCML, Mongla Factory. In this factory, there are total 87 officers, 112 staffs and 103 workers are working. The sampling approach used here is called 'Means Approach'. The level of precision is  $\pm 0.05$ , confidence level is 95% and Z value for this 95% confidence level is 1.9627. The sample size of this study has been finalized to 20.

The sample size formula has been used in this study as follows:

$$n_c = nN / (N+n-1)$$

Where,  $n_c$  = sample size with finite population correction;

$n$  = sample size without finite population correction;

$N$  = size of the population

The respondents of this study were taken from the various departments of Meghna Cement Mills Limited (MCML). Department wise frequencies of the respondents are given in the following table.

With the use of this methodology, we have tried to achieve the aim of our study and for this reason, 12 hypotheses between TQM Implementation Constructs (11 TQM constructs) and Overall Business Performance and 5 hypotheses among Overall Business Performance Constructs has been taken from the book of Zhang (2000). We have tried to apply his hypotheses in Bangladeshi manufacturing organization.

**Table1.1 Frequency distribution**

| Department of MCML | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| Engineering        | 7         | 35             |
| Sales & Marketing  | 5         | 25             |
| Quality Assurance  | 4         | 20             |
| Administration     | 4         | 20             |
| <b>Total</b>       | <b>20</b> | <b>100%</b>    |

Overall mean for all constructs have been calculated based on 5 point Likert scale. Dependent and independent variables have been put in SPSS 16.0 as input of the regression analysis to obtain the effects of current quality management on overall business performance in MCML.

### Hypothesis of the Study

Hypotheses between TQM Implementation Constructs and Overall Business Performance

*Hypothesis H1A:* Leadership has a positive effect on strategic business performance.

*Hypothesis H2A:* Leadership has a positive effect on employee satisfaction.

*Hypothesis H3A:* Supplier quality management has a positive effect on product quality.

*Hypothesis H4A:* Vision and plan statement has a positive effect on product quality.

*Hypothesis H5A:* Evaluation has a positive effect on product quality.

*Hypothesis H6A:* Process control and improvement has a positive effect on product quality.

*Hypothesis H7A:* Product design has a positive effect on product quality.

*Hypothesis H8A:* Quality system improvement has a positive effect on product quality.

*Hypothesis H9A:* Employee participation has a positive effect on employee satisfaction.

*Hypothesis H10A:* Recognition and reward has a positive effect on employee satisfaction.

*Hypothesis H11A:* Education and training has a positive effect on employee satisfaction.

*Hypothesis H12A:* Customer focus has a positive effect on customer satisfaction. (Source: Zhang, 2000)

Hypotheses among Overall Business Performance Constructs

The five hypotheses among the four constructs of overall business performance are listed as follows:

*Hypothesis H1B:* Employee satisfaction has a positive effect on product quality.

*Hypothesis H2B:* Employee satisfaction has a positive effect on customer satisfaction.

*Hypothesis H3B:* Product quality has a positive effect on customer satisfaction.

*Hypothesis H4B:* Product quality has a positive effect on strategic business performance.

*Hypothesis H5B:* Customer satisfaction has a positive effect on strategic business performance. (Source: Zhang, 2000)

### Analysis and Findings

This section presents the data obtained from the questionnaire survey at MCML on the 11 TQM constructs and 4 overall business performances factors. The following two tables summarize data obtained from TQM constructs and overall business performance (in the 5 point scale).

**Table 1.2 Summary of 11 TQM constructs**

| Name of the TQM Constructs      | Grand Mean |
|---------------------------------|------------|
| Leadership                      | 3.6        |
| Supplier Quality Management     | 4.8        |
| Vision and Plan Statement       | 4.20       |
| Evaluation                      | 3.85       |
| Process Control and Improvement | 3.56       |
| Product Design                  | 3.80       |
| Quality System Improvement      | 4.86       |
| Customer Focus                  | 4.67       |
| Employee Participation          | 3.4        |
| Recognition and Reward          | 2.79       |
| Education and Training          | 4.16       |

From Table 1.2 it is observed that among the 11 TQM constructs there are only supplier quality management, vision and plan statement, quality system improvement, customer focus and education & training have the grand mean of greater than 4 in the 5 point scale.

**Table 1.3 Summary of overall business performance**

| Name of the Overall Business Performance Scale | Grand Mean |
|------------------------------------------------|------------|
| Employee satisfaction                          | 3.13       |
| Product quality                                | 4.82       |
| Customer satisfaction                          | 4.30       |
| Strategic business performance                 | 2.13       |

**Table 1.3** reveals that product quality and customer satisfaction with grand mean over 4 in the 5 point scale.

### Analysis of the Data

From the TQM constructs and overall business performance, it is observed that there are 17 hypotheses. More precise observation will reveal that there are 4 dependent variables. These dependent variables include (1) employee satisfaction, (2) product quality, (3) customer satisfaction and (4) strategic business performance. Each of these variables is dependent on several other variables which will be considered as independent variables. The subsequent analysis will be based on these four dependent variables and the hypotheses associated with them.

The list of the dependent variables, independent variables and hypotheses that are related are shown in the following table.

**Table 1.4**

| Dependent Variables            | Independent Variables                                                                                                                                                                               | Dependent on Hypotheses Number |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Employee satisfaction          | a) Leadership<br>b) Employee participation<br>c) Recognition & Reward<br>d) Education & Training                                                                                                    | H2, H9, H10, H11               |
| Product quality                | a) Supplier quality management<br>b) Vision & plan statement<br>c) Evaluation<br>d) Process control & improvement<br>e) Product design<br>f) Quality system improvement<br>g) Employee satisfaction | H1D, H3, H4, H5, H6, H7, H8,   |
| Customer satisfaction          | a) Employee satisfaction<br>b) Product quality<br>c) Customer focus                                                                                                                                 | H2D, H3D, H12                  |
| Strategic business performance | a) Leadership<br>b) Product quality<br>c) Customer satisfaction                                                                                                                                     | H1, H4D, H5D                   |

### Employee Satisfaction

After putting employee satisfaction as dependent variable and leadership, employee participation, recognition & Reward and education & training as independent variables in SPSS 16.0 as input of the regression analysis the following outcomes derived.

**Table 2.1 Model Summary**

| Model | R    | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|------|----------|-------------------|----------------------------|
| 1     | 0.62 | 0.36     | 0.125             | 0.27                       |

R, the multiple correlation coefficients, is the linear correlation between the observed and model-predicted values of the dependent variable. Its large value of 0.62 indicates a strong relationship among the dependent and independent variables.

**Table 2.2 Regression Coefficients**

| Model                  | Un-standardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|------------------------|------------------------------|------------|---------------------------|-------|------|
|                        | B                            | Std. Error | Beta                      |       |      |
| 1 (Constant)           | -1.05                        | 3.37       |                           | -.031 | 0.77 |
| Leadership             | 0.96                         | 0.46       | 0.54                      | 2.06  | 0.07 |
| Employee Participation | -0.12                        | 0.40       | -0.07                     | -.028 | 0.78 |
| Recognition and Reward | -0.19                        | 0.33       | -0.16                     | -.058 | 0.58 |
| Education and Training | 0.38                         | 0.51       | 0.19                      | 0.75  | 0.47 |

From the table 2.2 the regression equation will be as follows:

Employee Satisfaction

$$= 0.96 * \text{Leadership} - 1.05 \text{ ----- Equation 1}$$

$$= 2.406 \text{ [Putting the grand mean of leadership = 3.6]}$$

Employee Satisfaction

$$= -0.12 * \text{Employee Participation} - 1.05 \text{ ----- Equation 2}$$

$$= -1.458 \text{ [Putting the grand mean of Employee Participation = 3.4]}$$

Employee Satisfaction

$$= -0.19 * \text{Recognition \& Reward} - 1.05 \text{ ----- Equation 3}$$

$$= -1.58 \text{ [Putting the grand mean of Recognition \& Reward = 2.79]}$$

### Employee Satisfaction

$$= 0.38 * \text{Education \& Training} - 1.05 \text{ ----- Equation 4}$$

$$= 0.53 \text{ [Putting the grand mean of Education \& Training = 4.16]}$$

So, from the above four equations it is clear that employee satisfaction impacted positively by the leadership and education & training. Therefore, the Hypothesis 2 and 11 are confirmed. Since leadership has the largest absolute Beta coefficients of 0.54, it is the most important factor for employee satisfaction.

### Product Quality

After putting product quality as dependent variable and employee satisfaction, supplier quality management, vision & plan statement, evaluation, process control & improvement, product design, and quality system improvement as independent variables in SPSS 16.0 as input of the regression analysis the following outcomes derived.

**Table 2.3 Model Summary**

| Model | R   | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-----|----------|-------------------|----------------------------|
| 1     | .69 | .48      | .01               | 0.22                       |

Here in the table 2.3 it is observed that the R (multiple correlation coefficients) has the high value of 0.69. This indicates high correlation among the dependent and independent variables.

**Table 2.4 Regression Coefficients**

| Model |                                 | Un-standardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|---------------------------------|------------------------------|------------|---------------------------|-------|------|
|       |                                 | B                            | Std. Error | Beta                      |       |      |
| 1     | (Constant)                      | -.98                         | 4.50       |                           | -.22  | .83  |
|       | Employee Satisfaction           | -.11                         | .23        | -.14                      | -.46  | .66  |
|       | Supplier Quality Management     | -.29                         | .50        | -.17                      | -.57  | .59  |
|       | Vision and Plan Statement       | 1.26                         | .66        | .59                       | 1.90  | .094 |
|       | Evaluation                      | -.67                         | .57        | -.38                      | -1.18 | .27  |
|       | Process Control and Improvement | -.24                         | .39        | -.20                      | -.61  | .56  |
|       | Product Design                  | .79                          | .44        | .52                       | 1.80  | .11  |
|       | Quality System Improvement      | .57                          | .51        | .38                       | 1.11  | .30  |

From the above table 2.4 the regression equations will be as follows:

Product Quality

= -0.11\*Employee Satisfaction -0.98 .....Equation 5  
= -1.32 [Putting the grand mean of employee satisfaction = 3.13]

Product Quality

= -0.29\*Supplier Quality Management -0.98 .....Equation 6  
= -2.37 [Putting the grand mean of supplier quality management = 4.8]

Product Quality

= 1.26\*Vision & Plan Statement - 0.98 .....Equation 7  
= 4.31 [Putting the grand mean of vision & plan statement = 4.2]

Product Quality

= -0.67\*Evaluation -0.98 .....Equation 8  
= -3.55 [Putting the grand mean of evaluation = 3.85]

Product Quality

= -0.24\*Process Control & Improvement -0.98 .....Equation 9  
= -1.83 [Putting the grand mean of process control & improvement = 3.56]

Product Quality

= 0.79\*Product Design -0.98 .....Equation 10  
= 2.02 [Putting the grand mean of product design = 3.8]

Product Quality

= 0.57\*Quality System Improvement -0.98 .....Equation 11  
= 1.79 [Putting the grand mean of quality system improvement = 4.86]

So, from the above equation 5 to equation 11 it can be said that the product quality impacted positively by the vision & plan statement, product design and quality system improvement. Therefore, Hypothesis 4, 7 and 8 are confirmed.

### Customer Satisfaction

After putting customer satisfaction as dependent variable and employee satisfaction, product quality, and customer focus as independent variables in SPSS 16.0 as input of the regression analysis the following outcomes derived.

**Table 2.5 Model Summary**

| Model | R   | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-----|----------|-------------------|----------------------------|
| 1     | .76 | .58      | .47               | .19                        |

From the above table 2.5 it is clear that the multi correlation coefficients (R) have a high value of 0.76 which means that there is high relationship between the independent and dependent variables.

**Table 2.6 Regression Coefficients**

| Model |                       | Un-standardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|-----------------------|------------------------------|------------|---------------------------|-------|------|
|       |                       | B                            | Std. Error | Beta                      |       |      |
| 1     | (Constant)            | 7.54                         | 1.56       |                           | 4.82  | .00  |
|       | Employee Satisfaction | .23                          | .23        | .26                       | 1.01  | .33  |
|       | Product Quality       | .21                          | .27        | .18                       | .94   | .37  |
|       | Customer Focus        | -1.09                        | .32        | -.91                      | -3.47 | .01  |

Based on the above table 2.6 the regression equation can be drawn as follows:

Customer Satisfaction

= 0.23\*Employee Satisfaction +7.54.....Equation 12  
= 8.26 [Putting the grand mean of employee satisfaction = 3.13]

Customer Satisfaction

= 0.21\*Product Quality +7.54.....Equation 13  
= 8.55 [Putting the grand mean of product quality = 4.82]

Customer Satisfaction

= -1.09\*Customer Focus +7.54.....Equation 14  
= 2.44 [Putting the grand mean of customer focus = 4.67]

So, on the basis of the regression equation 12 to 14 it is clear that the customer satisfaction impacted positively by the employee satisfaction, product quality and customer focus.

Since customer focus has the highest absolute beta value of 1.09, it is the most important factor in customer satisfaction. Therefore, the Hypothesis 3D and 4D and 12 are confirmed.

### Strategic Business Performance (SBP)

After putting strategic business performance as dependent variable and leadership, product quality, and customer satisfaction as independent variables in SPSS 16.0 as input of the regression analysis the following outcomes derived.

**Table 2.7: Model Summary**

| Model | R   | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-----|----------|-------------------|----------------------------|
| 1     | .57 | .32      | .15               | .21                        |

Here from the table 2.7 it is observed that the multiple correlation coefficients R have high value of 0.57 which indicates strong relationship between dependent and independent variables.

**Table 2.8 Regression Coefficients**

| Model |                       | Un-standardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|-----------------------|------------------------------|------------|---------------------------|-------|------|
|       |                       | B                            | Std. Error | Beta                      |       |      |
| 1     | (Constant)            | 1.18                         | 1.90       |                           | .62   | .55  |
|       | Leadership            | -.47                         | .35        | -.34                      | -1.34 | .21  |
|       | Product Quality       | .42                          | .26        | .41                       | 1.65  | .13  |
|       | Customer Satisfaction | .13                          | .22        | .15                       | .56   | .58  |

From the table 2.8 the regression equation can be drawn as follows:

$$\text{SBP} = -0.47 * \text{Leadership} + 1.18 \dots \text{Equation 15}$$

$$= -0.51 \text{ [Putting the grand mean of leadership} = 3.6]$$

$$\text{SBP} = 0.42 * \text{Product Quality} + 1.18 \dots \text{Equation 16}$$

$$= 3.2 \text{ [Putting the grand mean of product quality} = 4.82]$$

$$\text{SBP} = 0.13 * \text{Customer Satisfaction} + 1.18 \dots \text{Equation 17}$$

$$= 1.74 \text{ [Putting the grand mean of customer satisfaction} = 4.3]$$

So, from the equation 15 to 17 it is clear that SBP impacted positively by the product quality and customer satisfaction. And from the absolute Beta value it is clear that leadership is the most important factor in strategic business performance followed by the

product quality factor. Therefore, the Hypothesis 4D and 5D is confirmed.

### Conclusion and Policy Implication

The study found that MCML's strategic business performance and employee satisfaction are affected by the leadership. Product quality is affected by supplier quality management, vision and plan statement of the company, process control and improvement, product design, quality system improvement and employee evaluation system. Employee satisfaction is positively affected by employee participation, recognition, reward, education and training. The MCML's customer satisfaction depends on the customer focus of the organization. Customer satisfaction also is affected by the firm's product quality, employee satisfaction and strategic business performances. Finally, the firm's quality affects the firm's strategic business performance. Though the seventeen hypotheses tested have positive effect, the average mean of all constructs is nearly as 4 at 5 point Likert scale. If the firm pays more concern about the independent variables, the dependent variables will show more positive result. The following suggestions would be more helpful.

#### Leadership

1. Empowerment of employees to solve quality problems.
2. Arrangements of adequate resources for employee education and training.
3. Focuses on product quality rather than short term yields.
4. Pursue long-term business success.
5. Active participation in quality management.

#### Vision and plan statement

1. Employee's involvement from different levels should be increased in making policies and plans.
2. Various policies and plans should be well communicated to the employees.

#### Evaluation

1. Benchmarking company activities more extensively.
2. Quality related data should be used to evaluate the performance of all employees.
3. Quality related information should be displayed at the shop floor.

### Process control and improvement

1. The design of firm's processes should be 'foolproof' in order to minimize the chance of employee error.
2. The firm should use the Quality Circle tools extensively.
3. The firm should use Statistical Process Control (SPC) techniques extensively.

### Employee participation

1. The firm should have cross functional teams.
2. The firm should implement the suggestions of employees extensively after careful evaluation.
3. Employees should be actively involved in quality - related activities.
4. The firm should have several QC circles (within one function)

### Recognition and reward

1. Position promotion should be based on work quality.
2. Excellent suggestions should financially be rewarded.
3. Employees' rewards and penalties should be clear.

### Training

1. Employees should be regarded as valuable, long term resources worthy of receiving education and training throughout their career.
2. Specific work-skills training should be given to all employees.

### Product design

1. The customer requirements should be thoroughly considered in new product design.
2. Participation of various departments in new product development should maximum.
3. New product designs should be thoroughly reviewed before production.
4. Quality function deployment (QFD) should be used extensively in product design.
5. Experimental design should be used extensively in product design

### Strategic business performance

1. The firm should use various promotional activities to enhance the long term market share.

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