International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-9 Issue-6, April 2020

# Effects of Total Quality Management Practices on Operational Performance of Ethiopian Plastic Industry

**Hagos Berhane, Pramila Devi Maganti**

***Abstract*: The purpose for this research work is to evaluate the degree of total quality management (TQM) implementation in the Ethiopian plastic industry in Addis Ababa, Ethiopia and its impact on operational performance. A quantitative approach has been used via a self-administrated questionnaire. A simple random sampling technique was used to collect primary data. Correlation and regression procedures were used to analyse the primary data. The result of investigation on the level of TQM practices indicated that case industry has an acceptable level of TQM implementation. In addition, based on the regression analysis, it is concluded that two out of five of the selected TQM practices (training and supplier quality management) are significantly correlated with operational performance of plastic industry. In this process supplier quality management was considered as the most important TQM factor in terms of impacting operational performance.***

***Keywords*: Total Quality Management, Operational Performance Ethiopian Plastic Industry.***

## I. INTRODUCTION

TQM is known as an important source for creating enhancement in competitiveness through improving the overall effectiveness of organizational performance (Valmohammadi, 2011). Organizational performance is an outcome of company's operation which eventually causes achievement of organizational goals (Mahmood et al., 2014). According to Talavera (2005), an improvement in organizational performance is equal to reduction in employee turnover, occurrence of costly accident and disorders, and improvement in employee's performance, teamwork, and many more. Manufacturing industries need to progress the quality of their goods and facilities so as to remain competitive and cope with increasing business challenges. To address the difficulty of worldwide rivalry, numerous organizations have put generous assets in receiving and actualizing TQM procedures (Mehmet et al., 2006).

**Revised Manuscript Received on April 30, 2020.**
***** Correspondence Author
**Hagos Berhane***, Department of Production Engineering, College of Engineering, Andhra University, Visakhapatmam, Andra Pradesh, India. Email: hagos_berhane@yahoo.com
**Dr. Pramila Devi Maganti**, Department of Production Engineering, College of Engineering, Andhra University, Visakhapatmam, Andra Pradesh, India. Email: pramiladevi_m@yahoo.co.in



Ethiopian manufacturing organizations are expected to improve their product quality in order to enhance their competitiveness in global market. Ethiopia is in the period of increase to the World Trade Organization.
Becoming a participant of World Trade Organization involves the country to expose up maximum of the regions of the economy to the worldwide economy and the local companies need to prepare a head for fierce competition from foreign companies (Yeshanew and Satya, 2016).

## II. RELATIONSHIPS AMONG TQM DIMENSIONS AND OPERATIONAL PERFORMANCE

### A. Leadership (LS)

Pioneers in a TQM framework see the firm as a framework; bolster representative improvement; set up a multipoint correspondence among the laborers, chiefs, and customers; and use information productively and viably.

Managers should show more initiative than standard organization practices to heightening representatives' familiarity with quality activities in TQM acceptance and practices (Goetsch and Davis, 2010). Past investigations have discovered that LS improves operational execution (Phan et al., 2011). In light of the literature surveyed, the accompanying assumption is proposed.

**$H_1$: Leadership has effect on operational performance.**

### B. Knowledge and Process Management (KPM)

PKM guarantees that representatives acquire opportune solid, reliable, precise, and essential information and data as they have to carry out their responsibility successfully and effectively in the firm.

Past investigations have discovered that information, process management, and factual control/criticism improve operational execution (Lee, 2003; Phan et al., 2011). In light of the literature surveyed, the accompanying assumption is proposed.

**$H_2$: Knowledge and process management has effect on operational performance.**

### C. Training (TRG)

TQM industry ought to give basic preparing to all of their laborers to build their proficiencies in their endeavors. Successful preparing in the executives and improvement in quality bring achievement for the associations.

Preparing ought to be given to all representatives dependent on the after effects of the preparation needs appraisal (Criado et al., 2009; Goetsch and Davis, 2010). Few studies shown that preparation is decidedly identified with operational execution (Kaynak, 2003; Phan et al., 2011). In light of the literature surveyed, the accompanying assumption is proposed.

**$H_3$: Training is has effect on operational performance.**

### D. Supplier Quality Management (SQM)

Supply chain management in TQM includes diminishing and streamlining the provider base to encourage overseeing provider connections (Krause, 1997), creating arranged relationship with suppliers (Copacino, 1996), working with providers to guarantee that requirements are met (Watts and Hahn, 1993), and including suppliers from the get-go in the item improvement procedure to exploit their abilities and aptitude (Ragatz et al., 1997).

Past investigations have discovered that supplier quality administration totally influences operational execution (Phan et al., 2011). In light of the literature surveyed, the accompanying assumption is proposed.

**$H_4$: Supplier quality management has effect on operational performance.**

### E. Customer Focus (CF)

TQM firms center around serving the outside clients. They initially should know the clients' convictions and wants and afterward should offer the items/administrations, in like manner. Past investigations have discovered that client concentrate decidedly influences operational execution (Phan et al., 2011; Tari and Claver, 2008; Terziovski et al., 2003). In light of the literature surveyed, the accompanying assumption is proposed.

**$H_5$: Customer focus has effect on operational performance.**

### F. Strategic Quality Planning (SQP)

SQP incorporates vision, crucial, estimations of the organizations. They are framed by considering the quality idea. With usable arranged quality endeavors workers are taken as a contribution to building up the vision, crucial, and goals. Past examinations have discovered that vital quality arranging is decidedly connected with operational execution, stock administration execution (Phan et al., 2011; Ittner and Larcker, 1997).

In light of the literature surveyed, the accompanying assumption is proposed.

**$H_6$: Strategic quality planning has effect on operational performance.**

### G. Operational Performance (OP)

Operational execution is characterized as the degree to which an activity meets execution objectives, the significant strides so as to address client issues (Nigel et al., 2013). Operational execution manages the procedure and assesses the presentation of inward activity of the organization in term of cost, client administrations, conveyance, quality, adaptability, and item/administration process quality (Brah and Lim, 2006).

Survey of the above studies investigations demonstrates that there is certain connection between legitimate execution of TQM rehearses and operational execution of an industry.

The research study framework of the association among TQM dimensions and OP measures including hypotheses (H) is shown in Fig. 1.

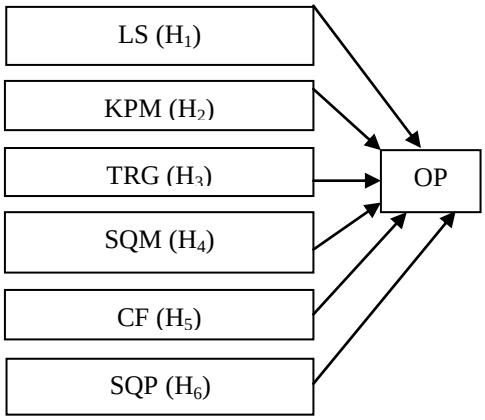


**Fig. 1. Proposed study model**

## III. RESEARCH METHODOLOGY

### A. Measurement Instrument, Population and Sample

LS, KPM, TRG, SQM, CF, and SQP as the TQM dimensions grounded on the previous research studies were considered and also included OP factor as a plastic industry performance. The construct/questions of the survey instrument were adopted from previous studies for both the TQM and OP measurements.

The preliminary questionnaire comprised 51 TQM and 29 OP questions. 31 for the TQM practices and 2 questions/items for the OP measures stayed afterward reliability examination was conducted.

The questionnaire was based on 5-point Likert-type scale i.e., 1 point for strongly disagree to 5-point for strongly agree, which shows participants difference or agreement with every question.

A cross-sectional assessment approach was used and sample selection for study was at the department/industry level. The sample was selected from the employees (lower level, middle level and top level) of plastic industry located in the Gerji, Addis Ababa (Ethiopia).

### B. Data Collection Process

The survey instrument was refined and constructed on the basis of the suggestions given by the various participants. The survey instrument was additionally reexamined in the wake of directing a pilot study and taking input from the respondents to make it straightforward, clear, justifiable, and simple to-follow.

Respondent privacy was kept, to improve precision of feedbacks and feedback frequency. The responses were obtained via face-to-face meeting. 100 questionnaires were distributed and obtained 71 correctly filled survey forms, with an acceptable reply rate of 71%.

### C. Statistical Analysis

Reliability of measurement scales was conducted. A two factors relationship analysis was performed to find the association of TQM factors among all and with the factor of OP. Regression analysis was used for OP measure to analyze the association among TQM factors and OP.

## IV. RESULTS

### A. Measurement Scales

Six latent factors are analyzed by 31 items. Altogether, 100 questionnaires were distributed to employees working in various departments in industry, and 71 valid questionnaires were collected for further analysis.

### B. Reliability of Measurement Scales

Reliability of questionnaire was measured by Cronbach's alpha value. Scale having alpha value more than 0.7 is reliable for studying. Alpha value was utilized to analyze the consistency of the measurement (Table I). Items LS 2*, KPM 2*, and CF 5* were deleted for further analysis, and alpha recalculated to test the constructs' reliability (Table II).

**Table-I: Reliability test for latent variables**

| Items | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted | Cronbach's Alpha |
|---|---|---|---|
| LS 1 | 0.614 | 0.521 | 0.714 |
| LS 2* | 0.434 | 0.736 | |
| LS 3 | 0.575 | 0.573 | |
| KPM 1 | 0.496 | 0.729 | 0.762 |
| KPM 2* | 0.244 | 0.778 | |
| KPM 3 | 0.409 | 0.747 | |
| KPM 4 | 0.561 | 0.715 | |
| KPM 5 | 0.771 | 0.665 | |
| KPM 6 | 0.538 | 0.719 | |
| KPM 7 | 0.358 | 0.756 | |
| TRG 1 | 0.557 | 0.630 | 0.713 |
| TRG 2 | 0.437 | 0.681 | |
| TRG 3 | 0.440 | 0.677 | |
| TRG 4 | 0.482 | 0.661 | |
| TRG 5 | 0.456 | 0.676 | |
| SQM 1 | 0.507 | 0.770 | 0.791 |
| SQM 2 | 0.594 | 0.744 | |
| SQM 3 | 0.499 | 0.773 | |
| SQM 4 | 0.653 | 0.722 | |
| SQM 5 | 0.606 | 0.739 | |
| CF 1 | 0.558 | 0.796 | 0.819 |
| CF 2 | 0.769 | 0.747 | |
| CF 3 | 0.625 | 0.781 | |
| CF 4 | 0.529 | 0.801 | |
| CF 5* | 0.419 | 0.824 | |
| CF 6 | 0.609 | 0.784 | |
| SQP 1 | 0.725 | 0.733 | 0.810 |
| SQP 2 | 0.564 | 0.783 | |
| SQP 3 | 0.559 | 0.788 | |
| SQP 4 | 0.544 | 0.790 | |
| SQP 5 | 0.612 | 0.771 | |
| OP 1 | 0.498 | 0.740 | 0.744 |
| OP 2 | 0.596 | 0.630 | |
| OP 3 | 0.623 | 0.599 | |

Alpha value for all of the independent factors is higher than 0.7 which ensure about the reliability of internal consistency of variables. The alpha value of dependent variable is 0.744 which is in an acceptable range to be considered reliable for measuring parameters of operational performance (Table II).

**Table-II: Summary of Cronbach's alpha**

| Factors | Code | Items | Alpha |
|---|---|---|---|
| *Independent Variables:* | | | |
| Leadership | LS | 2 | 0.736 |
| Knowledge and Process Management | KPM | 6 | 0.778 |
| Training | TRG | 5 | 0.713 |
| Supplier Quality Management | SQM | 5 | 0.791 |
| Customer Focus | CF | 5 | 0.824 |
| Strategic Quality Planning | SQP | 5 | 0.810 |
| *Dependent Variable:* | | | |
| Operational Performance | OP | 3 | 0.744 |

### C. Pearson Correlation and Regression Analysis

Pearson correlation was applied to decide the power/weakness of relationship among independent factors and the dependent factor. Correlation test was carried out before the hypothesis testing and the outcomes are presented (Table III) showing that TRG, SM, CF, SQP and LS, PM actors correlate significantly at the 0.01 level and 0.05 level. All Pearson correlation coefficients are higher than 0.3 and lower than 0.9. Therefore, it is concluded that autocorrelation phenomenon does not exist.

Based on the result in Table III, and also based on the critical values (Table IV) all of the independent variables have positive correlation with operational performance. However, leadership (LS): r = 0.29, knowledge and process management (KPM): r = 0.28 have a weak positive correlation and training (TRG): r = 0.35, supplier quality management (SQM): r = 0.52, customer focus (CF): r = 0.48, strategic quality planning (SQP): r = 0.44 have a moderate positive correlation with the value of 0.66, 0.62, and 0.64 respectively towards operational performance.

**Table-III: Correlation matrix (N = 71)**

| Factors | LS | KPM | TRG | SQM | CF | SQP | OP |
|---|---|---|---|---|---|---|---|
| LS | 1 | | | | | | |
| KPM | 0.65** | 1 | | | | | |
| TRG | 0.42** | 0.54** | 1 | | | | |
| SQM | 0.35** | 0.39** | 0.20 | 1 | | | |
| CF | 0.42** | 0.38** | 0.21 | 0.60** | 1 | | |
| SQP | 0.37** | 0.39** | 0.22 | 0.47** | 0.51** | 1 | |
| OP | 0.29* | 0.28* | 0.35** | 0.52** | 0.48** | 0.44** | 1 |
| Mean | 3.31 | 3.24 | 3.54 | 3.02 | 3.13 | 3.22 | 3.33 |
| SD | 1.00 | 0.79 | 0.69 | 0.72 | 0.80 | 0.86 | 0.89 |
| ** and *. Important at the 0.01 and 0.05 level (2-tailed). | | | | | | | |

**Table-IV: Pearson correlation critical values**

| Vale Correlation Coefficient | 1 | 0.7-0.9 | 0.4-0.6 | 0.1-0.3 | 0 |
|---|---|---|---|---|---|
| Strength Correlation | Perfect | Strong | Moderate | Weak | Zero |

The coefficient of multiple determination, R square, shows the proportion of variation of the dependent factor considered for by the independent factors in the regression model.

R square value (Table V) of regression model is greater than 0.35 that can be interpreted as strong effect (Cohen, 1988).

In order to identify the significance effect of the independent actors toward dependent factor, regression analysis is applied here. The analysis of variance (ANOVA) result in Table VI indicates a noteworthy difference among the mean of the variables and therefore all variables taken can be included in the regression analysis.

**Table-V: Model summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.632[a] | 0.399 | 0.343 | 0.727 |
| a. Predictors: (Constant), SQP, TRG, SQM, LS, CF, KPM | | | | |

In Table VI, ANOVA table is provided in order to displays the significant of overall predicted regression model of this study. As the p-value is 0.000 and it is less as compared to 0.05, it can be calculated the confidence level that the regression model estimated for the current data set is adequate and valid. Table VII shows the overall coefficient generated from multiple regression analyses through SPSS. Coefficients result will be used and explained more for hypothesis testing.

**Table-VI: ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 22.499 | 6 | 3.750 | 7.094 | 0.000[b] |
| | Residual | 33.832 | 64 | 0.529 | | |
| | Total | 56.332 | 70 | | | |
| a. Dependent Variable: OP | | | | | | |
| b. Predictors: (Constant), SQP, TRG, SQM, LS, CF, KPM | | | | | | |

Collinearity statistics (Table VII) gives two values tolerance (Tol.) and variance inflation factor (VIF). In this research study VIF was less than 10 and tol. is more than 0.10 thus no collinearity problem occurs that affect the least square estimates (Hair et al., 2015).

**Table-VII: Coefficients[a]**

| Model | | Unstandardized Coefficients | | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | | B | Std. Error | | | Tol. | VIF |
| 1 | (Constant) | 0.09 | 0.54 | 0.18 | 0.85 | | |
| | LS | 0.01 | 0.11 | 0.13 | 0.89 | 0.52 | 1.90 |
| | KPM | -0.17 | 0.16 | -1.03 | 0.30 | 0.45 | 2.22 |
| | TRG | 0.36 | 0.14 | 2.41 | 0.01 | 0.69 | 1.43 |
| | SQM | 0.38 | 0.15 | 2.48 | 0.01 | 0.58 | 1.70 |
| | CF | 0.20 | 0.14 | 1.40 | 0.16 | 0.54 | 1.84 |
| | SQP | 0.19 | 0.12 | 1.59 | 0.11 | 0.65 | 1.52 |
| a. Dependent Variable: Operational performance (OP) | | | | | | | |

From the Table VII it can be seen that TRG and SQM variables are significantly affect the OP. Hypothesis testing for this study is done through using regression results of all the variables which assumes that there is a significant association among the independent factors and dependent factor. The summary of hypothesis testing is reported in Table VIII. The p-values of TRG and SQM (independent factors) are less than $p < 0.05$ (Table VIII). It underpins the rightness of the hypothesis of this research study and concurs that there is an important connection between two independent factors and OP for the plastic industry.

**Table-VIII: Hypothesis testing**

| H: Statement | Findings | Results |
|---|---|---|
| $H_1$: LS has effect on OP | p (0.896) $>$ 0.05 | Rejected |
| $H_2$: KPM has effect on OP | p (0.303) $>$ 0.05 | Rejected |
| $H_3$: TRG has effect on OP | p (0.019) $<$ 0.05 | Accepted |
| $H_4$: SQM has effect on OP | p (0.016) $<$ 0.05 | Accepted |
| $H_5$: CF has effect on OP | p (0.165) $>$ 0.05 | Rejected |
| $H_6$: SQP has effect on OP | p (0.116) $>$ 0.05 | Rejected |

## V. CONCLUSION

The primary point of this research study was to see if LS, KPM, TRG, SQM, and SQP can affect OP of case industry or not. Indeed, the implementation of multiple regression analysis indicated existence of weak and moderate correlations amongst the variables and the affirmative effect of two independent variables on dependent one. The current findings indicate to the case industry managers that in order to achieve enhancement in operational performance of the industry, there should be efforts for improvement in the five identified independent variables as they all of have positive correlation with operational performance. Indeed, more attention should be paid to the supplier quality management due to the more effective impact which it has on dependent variable. The finding of this research shows the R square of 39.9% which means that continuous improvement, customers focus and employee involvement can explain just a less than half of the variations in operational performance of case industry. This study can be beneficial to all of the plastic industry in Ethiopia for creating improvement in their performance through assisting managers in having a better and clearer understanding from operational performance in industry and different TQM factors which can have significant impact on operational performance implementation.

## REFERENCES


1. S. Brah, & H. Lim. (2006). The effects of technology and TQM on the performance of logistics companies. International Journal of Physical Distribution & Logistics Management, 36(3), 192-209.
2. J. Cohen, Statistical Power Analysis for the Behavioral Sciences. Lawrence Erlbaum Associates, 2nd edition, 1992.
3. W.C. Copacino. (1996). Seven supply-chain principles. Traffic Management, 35(1), 60.
4. F. Criado, & A. Calvo-Mora. (2009). Excellence profiles in Spanish firms with quality management systems. Total Quality Management, 20(6), 655-679.
5. D.L. Goetsch, & S.B. Davis, Quality Management for Organizational Excellence. Pearson, New Jersey, NJ, USA, 6th edition, 2010.
6. C.D. Ittner, & D.F. Larcker. (1997). Quality strategy, strategic control systems, and organizational performance. Accounting, Organizations and Society, 22(3-4), 293-314.
7. H. Kaynak. (2003). The relationship between total quality management practices and their effects on firm performance. Journal of Operations Management, 21(4), 405-435.
8. D.R. Krause. (1997). Supplier development: Current practices and outcomes. International Journal of Purchasing and Materials Management, 33(2), 12-19.
9. S.M. Lee, B.H. Rho, & S.G. Lee. (2003). Impact of Malcolm Baldrige national quality award criteria on organizational quality performance. International Journal of Production Research, 41(9), 2003-2020.

10. S. Mahmood, F. Qadeer, & A. Ahmed. (2014). Relationship between TQM dimensions and organizational performance. Pakistan Journal of Commerce and Social Sciences, 8(3), 662-679.
11. D. Mehmet, T. Ekrem, T. Mehmet, & Z. Selim. (2006). An analysis of the relationship between TQM implementation and organizational performance evidence from Turkish SME. Journal of Manufacturing Technology Management, 17(6), 829-847.
12. S. Nigel, B. Alistair, & J. Robert, Operation Management. Pearson Publishing, 7th edition, 2013.
13. A.C. Phan, A.B. Abdallah, & Y. Matsui. (2011). Quality management practices and competitive performance: Empirical evidence from Japanese manufacturing companies. International Journal of Production Economics, 133(2), 518-529.
14. G.L. Ragatz, R.B. Handfield, & T.V. Scannell. (1997). Success factors for integrating suppliers into new product development. Journal of Product Innovation Management, 14(3), 190-202.
15. M.G.V. Talavera. (2005). TQM adoption and firm performance in the Philippines. Philippine Management Review, 12(1).
16. J.J. Tari, & E. Claver. (2008). The individual effects of total quality management on customers, people and society results and quality performance in SMEs. Quality and Reliability Engineering International, 24(2), 199-211.
17. M. Terziovski, D. Power, & A.S. Sohal. (2003). The longitudinal effects of the ISO 9000 certification process on business performance. European Journal of Operational Research, 146(3), 580-595.
18. C. Valmohammadi. (2011). The impact of TQM implementation on the organizational performance of Iranian manufacturing SMEs. The TQM Journal, 23(5), 496-509.
19. C.A. Watts, & C.K. Hahn. (1993). Supplier development programs: An empirical analysis. International Journal of Purchasing and Materials Management, 24(2), 10-17.
20. J.F. Hair, W.C. Black, B.J. Babin, & R.E. Anderson, Multivariate Data Analysis. 7th edition, India: Pearson, 2015.

## AUTHORS PROFILE

**Hagos Berhane** received his B.Tech. in Mechanical Engineering (2001) and M.Tech. in Industrial and Production Engineering (2005) degree from Aligarh Muslim University, Aligarh , India. He is a research scholar in the Department of Production Engineering, College of Engineering, Andhra University, Visakhapatmam, Andra Pradesh, India.

**Dr. Pramila Devi Maganti** is a Professor at Department of Production Engineering, College of Engineering, Andhra University, Visakhapatmam, Andra Pradesh, India. She has presented and published many research papers in national and international conferences and journals.