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Effect of Total Quality Management on Industrial Performance in Nigeria: An Empirical Investigation.

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Abstract
The study examined effect of Total Quality Management on Industrial Performance in Nigeria. Longitudinal design was employed which spanned the period of 1996 to 2008. Secondary data set of quality control cost, expenditure of salary on labour and the value of industrial output that served as surrogates of Total Quality Management and Industrial Performance respectively were collected from Pal Brewery in Anambra State. The data were analysed using Ordinary Least Square (OSL) method of multiple regression to determine the effect of the predictor variables on the dependent variable. The study found that cost of quality control had non significant positive effect on industrial performance while expenditure of salary on labour had a non significant negative effect on industrial performance. It was concluded that Total Quality Management substantially enhanced industrial performance in the Brewery subsector of the Nigerian economy. The study recommended that firms should initiate and implement company-wide and customer-centred Total Quality Management programmes to attain and sustain customer satisfaction and high performance.
Key Words: Total Quality Management, Industrial, Performance.

1. Introduction

Total Quality Management (TQM) is a philosophy and a set of guiding principles that represent the foundation of an excellent organisation and to ensure survival of industrial organisations in the competitive economy of today (Besterfield, 1999). Total Quality Management is a technique that underscores the continuous improvement of product and service quality to satisfy customers and enhance productivity. The emergence of Total Quality Management has been one of the most significant developments in the United State of management practice. The focus on the development of Total Quality Management(TQM) systems in the U S appears to have begun around 1980 in response to Global competition and stiff rivalry in the U S manufacturing subsector arising from Japan(Easton and Jarrell, 1998). In the last three decades, Total Quality Management has become pervasive and widely accepted in manufacturing, services, government, healthcare and banking subsectors of the developed economies(Fotoponlam and Psomas,2009; Freng et al (2008), Kaplan et al (2010). Al-swadi et al (2012) and Temtime(2003) assert that continuous attention has been given to TQM in the industrialised countries but researchers investigated quality practices in the developing countries in the last ten years.

According to Moballeghi and Moghaddam (2011), there is a growing awareness that a well-designed and well-executed Total Quality Management process is one of the most effective routes to increase product and service quality, productivity and profitability. However, many organisations are still mired in "quality confusion". This scenario is a common phenomenon in Nigeria. Quality of products has been identified as one of the critical determinants affecting the performance of most organizations in Nigeria. In response to the poor quality and substandard products in wide circulation alongside the attendant adverse effect on the lives of the citizens and the economy, Nigerian government established the legal and the institutional framework to curb the ugly trend and menace in the country. The Government of Nigeria set up regulatory agencies such as Standard Organisation of Nigeria (SON), National Agency for Food, Drug and Administration Control (NAFDAC), Nigerian Drug and Law Enforcement Agency (NDLEA) and Consumer Protection Council to safeguard the unsuspecting public against unethical practices and improve the quality of goods and services produced by business organizations. Consequently, the study is to ascertain as to whether product quality improvement policy drives by the government and the adherence of manufacturing firms to TQM practices have impacted on the industrial performance in Nigeria.

2. Conceptual and Theoretical Issues

2.1Total Quality Management (TQM)

Total quality management (TQM) is a business philosophy that embodies the belief that management process must focus on integrating the idea of customer-driven quality through an organization (Aluko et al, 2004). In the view of these scholars, it means that all organizational activities initiated by the management of entities should be targeted at satisfying customers with high quality products and services. This is to ensure the attainment of competitive edge in the market place. TQM underscores the continuous improvement of product quality and service delivery. According to Hinton and Schaeffer (1999), TQM is a disciplined approach to keep the attention and actions of organizational members on task towards providing greater customer satisfaction. This stresses that all efforts of employees and management of organizations must have the customer in focus. TQM is composite word which integrates the team "quality" and "management". In TQM thinking, management is seen as providing impetus and the prime mover for making total quality the guiding principles of the organization. In view of the postulates of the total quality management philosophy, the nitty-gritty of TQM is customer satisfaction, continuous improvement of quality and productivity.

According to Ross (1995) TQM means thinking about quality with respect to all functions of the enterprise. It is a system's approach that considers every interaction among the elements of the organization. Total quality management is a proactive and prevention-based approach that focuses on organizational members and processes with customer driven leadership (Arora, 2006). TQM is unique and a philosophy that has a cutting edge over the traditional reactive approach of quality control because it brings about quality improvement by focusing on the processes, employee involvement, customer satisfaction, leadership and continuous quality improvement. Jarrel and Easton (1998) contend that what constitutes total quality management is a subject of debate. However, the management scholars articulate that total quality management consists of process focus, systematic improvement, companywide emphasis, customer focus, management by fact, employee involvement and development, cross functional management, supplier performance and supplier relationship, and recognition of TQM as a continuous competitive strategy.

Implementation of total quality management in the Nigerian Manufacturing sector is not encouraging. According to Chikodili (2010), one of the fundamental challenges of the Nigerian Manufacturing Industry is the implementation of a holistic management that improve competitiveness in the global economy. As a result, the products and services of Nigeria cannot favourably compete with foreign products and services. In view of the perspectives of scholars on TQM, implementation of total quality management in Nigerian requires conscious and concerted effort of the leadership and all employees in consideration of the constituents of TQM as highlighted by quality gurus.

2.2 Industrial Performance

Industrial performance has several meanings dependent upon the perspective and discipline from which the scholar articulates this concept. Industrial performance is conceived as industrial output or productivity. Telsang (2007) asserts that productivity is the quantitative relationship between what is produced and what is used as a resource to produce them. Economists determine productivity from Gross National Product (GNP). It means the ratio of output to input. Managers consider productivity as cost cutting and speed up in production; accountants consider productivity from financial ratios and budgetary variances while engineers consider productivity with respect to output per hour, capacity utilization, and manpower efficiency. In the context of this study, productivity is the ratio of outputs to inputs at periodic intervals. Industrial performance means the value of annual output of brewery firms. According to Telsang (2007), productivity is crucial to the welfare of industrial firms as well as the economic progress of any country. In view of the foregoing, industrial output of the brewery industry is critical to the aggregate economy in Nigeria.

2.3 Total Quality Management and Industrial Performance

Total quality management is world-class productivity and value addition in order to deliver customer delight (Telsang 2007). TQM perspective of productivity considers both the qualitative and quantitative facets of relationship between inputs and outputs. The application of total quality management results in improved quality product with increased output, sales volume and customer satisfaction.

There is empirical evidence that lends credence to the relationship between Total Quality Management and Industrial Performance. Hendrick and Singal (1997) investigated the relationship between quality of product and financial performance by comparing the financial performance of firms that have won quality awards against a control group of non-winners. Their result showed that quality award winners outperformed the control firms on a series of operating-income based measures. Similarly, Jarrell and Easton (1998) examined the impact of Total Quality Management on the performance of 108 firms that began TQM implementation between 1981 and 1991. The results showed that the improvement of performance was consistently stronger for firms with more advanced TQM system. In another related study, Garvin (1991) conducted a study on the impact of TQM

practices and organizational performance. The study found a strong relationship between TQM practices and organizational performance measured in terms of productivity, profitability and customer relations. The findings of the previous studies clearly demonstrated the significance of quality products and services through application TQM to meet customer desires and increase industrial productivity.

3. Methodology

3.1Research Design

Research design is a detailed blueprint that guides a researcher in achieving research goals. In this study, a longitudinal design was adopted because data sets of variables that covered the period of 1996 to 2008 were measured at regular intervals of an economic unit of Anambra state in Nigeria.

3.2 Source of Data and Sample size

Secondary data were collected from textbooks and journal articles that dealt with conceptual and theoretical issues. Besides, annualized panel data of industrial output, expenditure on labour and cost of quality control all measured in monetary unit were collected from Pal Breweries Plc. The sample data sets spanned the period of 1996 to 2008 with thirteen (13) observations for all the proxies of the study variables.

3.3 Justification for the Included Study Variables

Productivity is conceptualised as the ratio of output to input. Productivity in this study is 'operationalised' as industrial performance. Therefore, industrial performance is measured as the ratio of output to input. Mathematically,

$$\text{Industrial Performance (IP)} = \frac{\text{output}}{\text{Input}}$$

The surrogate for industrial performance is the monetary value of annual outputs which serve as the output component of the industrial performance ratio. Hassan et al (2012) postulated a conceptual model based on the study of Impact of Total Quality Management practices on Firm Performance. In the model of this study, incentive and recognition system, process monitoring and control among others were mentioned as TQM practices that improve product quality and increase the level of firm performance.

Incentive and recognition system is part of the expenditure on labour to motivate the workforce to have quality commitment and enhance firm productivity. Besides, process monitoring and control initiated and maintained in production firms bring about the cost of quality control through prevention and appraisal. The aim is to reduce the incidence of cost of rework, rate of wastage, defective products and enhance organizational productivity and customer satisfaction. Consequently, expenditure on labour and cost of quality control serve as critical elements of Total Quality Management practices of organisations. This justifies the basis for the two variables as proxies and predictors of TQM and industrial performance respectively. To this end, expenditure on labour and cost of quality control are the input variables to the industrial performance ratio.

$$\text{Industrial Performance (IP)} = \frac{\text{Total Annual Output}}{\text{Total Expenditure on Labour + Total cost of Quality Control}}$$

3.4 Model Specification

The study was to examine the effect of Total Quality Management (TQM) on the industrial performance in Nigeria.

Total quality management is an organization-wide process that involves entire workforce of any entity. Thus, the human resource must be motivated with relative and commensurate rewards to stimulate optimum effort, commitment from all workers and increase productivity. Industrial performance can be measured from various economic indices. Annual output of Pal Breweries was utilized as a proxy to measure the industrial performance in this study.

The dependent variable for the study is industrial performance while the predictors/explanatory variables are cost of quality control and expenditure on labour. The model for the study is specified thus:

$IP = f(QC + ES)$……. (i)

Therefore, the estimation equation for the study is formulated as follows.

$IP = \beta_1 + \beta_2 QC_i + \beta_3 ES_i + u_i$.....**(.ii)**

Where

IP = Industrial Performance.

$\beta_1, \beta_2, \beta_3$ = they are the parameter estimators of the intercept, cost of quality. control and expenditure of salary on labour respectively.

QC = Cost of quality control.

ES = Expenditure of salary on labour.

U = Stochastic disturbance/error term.

i = $_i$th observation.

3.5 Method for Data Analysis

From the above equation two (ii), Ordinary Least Square (OLS) multiple regression, diagnostic test statistics as well as summary statistics were utilized for the analysis of data. The research hypothesis for the study is;

Ho: ***Cost of Quality Control and Expenditure of Salary on Labour do not have significant effect on Industrial Performance of Brewery firms.***

H_1: ***Cost of Quality Control and Expenditure of Salary on Labour do have significant effect on Industrial Performance of Brewery firms.***

4.0: Data Analysis and Discussion of Results

This section is concerned with the presentation of analyzed data and discussion of results.

Table 4.1 Discriptive Statistics Of The Variables

	*IP	*QC	*ES
Mean	197.5438	19.31692	41.13692
Median	186.7000	11.81000	42.80000
Maximum	293.7000	50.21000	43.00000
Minimum	117.0700	7.470000	28.00000
Std. Dev.	53.86909	15.29155	4.113205
Skewness	0.811460	1.200638	-2.770943
Kurtosis	2.581671	2.914939	9.423223
Jarque-Bera	1.521471	3.127237	38.98391
Probability	0.467323	0.209377	0.000000
Sum	2568.070	251.1200	534.7800
Sum Sq. Dev.	34822.54	2805.977	203.0215
Observations	13	13	13

Table 4.1 demonstrates the summary statistics of mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera with the probability values, summation, sum of squared deviation and the number of observations. From the variables of the study, mean values were (197.54), (19.31) and (41.13); standard deviation values were (53.8), (15.29), and (41.13); skewness statistics were (0.81), (1.20) and (-2.77); while kurtosis values were (2.58), (2.91) and (9.42) for Industrial Performance, Cost of Quality Control and Expenditure on Salary of Labour respectively.

Skewness of a symmetric distribution is zero which is otherwise referred to as a normal distribution. By careful observation of skewness statistics, the series of industrial performance and cost of quality control have right long tail distributions affirmed by the positive values while the series of expenditure of salary on labour has a long left tail distribution affirmed by the negative value. Kurtosis measures the peakness or flatness of the distributions. Kurtosis statistics of industrial performance (2.58) and cost of quality control (2.91) were not wide apart but close to three (3) as the benchmark for normal distribution. This implies that the series for these two variables have flat distributions that are relative to normal. For expenditure on salary of labour, it had (9.42) as kurtosis value which is wide apart from the criterion value of 3. This implies that the series of expenditure for salary has a peaked distribution.

The Jarque-Bera (JB) statistics and corresponding probability values were 1.52(0.47), 3.12(0.21) and 38.98(0.00) for industrial performance, cost of quality control and expenditure on salary respectively. The JB statistics for industrial performance and quality control were not far apart from zero, exception of expenditure on salary while the probability values of industrial performance and cost of quality control were sufficiently as high as 47 and 21 percent respectively but salary on expenditure was too low. Therefore, we do not reject the hypothesis that the error terms were normally distributed for industrial performance and cost of quality control but expenditure on salary. Although the probability value for expenditure on salary was too low, the sample size of 13 observations may not be large enough.

Table 4.*2 Diagnostic Test for First-Order Serial Correlation*

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
t-statistic	1.540056	10	0.1546
F-statistic	2.371773	(1, 10)	0.1546
Chi-square	2.371773	1	0.1235
Null Hypothesis: C(3)=2			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
-2 + C(3)		259.5853	168.5558
Restrictions are linear in coefficients.			

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.563271	Prob. F(2,8)	0.5904
Obs*R-squared	1.604666	Prob. Chi-Square(2)	0.4483

Table 4.2 displays the robust diagnostic Wald and Breusch-Godfrey (BG) LM test Statistics to determine the presence or otherwise of first order serial correlation. From the Wald test, the results show that (t =1.54, p> .154) ;.($F_{(1, 10)}$ = 2.37, p >.154) and (X^2 = 2.37, p >.123) while the BG LM test results demonstrate ($F_{(2, 8)}$ = .563, p >.591) and (Obs* R-Squared = 1.664, p > .448). Since the probability values were greater than .05 level of significance, the null hypothesis of no serial correlation should be accepted. This implies that the panel data has no autocorrelation

Table 4.3 Multiple Regression Analysis

Dependent Variable: IP				
Method: Least Squares				
Date: 06/29/13 Time: 19:33				
Sample: 1996 2008				
Included observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
QC	2.039142	1.013002	2.012969	0.0718
ES	-2.514321	3.766008	-0.667636	0.5195
C	261.5853	168.5558	1.551922	0.1517
R-squared	0.514780	Mean dependent var		197.5438
Adjusted R-squared	0.417736	S.D. dependent var		53.86909
S.E. of regression	41.10548	Akaike info criterion		10.46933
Sum squared resid	16896.61	Schwarz criterion		10.59971
Log likelihood	-65.05067	Hannan-Quinn criter.		10.44254
F-statistic	5.304596	Durbin-Watson stat		1.750749
Prob(F-statistic)	0.026896			

Table 4.3 displays the multiple regression analysis of Industrial Performance, Cost of Quality Control and Expenditure on Salary of Labour. The t - test statistic of the independent variables show that cost of quality control had positive non-significant effect on industrial performance (t_c = 2.013, $p > .05$) while expenditure of salary on labour had negative non-significant effect on industrial performance(t_c = -0.668, $p > .05$). The cost of quality control and expenditure of salary on labour had co-efficients of ($\beta_2 = 2.04$) and ($\beta_3 = -2.52$) respectively. The beta co-efficient implies that industrial performance is estimated to increase by 2.04 percent annually for every one million naira incurred as cost of quality control while the beta co-efficient for the subsequent variable indicates that industrial performance is estimated to decrease by 2.51 percent annually for one percent increase in the expenditure of salary on labour which is contrary to a priori expectation.

The second partition of the table 4.3 is the computed output of multiple regression which demonstrates that $R^2 = .52$, Adjusted $R^2 = .42$ and F-statistic = 5.31. The adjusted R^2 of .417 implies that 42 percent of variation in industrial performance is explained by cost of quality control and expenditure of salary on Labour. This means that 42 percent in corporate performance of brewery firms was attributed to cost of quality control and labour and that 58 percent of industrial performance was accounted for by other exogenous variables.
Regarding the F-ratio of 5.31 and probability value of .026, it means that there was a significant relationship between industrial performance, cost of quality control and expenditure of salary on labour ($F_{(1,10)} = 5.31$, $p < .026$). It means that the model has a good fit which can be used for forecasting industrial performance of corporate entities.

The finding that cost of quality control had non-significant positive effect on industrial performance is consistent with the assertion of Arora (2006) that higher quality leads to enhanced customer satisfaction, sales and increased productivity. The finding of the present study concurs with the previous studies of Kuma et al (2009), Feng et al (2006) and Hassen et al (2012). According to them, Total Quality Management generally has strong and positive relationship with performance.

The finding that expenditure of salary on labour had non significant negative effect on industrial performance is not in sympathy with a priori expectation. Salary is one basic instrument for staff motivation, encourage them to implement TQM practices and increase productivity of employees. The finding further suggests that performance at the functional and organizational level involves several other variables. Besides, salary only cannot constitute the appropriate reward mix that influence employee productivity. However, the finding is in agreement with Herzberg Two-Factor Hypothesis that money is not a motivator but a hygiene factor

5. Conclusion and Recommendations

Based on the findings of the study, we concluded that quality control is one of the indispensable elements of Total Quality Management which improves performance of the Brewery industry in Nigeria. It was further concluded that salary of workers alone lacks the capacity to stimulate all category of employees in the brewery industry for total quality management practices and industrial output.

In order to ensure good quality and performance in the brewery industry in Nigeria, the following recommendations were proffered.

The brewery industry should not rely completely on the increase of salary as the only means of reward for staff motivation but should apply relevant reward mix that is capable of motivating all categories of staff for quality concern and optimum productivity.

All stakeholders of quality control should ensure that the expenditure on quality control is justified through proper monitoring, checks and inspection to forestall customer complaints, defective and returned products, loss of good will and ultimately boost productivity of the brewery industry.

The management should initiate total quality management drives that crisscross the entire organization on regular basis to attain and sustain high quality standards and meet customer satisfaction.

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APPENDIX

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