

Effects of Total Quality Management on Operational Performance of Brewing Industries in South-East Nigeria

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Abstract: *The study examined the effect of practice of total quality management on operational performance measures of firms in the brewing industry in South-East, Nigeria. Objectives of the study were to: Examine the effect of process management as one of the elements of total quality management on quality performance of the organizations; ascertain the effect of top management support as an aspect of total quality management on cost reduction in the organizations. The study adopted descriptive survey design. Management and technical staff of the selected firms were the target population and out of 1785 of the chosen category, a sample of 343 was determined through the application of Taro Yameni's statistical formula for determining sample size from a finite population. Major statistical tools of analysis were summary statistics of percentages. From the Analysis the study found that total quality management factor process management has significant and positive effect on operational performance with respect to quality performance of the firms in brewing industry in South East, Nigeria. Total quality management factor (top management support) have significant and positive effect on operational performance with respect to cost reduction of firms in brewing industry in South-East, Nigeria. It was recommended among others that customer focus and product design elements be given more attention in the practice so as to achieve higher impact on quality performance. More attention be given to customer focus and continuous improvement elements so as to enjoy sustained contributions to cost reduction.*

Keywords: *total quality management on operational performance, process management, top management.*

1.1 Introduction

Incorporating quality in all aspects of business operation has become a strategic tool in the dynamic business and operating environment (Hassan, Malik, Imran, Abbas and Amran, 2012). Given the growing levels of competition, demands of both current and potential customers for products and services of high quality, businesses are continually and consciously strategizing on how to beat their competitors so as to enjoy larger market share for their products (Addae-Korankye, 2013). As a process which aims at achieving continuous improvement of quality in an organization's management, total quality management ensures that all management subsystems are integrated towards the realization of organizational goals and objectives (Gharakhani, Rhamati, Farrokhi and Farahmandian, 2013). The ever-increasing demands for high quality of products and services, especially in the Pharmaceutical industry and the global revolution in technological advancement, have compelled organizations to begin to adopt and implement the principles of total quality management (Shekhar and Joshi, 2011).

Total quality management is known as an important source for creating enhanced competitive advantage through improvement in overall effectiveness of the organizational activities (Valmohmmadi, 2011). Such an effectiveness leads also to enhanced organizational performance. 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 or measured in terms of reduction in employee's turnover, occurrence of costly accident or disorder, improvement in employee's performance, teamwork and many more. Manufacturing industries need to progress/improve on the quality of their goods and facilities so as to remain competitive and be able to cope with the increasing business challenges. To address the difficulty of global rivalry or competition in business environment, many organizations have put generous assets in receiving and actualizing total quality management programmes and procedures (Mehmet et al, 2006). Therefore, pharmaceutical manufacturing organizations are expected to improve their product quality in order to continue to remain relevant by enhancing their competitiveness in the global market (Yeshanew and Satya, 2016).

Total quality management (TQM) is anchored on a number of principles which are targeted at increasing stakeholders' satisfaction through the effective and efficient utilization of organizational resources (Barros, Sampaio and Araiva, 2014). They observe that TQM is a quality process tool that leads to increased productivity which enhances organization's competitive position. In their opinion, as quality improves, rework and waste are reduced thereby promoting customer satisfaction. TQM principles lead to generation of improved processes, services and products, and reduced costs which ultimately lead to improved financial performance as the bottom-line (Ndirangu, 2014). But more importantly, the success of the principles are measured through some performance criteria such as the level of quality achieved, the extent the process was able to reduce cost through waste minimization, delivery performance which measures the speed of delivery to the satisfaction of the customer, flexibility in product adaptability and in meeting the varied customer demands in terms of specification as well as in terms of flexible production methods aiming at bringing down costs to reduce lead time. There is equally performance criterion of dependability which measures the rate of reliability, certainty and consistency in production and delivery processes in the organization, which accords the firm a reputation that is seen as an intangible asset for the industry.

The brewing industry in Nigeria is facing many challenges, including debt overhang. However, our concern is in the area of manufacturing adulterated and substandard products that do not meet the prescribed standards of the International Brewing Association (IBA). World Health Organization Report (2017) indicates that production of substandard alcoholic drinks, especially bear is injurious to human health. According to Ogbonna et al (2015), there have been growing and sustained trend of all manner of counterfeiting production in Nigeria ranging from raw materials to finished products with its negative health consequences for the consuming public. A review of modelling studies in China showed that poor-quality beer causes serious harm to peoples' health and affects the productivity of the workforce (Orubu, Ching, Zaman and Wirtz, 2020). It appears Nigeria has one of the highest incidences of substandard and falsified beer products in sub-Saharan African is not the entire African continent because there have been reports of fatalities recorded from the

consumption of adulterated and fake products from the industry (Oyetunde, Ogidan, Akinyeni, Ogunbameru and Asaolu, 2019). The dangerous effect of poor quality beer on human life is enormous hence the need to examine the effects of total quality management on operational performance of selected firms in the brewing industry in some states of the South-East, Nigeria.

On the other hand, operational performance connotes the measurement of actual outputs of an organization in relation to the set goals or expectations. It is indeed the output of an organization driven by operations toward goal achievement financially, operation wise and organizational effectiveness (Richard, Fariborz and Carlos, 2009 in Nyamari, 2017). It also entails those activities that are geared toward formation of organizational goals where the firm monitors the progress being made toward the achievement of the goals and takes remedial action in case of any deviations (Al-Ettayem and Zubi, 2015). Operational performance can actually be measured in the organization based on its objectives such as quality, cost, delivery, flexibility and dependability (Slack and Lewis, 2011). It is the cornerstone that determines the future performance of an organization as well as the foundation that enables an organization to be competitive through the provision of capability to action customer feedback and step ahead of the competitors (Slack, Chambers and Johnston, 2010).

1.2 Statement of the Problem

In today's globalized and heavily competitive business environment, customers are more aware and conscious of the quality of products/services they get from the producers (organizations). As a result, the need for continuous improvement of products quality by organizations cannot be overemphasized. The brewing industry is one of the areas where quality of products cannot be compromised because of its effect on human life, but the experience as manifested in the quality of products coming out from the firms in the industry appears to be in the contrary. Not even the efforts of some regulatory agencies like National Agency for Good, Drugs Administration and Control (NAFDAC) and Standard Organization of Nigeria (SON) could deter them. It appears the firms in the industry area not interested in implementing the total quality management principles which guarantees quality of products and consequently customer satisfaction.

Apart from health implications of a substandard product, if products are not of the required standard or specifications, it certainly makes the productless competitive at both national and international markets thereby making the money spent in the production of the products very difficult to record with negative return on investment. Customers as well as shareholders are dissatisfied in the end. The organizations profitability and corporate image are severely affected. In the light of the above, we are poised to determine the effect of implementing some identified total quality management dimensions on operational performance of some brewing firms located in some states of the South-East, Nigeria moreso, when no such study can be said to have taken place in the area to the best of our knowledge.

1.3 Objectives of the Study

The broad objective of the study is to investigate the effect of total quality management factors on the operational performance measures of the organization, using some selected brewing firms located in some states of the South-East Nigeria as the study area. More specifically however, the study intends to:

- (i) Examine the effect of process management as one of the elements of total quality management on quality performance of the organizations.
- (ii) Ascertain the effect of top management support as an aspect of total quality management on cost reduction in the organizations.

1.4 Hypotheses

The following null hypotheses were formulated to guide the objectives of the study as well as strengthen the analysis:

- (i) Process management as one of the elements of total quality management does not have significant and positive effect on quality performance of the organizations.
- (ii) Top management support as an aspect of total quality management does not have significant and positive effect on cost reduction performance in the organizations.

REVIEW OF THE RELATED LITERATURE

2.1 Theoretical Framework

The study was anchored on the General System Theory (GST) developed by Bertalanffy in 1968. He postulated that a system is a complex of interacting elements and that they are open to and interact with their environment. In addition, they can acquire qualitatively new properties through emergence, thus they are in a continual evolution. When referring to system, it also generally means (they self-correct through feedback). Bertalanffy posits in general system theory that every system, including organizational system has a sub-system which makes up the entire system. Such sub-systems are assigned functions and provided with enabling environment, including resources, capable managerial skills, etc, which actually help them perform their responsibilities effectively. Systems theory is the interdisciplinary study of systems, that is, cohesive groups of interrelated, interdependent parts that can be natural or human-made. Every system is bounded by space and time, influenced by its environment, defined by its structure and purpose and expressed through its functioning. A system may be more than the sum of its parts if it expresses synergy or emergent behaviour.

Changing one part of a system may affect other parts or the whole system either negatively or positively depending on the direction of the change. It may also be possible to predict these changes in pattern of behaviour. Some systems support other systems, thereby maintaining the other system to prevent failure. The goals of systems theory are to model a system's dynamics, constraints, theory are to model a system's dynamics, constraints, conditions and to elucidate principles (such as purpose, measure, methods and tools) that can be discerned and applied to other systems at every level of nesting and in a wide range of fields of achieving optimized equifinality (Benen, 2006). General systems theory, according to Kast and Resenzweig (1972), is about developing broadly applicable concepts and principles, as opposed to concepts and principles specific to one domain of knowledge. It distinguishes dynamic or active systems from static or passive systems. Active systems are actively structures or component that interact in behaviours and processes. To this extent, systems theory

in business or the systems approach to management, is based on the idea that “everything is interrelated and interdependent”, Chand says. A system is therefore composed of related and dependent elements, which, when in interaction, forms a united whole, Chand says, adding that, “a system is simply an assemblage or combination of things or parts forming a complex whole.”

The system theory in business or the systems approach to management, is based on a basic assumption that “everything is interrelated and interdependent,” Kast and Rosenzweig (1972), say a system is composed of related and dependent elements, which, when in interaction, forms a united whole, adding that a system is simply an assemblage or combination of things or parts forming a complex whole.” Thus, implying that when a sub-system is bad, it affects the whole complex. In the same like manner, total quality management principle has components or dimensions which are expected to perform effectively to achieve the wellbeing of the whole organizational performance.

It presupposes that each of the components of total quality management as identified in this study is very critical to the achievement of operational performance of the firms under investigation. Therefore, we presume that the issues relating to total quality management and operational performance of the organization can be effectively analyzed under the framework of general system theory as postulated by Ledwig Von Bertalanffy.

2.2 Empirical Review

Empirical Review: Webometric Analysis

Author and Date	Time Frame	Title or Topic	Variables	Method	Findings	Conclusion/Remarks
Carolyne and Bichanga (2014)	None	Effects of total quality management on financial performance in the banking sector: a study of national bank of Kenya	Total quality management and financial performance	Descriptive survey design	Positive relationship between dimensions of TQM and banks' financial performance	Total quality management practices enhances organizational performance
Ayandele and Akpan (2015)	None	The practice, challenges and benefits of total quality management in manufacturing firms in Nigeria.	Practice of total quality management and the manufacturing firms.	Descriptive survey design	Practice of TQM showed significant reduction in operation costs	Careful and objective implementation of TQM leads to cost reduction.
Onyango (2016)	None	Quality management and performance of commercial banks in Kenya: A Thesis of Masters Degree	Quality management of performance of commercial banks	Descriptive survey design	No relationship between TQM practice implementation and banks performance	Total quality management practice is more effective in the manufacturing sector.

		in University of Nairobi, Kenya				
Al-Damen (2017)	None	The impact of total quality management on organizational performance: a study of Jordanian Oil Petroleum Company	Total quality management and organizational performance	Descriptive survey design	Total quality management practices has positive effect on organizational performance of Jordanian oil company	Adoption of TQM practice enhances organizational performance
Singh, Kumar and Singh (2018)	None	Impact of total quality management on organizational performance: a study of Indian manufacturing and service industry	Total quality management and organizational performance	Descriptive survey design	Positive and significant relationship exists between the variables	TQM elements are positively related to the performance of Indian Companies.
Tsou, Huang, Liu and Do (2021)	None	The effect of total quality management and corporate social responsibility on firms' performance: a future research agenda	Total quality management and corporate social responsibility and firm's performance	Descriptive survey design	TQM and corporate social responsibility area excellent tools and they have a similarity in supporting the firms' performance	TQM practices give more values to firms performance than CSR.
Kumar, Cheisne, De Grosbois and Kumar (2009)	None	Impact of TQM on company's performance	Total quality management and company's performance	Descriptive survey design	Significant positive relationship exists between the variables	Practice of TQM brought about reduction in error defects and customer complaints.
Marcel and Ayankeng (2015)	None	Impact of total management on organization performance: a study of selected service sector firms in Kenya	Total quality management and organizational performance	Descriptive survey design	Only employee traiing and empowerment have effect on organizational performance	None of the dimensions of TQM has effect on customer satisfaction
Mohammad, Flery and Khalid (2017)	None	The effect of TQM on organizational performance: empirical evidence from the textile sector of a developing country using SEM	Total quality management and organizational performance	Descriptive survey design	Total quality management has highly positive impact on organizational performance.	Positive effect of TQM practice is not limited to organizations in the developed countries only.

Wangara (2018)	None	Effect of TQM practices on operational performance of food manufacturing firm in Nairobi County Kenya.	Total quality management and operational performance	Descriptive survey design	Significant positive relationship between elements of TQM and operational performance	The implementation of TQM practices in food industry is very essential
Nojoud and hesham (2021)	None	Quality management practices and their effect on performance of organization.	Quality management and organizational performance	Descriptive survey design	Significant positive relationship exists between TQM and organizational performance	Organizations adopting TQM gain advantages more than those who are not adopting it.
Norah, Sabah and Azrilah (2015)	None	The impact of TQM on organizational performance	Total quality management and organizational performance	Descriptive survey design	The result showed two performances financial and non-financial	Every organization should practice TQM.
Al-Saffar and Obeidat (2019)	None	The effect of total management practices on employee performance: the moderating role of knowledge sharing.	Total quality management and employee performance	Descriptive survey design	TQM has significant effect on employee performance through knowledge sharing	TQM practices enhances employee performance through knowledge sharing.
Kimbel (2012)	None	The effect of total quality management practices on operational performance of Hibret Bank, S.C. Addis Ababa, Ethiopia.	Total quality management and organizational performance	Descriptive survey design	Some TQM variables in the study have significant positive effect on performance.	Practice of total quality management is good for organizational growth
Abdi and Singh (2021)	None	Effect of total quality management practice on non-financial performance: empirical analysis of automotive engineering industry in Ethiopia	Total quality management and non-financial performance	Survey Method	There is significant positive effect on non-financial performance	The significant positive effect indicates that TQM is very important in organizations.
Mohammad et al (2019)	None	Impact of total quality management on operational	TQM and operational performance	Descriptive survey design	Customer focus and other dimensions have significant	The study's result can guide organization's in prioritizing

		performance of Ethiopian pharmaceutical manufacturing plants.			positive effect on performance.	implementation of TQM practice
Alamri, Atharhi, Alharthi, Alhabashi and Hassan (2014)	None	Organization's performance improvement using total quality management principles	Total quality management and performance improvement	Descriptive survey design	Variables are significantly and positively related to operational performance	Results are consistent with that of past studies in the area.
Senanath, Qunarathne and Fernando (2020)	None	Impact of TQM on operational performance in Srilanka large scale manufacturing organizations.	Total quality management and operational performance	Descriptive survey design	Total quality management practices have significant positive effect on operational performance	Large firms in Srilanka will do better if the implement TQM practices.
Antunes, Mucharreira, Justino and Teixeira (2021)	None	Effects of total quality management dimensions an innovation: evidence from SMEs	Total quality management dimensions and innovation	Descriptive survey design	All dimensions of TQM in the study have significant positive effect on product innovation in the organization	TQM practices is of great importance to SME in Portuguese. It will enable them enhance profitability and financial sustainability.
Mehmood, Qadeer and Ahmad (2014)	None	Relationship between TQM dimensions and organizational performance	Total quality management and organizational performance	Descriptive survey design	Continuous improvement and employee involvement were the most critical dimensions	Customer focus and top management supports were not statistically significant in predicting performance.
Ahmaed (2020)	None	The impact of total quality management dimensions in non-financial performance of the organization, using Saudi Commission for Tourism and National Heritage Hotels.	Total quality management and non-financial performance	Descriptive survey design	All dimensions of TQM used have significant positive effect on non-financial performance	Only top management support and continuous process improvement have higher predictions of performance of non-finance.
Nyamari (2017)	None	The effect of total quality management practices on operational performance of commercial banks in	TQM and operational performance	Descriptive survey design	The independent variables have significant positive effect on operational performance	Effective TQM implementation enhances operational performance of firms.

		Mombasa County, Kenya				
Chukwu, Adeghe and Anyasi (2016)	None	Impact of total quality management performance of beverage companies in Nigeria	Total quality management and companies' performance	Descriptive survey design	Significant positive effect on companies' performance	TQM practice affords early error detection and cost reduction
Gelan and Dange (2021)	None	Dimensions of TQM and operational performance of manufacturing industries in Dire Dawa, Ethiopia	Dimensions of TQM and firms' operational performance	Descriptive survey design	There is significant positive effect of all the dimensions of TQM used on operational performance of firms in the study except for supplier quality management and continuous process improvement	Each of the dimensions have its own effect on operational performance no matter how little.
Singh and Dhalla (2010)	None	The effect of total quality management on the performance of Indian Pharmaceutical industry	TQM and firms' performance	Descriptive survey design	TQM enhances performance and brings improvement in customers satisfaction.	Organizations adopting the practice of TQM are always ahead of others.
Al-Qudah (2012)	None	Impact of TQM on competitive advantage of pharmaceutical manufacturing companies in Jordan	TQM practices and firms' competitive advantage	Descriptive survey design	TQM practice significantly impacted firms' competitive advantage.	Customer focus component was the most impacting of all the elements.
Wangai (2015)	None	Effect of TQM on performance of pharmaceuticals manufacturing and distributing firms in Kenya	TQM and firms performance	Cross-sectional survey method	Implementation of TQM principles greatly affected the performance of firms in the industry positively	Customer focus is the most important component of TQM.
Gebremehdine And Raju (2016)	None	Total quality management implementation and its impact on organization performance in manufacturing industries in	Total quality management and organizational performance	Descriptive survey design	There is positive and strong association between TQM and organizational performance	Many of the TQM elements are not being implemented by firms in Tigray State but those being implemented have significant

		Tigray State, Ethiopia				impact on performance.
Kumar and Prasad (2017)	None	Total quality management practices in pharmaceutical industry: a study of selected companies in Andhra Pradesh and Telangana States, India	Total quality management and firms performance	Descriptive survey design	Total quality management impacted organizational performance but the practice is on a small scale	Management inactions undermined leadership commitment to quality
Nyamari (2017)	None	Impact of TQM on selected firms in Kenya	TQM and firms performance	Cross-sectional descriptive survey design	All independent variables have significant positive effect on operational performance of firms.	TQM practice did not directly influence firms profit.
Shegaw (2019)	None	The effect of TQM dimensions on operational performance of Ethiopian pharmaceutical manufacturing	Total quality management and operational performance	Descriptive survey design	Strong positive relationship between total quality management variables and operational performance of firms	Customer focus, process management, product design and people management impacted operational performance more.
Prajogol and Sohal (2002)	None	The relationship between TQM practices, quality performance and innovation performance: an empirical examination	TQM practice and quality and innovation performance	Descriptive survey design	TQM variables are positively and significantly related to both product and innovation performance	Innovation performance caused product quality performance
Mohammed, Jagadish and Aderaw (2019)	None	Impact of total quality management on operational performance of Ethiopian Pharmaceutical manufacturing plant	Total quality management and operational performance	Descriptive survey design	Total quality management dimensions have significant positive effect on operational performance	Managers cannot but practice implementation of TQM principles in their organizations.
Kasange (2018)	None	Total quality management and operational performance in the utility pole treatment industry: a study of Uganda Electricity	TQM and operational performance	Cross-sectional survey design	Strong positive relationship exists between TQM variables and operational performance of the firms	Practice of TQM helps to prevent problems/errors before they happen in the organization thereby reducing cost.

		Distribution Company				
Ajayi (2021)	None	Total quality management: a means of better work output in Nigerian manufacturing industries	Total quality management and better outputs	Exploratory Content analysis	Total quality management guarantees better work output in an organization	Total quality management practices helps organization to achieve its goals.

METHODOLOGY

Research Design

The study intends to make use of descriptive survey design because the results from the analysis of the primary data would be generalized for the retire population of interest. The study covers brewing industry located in some states of the South-East Zone, Nigeria. The breweries include: Nigeria Breweries PLC Ama, Enugu State, Golden Guinea Breweries Umuahia, Abia State and Sabmiller Breweries PLC, Onitsha, Anambra State. A total of 1785 of the stated categories of employee across the firms were identified from a pilot study commissioned by the researcher constituted the numeral number of the population. The data for study would be principally primary in nature and it would be collected from the respondents selected for the study. The sample size for the study was determined through the application of the formula developed by Borg and Gall in 1973 which give us 343. The study intends to use systematic sampling method in selecting the units of observation. The researcher intends to adopt direct questionnaire distribution method in collecting the data. The data generated in the study would be analyzed quantitatively. All tests would be conducted at 0.05 level of significance. That being the probability level at which we would be willing to accept type I error.

DATA PRESENTATION AND ANALYSIS

The data generated in this study were presented and analyzed in three broad sections, namely; demographic features of the respondents, answer to research questions and test of hypotheses. Accordingly, frequency tables were used to present and analyze the demographic characteristics of the respondents while summary and descriptive statistics were used to answer the research questions were already in a likert scale format. As for the hypotheses, inferential statistics of Pearson Correlation and multiple regression analysis were deployed to verify the various claims of the null hypotheses.

4.1 Demographic Characteristics of the Respondents

In this section of the analysis, personal data of the respondents were presented and analyzed to actually determine whether the respondents were in a position to discuss all issues relating to total quality management and operational performance of the firms in the study effectively. Such personal information of the respondents include: gender of the respondents, age, educational attainment and organizational tenure. The analysis was carried through frequency tables and percentages.

Table 4.1: Gender of the Respondents

S/N	Gender	Frequency	Percent	Valid Percent	Cumulative
1.	Male	224	69.7	69.7	69.7
2.	Female	97	30.3	30.3	100.0
	Total	321	100.0	100.0	

Source: Field Survey, 2023

Table 4.1 is the presentation of respondents gender. The percentage analysis showed there are more male respondents than there are female respondents. The implication is that in the brewing industry, there are more males as technical experts and managers than there are females across the firms under investigation.

Table 4.2: Age Bracket of the Respondents

S/N	Age Bracket	Frequency	Percent	Valid Percent	Cumulative
1.	18 – 27	19	5.9	5.9	5.9
2.	28 – 37	61	19.0	19.0	24.9
3.	38 – 47	118	36.8	36.8	61.7
4.	48 – 57	90	28.0	28.0	89.7
5.	58 and above	33	10.3	10.3	100.0
	Total	321	100.0	100.0	

Source: Field Survey, 2023

The analysis of respondents' age bracket presented in Table 4.2 showed that the age bracket 38 to 47 years has the highest frequency of 118 which represents 36.8 percent of the entire sample. Another look at the table shows that overall, more than 60 percent of the respondents in the sample are below 50 years of age thus showing that the sample consists of people who are relatively young.

Table 4.3: Educational Attainment of the Respondents

S/N	Educational Attainment	Frequency	Percent	Valid Percent	Cumulative
1.	OND/NCE	47	14.5	14.5	14.5
2.	HND/First Degree	158	49.3	49.3	63.8
3.	Masters Degree	68	21.2	21.2	85.0
4.	Professional Cert.	37	11.7	11.7	96.7
5.	Ph.D	11	3.3	3.3	100.0
Total		321	100.0	100.0	

Source: Field Survey, 2023

Table 4.3 shows that 158 respondents representing 49.3 percent of the sample claim they have Higher National Diploma (HND) or first degree. The table shows further that more than 80 percent of the respondents have qualifications ranging from first degree or its equivalent and above. The implication is that the sample consist of highly literate respondents.

Table 4.4: Organizational Tenure

S/N	Length of Time in Service	Frequency	Percent	Valid Percent	Cumulative
1.	Below 5 years		9.3	9.3	9.3
2.	5 – 10 years		27.5	27.5	36.8
3.	11 0 15 years		43.1	43.1	79.9
4.	16 years and above		20.1	20.1	100.0
Total		321	100.0	100.0	

Source: Field Survey, 2023

The analysis of respondents' organizational tenure, that is, the length of time the respondents have spent in their respective organizations shows that 90.7 percent of the people in the study have worked in their respective organizations for upward of 5 years and above. Thus, showing that they have had experience of what operational performance is all about. Therefore, from the point of view of the educational background and the organizational tenure, it will not be wrong to conclude that the respondents have all it takes to effectively discuss all issues relating to total quality management and operational performance as outlined in the study.

4.5 Regression Results for all the Measures of Operational Performance

In this section of the analysis, the results of the regression analysis for all the measures of operational performance as the dependent variable were presented to make clear the effects of total quality management variables as identified in this study. Accordingly, the results are presented as follows starting with quality performance of the firms in the study.

Analysis of Variance (ANOVA) for Quality Performance

ANOVA ^b					
Source of Variation	df	Sum of Squares	Mean Squares	F-ratio	Sig.
Regression	4	258.850	64.713	49.475	0.000 ^a
Residual	145	189.693	1.308		
Total	149	448.543	-		

a. Predictor: (constant), process management.

b. Dependent variable: Quality Performance

With the F-Statistic of 49.475 and $P \leq 0.05$ significance level as presented in Table 4.20, regression model is statistically significant and significant positive relationship exists between dependent and independent variables. Therefore, model is valid and fit for predictions.

Summary of Regression Results for Quality Performance

Model	R	R ²	Adjusted R Square	Standard Error of the Estimate	Durbin Watson Stat.
I	0.611	0.590	0.523	0.49765	2.071

a. Predictor: (constant), process management

As could be seen from Table 4.21, regression coefficient represented in the table by 'R' with the value of .611 shows that 61.1 percent relationship exists between the dependent and independent variables. Similarly, the coefficient of determination represented by 'R²' in the table with the value .590 shows that 59 percent of the variation in quality performance can be explained by the regressors. In the same vein, the Durbin Watson Statistic of 2.071 is an indication that the data does not contain serial autocorrelation.

Coefficients of the Predictor Variables, t-values and Significance Level

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	Beta		
1 (Constant)	-.173	.205	-	-.852	.349
Process Management	.627	.047	.581	10.420	.000

a. Dependent Variable: Quality Performance

Table 4.22 shows that all the regressors have positive relationship with the dependent variable. The t-values and the probability levels equally showed that the coefficients are significant. Thus confirming the a priori signs.

Summary of ANOVA for Cost Reduction Performance

ANOVA ^b					
Source of Variation	df	Sum of Squares	Mean Squares	F-ratio	Sig.
Regression	4	279.483	69.871	53.996	0.000 ^a
Residual	145	187.635	1.294		
Total	149				

a. Predictor: (constant), top management support

b. Dependent variable: Cost Reduction Performance

The F-value of 53.996 presented in Table 4.23 is significant because $P \leq 0.05$ is greater than $P_{0.000}$ and as such, it can be inferred that the model is statistically significant and therefore valid for predictions.

Summary of Regression Results for Cost Reduction Performance

Model	R	R ²	Adjusted R Square	Standard Error of the Estimate	Durbin Watson Stat.
I	0.637	0.610	0.523	0.54781	1.908

a. Predictor: (constant), Top management support

Table 4.24 shows that regression coefficient represented by 'R' in the table with the value of 0.637 is an indication that 63.7 percent relationship exists between total quality management elements and cost reduction performance measures of the firms under study. In the same vein, the coefficient of determination represented by 'R²' in the table with a value of 0.610 shows that 61 percent variation in the dependent variable can be accounted for by the regressors. Finally, the Durbin Watson Statistic of 1.908 shows that the model does not contain serial autocorrelation.

Coefficients of the Predictor Variables, t-values and Significance Level

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	Beta		
1 (Constant)	-.773	.201	-	-	.520
Top Management Support	.197	.057	.605	3.267	.000

a. Dependent Variable: Cost Reduction Performance

The coefficients of the regressors presented in Table 4.25 shows that all the variables have significant and positive relationship with the dependent variable as could be seen from the t-values and the corresponding probability levels when compared with $P \leq 0.05$. Similarly, the positive values of the coefficients are confirmation of the a priori signs.

4.6 Test of Hypotheses

The coefficients of the independent variables as presented in Tables 4.20 to 4.34 were interpreted alongside the other parameters such as the values of t-statistic and

significance levels to facilitate decision taking on the claims of null hypothesis across the five measures of operational performance as identified in this study. Accordingly, the coefficient for process management ($\beta_1 = .581$), which means that if the independent variable is increased by one additional unit, quality performance of the firms will increase by 58.1 percent. The result shows also that at 0.05 significance level, the coefficients are significant given the values of t and the corresponding probability level. Consequently, the null hypothesis was rejected while the alternative which suggests that total quality management factor process management has significant and positive effect on operational performance with respect to quality performance of the firms in brewing industry in South East, Nigeria was accepted.

In the same vein, the coefficients of top management support represented by $\beta_2 = .605$. It means that when the regressor is increased by one more unit, the dependent variable, cost reduction will increase by 60.5 percent. The signs of the coefficients and other parameters in the table shows that the coefficient is significant. Therefore, given such weight of evidence against the null hypothesis, it was while the alternative which suggests that total quality management factor (top management support) have significant and positive effect on operational performance with respect to cost reduction of firms in brewing industry in South-East, Nigeria was accepted.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study investigated the effect of total quality management principles implementation on operational performance of firms in the brewing industry in the South-East region of Nigeria. The exhaustive and rigorous analysis carried out in the study threw up some remarkable finding and on the basis of the findings, some far-reaching conclusions were drawn for the study. Firstly, the respondents were overwhelmingly in the affirmative in their support for the implementation of total quality management principles as a means of enhancing firms' operational performance in the brewing industry. In other words, total quality management practices were found to be very critical in improving firms' performance in the industry. This is particularly in the areas of achievement of sustained competitive advantage in the industry. Competition in the brewing industry is driven by innovation and managerial capabilities. Therefore, firms operating in the industry are always on their toes in terms of what can make the difference which actually is the source of advantage. For this singular reason, firms are ready to stake anything to make sure that they attain the desired level of competitive advantage.

Secondly and very importantly too, are the strong positive relationships between the dimensions of total quality management and the measures of operational performance as identified in this study. The high correlation coefficients between the dependent and independent are indications that the elements of total quality management can actually make the needed difference in the performance of the firms studied if effectively managed. As a process or management philosophy that is designed to always satisfy the desire of the customers, management of the organization always ensures that everybody get involved in one way or the other to make sure that customers have nothing to complain about in the way they are served or attended to at all levels of contact with the employees of the organization. The study recommends that customer focus and product design elements be given more attention in the practice so as to achieve higher impact on quality performance. More attention be given to customer

focus and continuous improvement elements so as to enjoy sustained contributions to cost reduction.

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