Total Quality Management and Operational Performance of Selected Pharmaceutical Manufacturing Industries In Anambra State

Bulus Nyazun Dankaro and Nwekpa Kenneth C PhD

Centre Coordinator, Bioresources Development Centre (BIODEC), Bogoro, Bauchi State and Ebonyi State University, Abakaliki

Abstract

The study examined the effect of total quality management implementation on operational performance of selected pharmaceutical manufacturing industries in Anambra State. The specific objectives are to: examine the effect of customer focus on operational performance of pharmaceutical manufacturing industries in Anambra State; determine the effect of top management support on operational performance of pharmaceutical manufacturing industries in Anambra State; Ascertain the effect of continuous process improvement on operational performance of pharmaceutical manufacturing industries in Anambra State and Evaluate the effect of product design on operational performance of pharmaceutical manufacturing industries in Anambra State. The study adopted descriptive survey design. Using Taro Yameni's statistical formula, a sample of 192 was estimated from a population of 371 senior employees of the selected firms. An item structured instrument of the Likert scale format was validated, tested for reliability and used for data collection. Major statistical tools of analysis were summary statistics, Pearson correlation and regression analysis. All tests were conducted at 0.05 level of significance. Findings suggest that the identified dimensions of the total quality management for the study which include: customer focus, top management support, continuous process improvement and product design have significant and positive effect on operational performance measures. The study concludes that total quality management guarantees production of quality products that satisfies the expectation of the customer. It was recommended among others that organizations, especially those in the manufacturing subsector should start the implementation of total quality management principles to help them gain competitive advantage.

Keywords: *Customer focus, Continuous process improvement, top management support, Product design and operational performance*

I. INTRODUCTION

Quality management has become a strategic tool in the present dynamic business world. This is because the competition in the global business environment is increasingly becoming more intense. Given this 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 to enable them remain relevant so as to enjoy larger market share for their products or services (Addae-Korankye, 2013). As a process which aims at achieving continuous improvement in quality of organization's management, total quality management ensures that all management subsystems are properly integrated into the realization of organizational goals of customer satisfaction (Gharakhani, Rhamati, Farrokhi and Farahmandian, 2013).

The ever-increasing demands for high quality of products or services, especially in the pharmaceutical industry and the current global revolution in technological innovation, have compelled organizations to begin to adopt and implement the principles of total quality management. Consequently, it has become an important source of creating enhanced competitive advantage an improvement in overall effectiveness in organizational activities. The effectiveness in the organization through the adoption of total quality management leads to organization's improved performance. Thus, organization's performance is and outcome of its operation which eventually leads to the realization of set goals in the organization (Mehmood, Qadeer and Ahmed, 2014).

According to Su Ni (2015), total quality management is a management philosophy for continuously improving overall business performance based on leadership, supplier quality management, vision and plan statement, revolution, process control and improvement, employee participation, recognition and reward, education and training as well as being customer focused. Firms employ these management techniques to improve on their operational and business performance such as reduced cost, increased quality of goods or services, increased profit and increased market share. He notes further that excellent quality is regarded as one

of the most important aspect of manufacturing, service and buyers' strategies by producers. In the opinion of Asumeng and Osae-Larbi (2015), organizational learning enhances an organization's capability to acquire and develop new knowledge and how the knowledge can be put to use to improve performance.

It is common knowledge that pharmaceutical industry in Nigeria is facing many challenges and firms located in Anambra State are no exception. However, our focus in this paper is in the areas of manufacturing of substandard, fake, adulterated or counterfeit drugs, that do not meet the prescribed standards of the World Health Organization (WHO Report, 2002). To Ogbonna Ilika and Nwabueze (2015), there has been growing trend of all manner of drug counterfeiting in Nigeria, ranging from raw materials to finished pharmaceutical products with its negative health consequences for the people. A review of modelling studies showed that poor-quality medicines can result in serious harm to the consuming public and have serious effect on the productivity of the workforce (Orubu, Ching, Zaman and Wirtz, 2020).

For the reasons above and many more, this study tries to evaluate the effect of implementation of total quality management on operational performance of selected pharmaceutical manufacturing firms in Anambra State. Operational performance connotes the measurement of actual outputs of an organization in relation to set goals or expectations. It can be measured in an organization based on its objectives such as quality, cost reduction, speed of delivery, flexibility and dependability (Nyamari, 2017). In the light of the above, the study examines the effect of some dimensions of total quality management such as customer focus, top management support, continuous improvement and product design on firms operational performance.
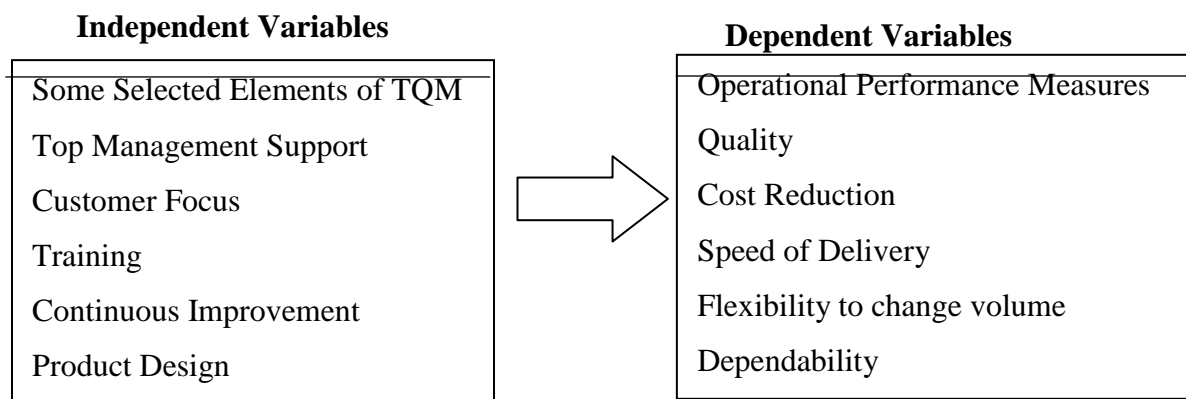
Therefore, the need for continuous process improvement cannot be overemphasized. The pharmaceutical industry is one of those areas where quality can never be compromised because of its effect on human life, but the experience as manifested in the quality of products being produced in the industry across the country appears to be in the contrary. Even the pharmaceutical firms that engage in large scale importation of drugs seem not to be concern with the quality and originality as the always flood the market with fake and substandard products, from China and India in particular (Coodman, 2002 cited in Lybecker, 2008). It would appear that the pharmaceutical firms are not interested in implementing the principles of total quality management despite its presumed advantages and prospects.

However, the specific objectives are to: examine the effect of customer focus on operational performance of pharmaceutical manufacturing industries in Anambra State; determine the effect of top management support on operational performance of pharmaceutical manufacturing industries in Anambra State; Ascertain the effect of continuous process improvement on operational performance of pharmaceutical manufacturing industries in Anambra State and Evaluate the effect of product design on operational performance of pharmaceutical manufacturing industries in Anambra State.

II.   REVIEW OF RELATED LITERATURE
2.1 Conceptual Review
The conceptual framework for the article is formulated below:

Independent Variables

Some Selected Elements of TQM

Top Management Support

Customer Focus

Training

Continuous Improvement

Product Design

Dependent Variables

Operational Performance Measures

Quality

Cost Reduction

Speed of Delivery

Flexibility to change volume

Dependability

Figure 1: Conceptual Framework
Source: Author's derivation

2.1.1 The Concept of Total Quality Management
Total quality management has been conceptualized as a macro-management philosophy, which aims at improving continuously in all functions of the organization to produce and deliver goods or services in line with the needs or requirements of the customers in less cost, with faster, safer and easier way compared with that of the competitors, with full participation and involvement of all employee (Al Quadah, 2012). In a similar manner, Lee and Chang (2006) define the concept as the commitment of all employees to continuous

improvement of business processes to meet the needs and requirements of customers. In other words, total quality management is a business philosophy, a way of doing business which describes ways of managing people and business processes to ensure complete customer satisfaction at every stage. In the same vein, Gelan and Dange (2021) define it as a management philosophy that is used by organizations that strive to improve their efficiency and competitiveness in the business market place. It is a management approach which focuses on long term success through customer satisfaction.

2.1.2 The Concept of Operational Performance

Operational performance refers to activities directed at the formation of organizational goals where firms monitor the progress being made towards the achievement of the goals and take remedial action in case of any deviation (Richard, Fariborz and Carlos, 2009). McNamara (2013) refers to it as the output of an organization driven by operations toward goal achievement which could be financial, operation wise and/or organizational effectiveness. But to Kamal (2012), operational performance is the end result of an organization's activities, which entails measures like set targets to be accomplished within a given period of time. As the ability of an organization to realize its objectives by offering high quality products/services aimed at beating competitors own, operational performance variables must be measurable (Akhtsr, 2014).

2.2 Theoretical Framework

The underpinning theory for the study is the General Systems Theory (GST). The theory was developed by Bertalanffy in 1968. He postulated in the theory that a system is a complex of interacting elements and that they are open to and interact with their environment. He posits that every system, including organizational setting, has a sub-system which makes up the whole, that is, the entire system. Such sub-systems are assigned functions and provided with enabling environment, including resources, capable managerial skills, etc, which actually help them to perform their responsibilities effectively. He states further that every system is bounded by space and time, influenced by its environment, defined by its structure and purpose and expressed through its functioning.

Active systems are actively structures or components 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 in organizational management is interrelated and interdependent. The impact of this assumption is that when a subsystem malfunctions, the whole system would be affect. Therefore, by analogy, total quality management concept with its components or dimensions is expected to function effectively such that no element or principle may be found wanting in its implementation otherwise, the overall performance may be negatively affected. For instance, customer focus principle must be followed religiously likewise the continuous process improvement component and so for the rest of the dimensions.

2. 3 Empirical Review
2.2   Empirical Review

Kimbel (2021) carried out a study on the effect of total quality management practice on operational performance of Hibret Bank S.C., Addis Ababa, Ethiopia. The study adopted descriptive survey design. The researcher used simple random and cluster sampling techniques to select 370 employees out of which 362 completed and returned their instruments. Linear regression analysis was the main total of statistical analysis. Findings from the study indicate that out of the five independent variables that could affect operational performance, four variables namely: top management commitment, employee training and education, quality focus and continuous process improvement, have significant positive effect on operational performance.

Good as the structure of the study appears in terms of framing of the topic and the problem it sets out to solve, it suffered some serious technical issues which are worthy of mentioning in this section. One, the study did not specify the category/categories of staff it used in the investigation. Two, the study failed to indicate the size of the population from where the 370 employees were drawn and the method it used in determining the sample size. Three, sampling technique should have been a systematic sampling method which has unique attributes of random start and sampling interval. They are the attributes that enable the technique to spread the sample evenly across the population of interest. Fourth, the linear regression method adopted was inappropriate for the analysis because there were more than one independent variable in the model rather, multiple regression analysis would have been more appropriate for the analysis.

Abdi and Singh (2021) did a study on effect of total quality management practices on nonfinancial performance; an empirical analysis of automotive engineering industry in Ethiopia. The study design was survey method. The study administered more than 500 copies of self-administered questionnaire to the employees working under different departments and factories under the automotive engineering industry. Major statistical tools of analysis were correlation and factor analysis as well as mean scale test. The software packages were SPSS and AMOS-26. Findings suggest that the dimensions of total quality management used as the independent variables have significant positive effect on nonfinancial performance of the organization. The study concludes

that the positive relationship between the total quality management variables and the NFP measures is an indication of the importance of each of these practices in improving quality in the industry.

Even though the findings of the study were far-reaching, the study did not state the population of study, the categories of staff interviewed, the sample and the method used in determining the sample size as well as the technique used in selecting the units of observation. It is not enough to state that over 500 employees were interviewed, both the population and the exact sample size obtained through a known technique have to be stated otherwise, generalizing the result for the entire population of interest will be difficult. Furthermore, upholding the previously empirical validated relations is not acceptable for a study of this magnitude. There ought to be independent findings to which the study can lay claim. We therefore suggest that findings and conclusions should always be based on the results generated from current and not past studies as we have witnessed in the present circumstance.

Mohammed et al (2019) carried out a study on impact of total quality management on operational performance of Ethiopian Pharmaceutical manufacturing plants. The purpose of the study was to determine the impact of TQM system on the operational performance of the pharmaceutical manufacturing companies operating in Ethiopian industrial space. Data for the study were collected using copies of self-administered questionnaire. The study was carried out on 65 respondents drawn from 13 companies. Out of the 65 copies of questionnaire distributed among these companies, a total of 57 got returned. Through comprehensive literature review, seven critical success factors of TQM practices that are considered relevant to the pharmaceutical industry were identified. Correlation and regression analysis were the major statistical tools of analysis and they were used to determine the relationship between TQM practice variables on operational performance (quality, cost, speed of delivery and flexibility to volume). The result of the correlation analysis revealed that there is strong positive relationship between TQM practice variables and operational performance among the pharmaceutical manufacturing companies. The outcome of regression analysis showed that customer focus, process management, product design and people management have significant positive contributions to at least one of the operational performance measures. Top managements support, suppliers' quality management and continuous improvement do not appear to contribute as much as those mentioned earlier. Based on the aforementioned findings, the study concluded that managers are now better informed and as such, they can now take better decisions in the implementation of TQM practices in their respective organizations. It also concludes that the study's results can equally guide organizations in prioritizing the implementation of TQM based on strategic importance of performance measures needed by them. Hence the choice of performance measures is based on the perceptions of the managers and as such, generalization of the results and observations must be made with sufficient caution.

As detailed as the reporting of results of this study is, it suffered some crucial setbacks. One of them is that the study did not state in clear terms the research design it adopted as the method. Two and very important, the study did not state the population, method of sample size determination and of course, the category of staff used to answer the questions. Because these issues mentioned were not there, there was no sampling technique. But multi-stage would have been most appropriate because there should be at least two-stage selection process from what was presented in the abstract. Since all the companies in the industry were not studied, there should have been a method for selecting the firms in the study, called the primary selection and then the employees at the second level called the secondary selection in statistics. Consequently, it may be very difficult to generalize the results for the entire population of interest since the necessary due process was not observed in the methodological aspect of the study.

Alamri et al (2014) investigated organizational performance improvement through the application of total quality management practices. The purpose of the study was to investigate the relationship between six total quality management variables and the operational performance in one of the largest Saudi telecommunication companies. The data used in the research were collected through a survey that distributed 421 copies of the questionnaire to the employees in the company. Major statistical tool of analysis was correlation coefficient. Result of the analysis showed that the variables of total quality management as identified in the study were positively related to operational performance in the organization. However, it was revealed that a negative relationship exists between supplier quality management and operational performance in the organization. The study concluded that the results obtained from the study are consistent with those of past studies in the area.

The major problem with the study is that neither the population nor the employee categories were stated. The study also did not state specifically the research design it adopted in carrying out the study and it is a development which will make results generalization a bit difficult. In another development, the conclusion of the study appeared to be over generalize thereby rendering it weak. Apart from that, a study that sought to determine the effect of independent variables on a specified dependent variable ought to have use multiple regression analysis so that in addition to determining the overall fitness of the model, the respective contributions of each independent variable may easily be identified, measured and commented upon.

Senanath et al (2020) explored the impact of total quality management practices on operational performance of large scale manufacturing organizations in Sri-Lanka, by using a sample of 279 companies. Two hypotheses were stated and tested using structural equation modeling. The result from the analysis showed that total quality management practices have positive impact on operational performance and all the six TQM indicators as identified for the study individually, have positive impact on operational performance. The study therefore concluded that large scale manufacturing organizations in Sri-Lanka would be able to increase their operational performance during their peak seasons by effectively implementation TQM principles while facing the competition in the market.

One major problem with the study is that it failed to properly state its population. For instance, if the managers are the respondents as the researcher has claimed, then organizations in the industry cannot be the units of observation or be used as the population rather the number of the managers who were actually interview should be stated as the population, cutting across all the firms in the study. The implication, however, is that the multi-stage selection procedure should have been adopted in selecting both the primary level (firms) and the secondary level (managers). This has to be clearly stated in addition to outlining the method used in determining the sample size since the entire population was not studied. Finally, it is expected that for a study of this level, the relevance of theory used in explaining the phenomenon under investigation should have been highlighted.

In a study carried out by Antunes et al (2021), the effects of total quality management dimensions on innovation was investigated using evidence from the SMEs sector. The study aimed to identify which dimension of TQM have influence on and support innovation strategies within the Portuguese SMEs, in the context of product services innovation and process innovation as well as to analyze the extent to which this relationship occurs. To examine the relationship between the TQM dimensions and innovation strategies concerning innovation products and innovation processes, a multiple linear regression analysis was chosen and an eight-predictor multiple linear regression model was proposed. The data were collected through a questionnaire sent by mail. This research concludes that several dimensions of TQM, such as benchmarking, quality/conception and product design and continuous improvement, have significant positive association with product innovation. Although the data analysis/measurement of the results showed some dimension have significant association with product innovation, the association is negative. Conversely, several TQM dimensions, such as leadership/management's commitment, benchmarking, involvement/empowerment of employees and continuous improvement, revealed a positive and significant association with process innovation. The study concluded that the work is of crucial importance for the knowledge of Portuguese SMEs and the fundamental factors that companies must address to both improve their efficiency and be more competitive, to increase profitability and ensure financial sustainability in the medium and long-term periods in the organizations

The study made use of primary data principally, collected from the employees or owner-managers of the various SMEs in the study. The status of the respondents were not revealed neither were the population nor selection procedure. Even though the design for the study was not stated in clear terms, we presume that it must have been a descriptive survey method because it involved drafting and positing or mailing of copies of the questionnaire to the supposed respondents. It was equally observed that the study would have made more sense if the conclusion has been made in specific terms along the line of the findings even though such conclusions would be received and treated with a lot of caution given the issues raised above in the methodology of the study.

Mehmood et al (2014) investigated the relationship between total quality management dimensions and organizational performance by using Pakistani Textile Mills as the study area. The paper focused on four dimensions of total quality management which are customer focus, continuous improvement, employee involvement and top management support. The intention was to determine the relationship between the variables as listed above and organization performance in addition to identifying the most critical dimension out of the four mentioned as the predictor of organizational performance. The results are based on the empirical data collected from a self-administered survey instrument of 90 organizations from which 270 managers were identified and interviewed. The main statistical tool used was multiple regression analysis. The results indicate that continuous improvement and employee involvement dimensions were the most critical dimensions in predicting organizational performance. The result showed also that customer focus and top management support have no statistical significance for predicting the performance.

It has become very persistent that many researchers either do not know how to or do not want state the design their study is adopting neither do they know how to state the population of the study not to talk of the sampling technique or the method of sample size determination. For example, this study that is being reviewed presently said that Pakistani Textile Mills is the population of the study and it is quite wrong because the textile mills are managed by people of different categories in the respective firms in the industry. Since it is not a census of all the textile mills in Pakistan, there should have been a sample of textile mills and then a sample of people working in the firms. Therefore, it is wrong to state that the population of study is 396 textile manufacturing firms in Pakistan. Another serious shortcoming of the study is that it has no conclusion. So, I wonder what the researcher has achieved because it would be practically difficult for anybody who might want

to make reference to the study to find anything to say about the study. Concluding section is a very crucial aspect of any study.

Ahmed (2020) did an empirical investigation of the impact of total quality management dimensions on non-financial organizational performance, using Saudi Commission for Tourism and National Heritage Hotels as the study institutions. The list of the TQM dimensions used as the independent variables include, Top management support, customer focus, employees' participation, training and education, continuous process improvement, strategic planning, effective communication and decision-making based on data and information. While the non-financial organizational performance measurement has job satisfaction, organizational commitment and employees' creativity as the dependent variable. The sample consists of 121 employees from different hotels, which are classified within the Saudi Commission for Tourism and National Heritage (SCTH) in Najran Region. The main statistical tool of analysis was multiple regression. Results from the analysis showed that effective communication, top management support, continuous process improvement, employee participation, decision-making based on information, strategic planning, training and education and customer focus had significant positive effect on non-financial performance of the organizations studied. However, it was equally revealed from the results that top management support, employees' participation, continuous process improvement and effective communication predicted non-financial performance of the organizations better than the rest of the dimensions evaluated. The study concluded that total quality management constructs, especially those four with the highest coefficients can be adopted by the organizations studied in this exercise and even others.

Like the studies reviewed before this one, the study had no clear-cut design, no population or sample was clearly defined and no conclusion was made. But a study of this nature, which covered an important sector of an economy, should have made a far-reaching conclusion from the findings of the study. However, because mention was made of collection of primary data, through self-administered questionnaire, we presumed that the design must have been a descriptive survey design. Nevertheless, since neither the population nor the sample were clearly stated, generalization of the results for the entire population may not be acceptable.

In a study carried out by Nyamari (2017), the effect of total quality management practices on operational performance of commercial banks in Mobasa County, Kenya was investigated. The study employed a cross-sectional descriptive survey design. The design was considered most appropriate due to information gathering done at particular point in time over a short time period. The target population was 41 commercial banks in Mombasa County and as such there was no need for sampling given the smallness of the number of banks. In studying all the banks in the region, 41 copies of questionnaire were distributed and 31 of them were completed and returned thus showing a 76 percent response rate which was considered adequate for the study. Results of the analysis showed that the five quality management practices dimensions used as the independent variables had significant relationship with operational performance.

However, it was equally found that TQM practice does not directly enhance the profits of the banks studied. The study concluded that effective total quality management produces high operational performance for the commercial banks in Mombasa County, Kenya. This study unlike those reviewed earlier, recognized the need for research design and the statement of study population, and the cross-sectional design adopted was quite appropriate. However, the correlation analysis adopted for analyzing the effect of dimensions of total quality management practices was not appropriate. Multipole regression analysis would have been more effective so that apart from overall effect of the total quality management on operational performance of the banks, individual contributions of each dimension could equally be measured. No wonder that the study did not have assuring conclusions in specific terms.

III. METHODOLOGY

The study adopted descriptive survey design. The choice of the design was informed by the fact that the data for the analysis would be principally primary in nature. The study was conducted in Anambra State. The target population of the study is all employees of selected frontline pharmaceutical firms in the state and 371 members of staff were identified. From it, a sample of 192 was determined through the application of Taro Yameni's statistical formula. Systematic sampling technique was used in selecting the units of observation from the selected firms. An item structured instrument developed to reflect the modified Likert scale format of strongly agree, agree, disagree, strongly disagree and undecided was used to elicit information from the respondents by the researcher after it was validated and reliability test conducted on it. The following reliability coefficients were generated from a method of test re-test: 0.80, 0.83, 0.90 and 0.80 (see Appendix II for details of the estimation) for the four research questions with an average coefficient of 0.83 thus showing that the instrument is 83 percent reliable. Direct questionnaire, distribution approach was adopted in collecting the data. The approach facilitated reduction in the volume of non-response rate which often associate with surveys of this nature. Out of the 192 copies of the questionnaire issued out, 157 were completed and returned thus showing a response rate of 81.8 percent which we considered very adequate for the study. The data generated from the

study were analyzed through summary statistics, correlation and multiple regression analysis. All tests were conducted at 0.05 level of significance.

IV. DATA PRESENTATION AND ANALYSIS

Demographic Characteristics of the Respondents

The demographic features of the respondents such as gender, age, educational qualification, length of time in service/organizational tenure (in years) and designation, were analyzed in this section of the analysis to determine the capacity and suitability of the respondents in discussing all issues relating to total quality management and operational performance of the selected firms.

Table 4.1: Demographic Features of the Respondents

S/N	Demographic Features		Frequency	Percentage of Total
1.	Gender:	Male	112	71.3
		Female	45	28.7
		Total	**157**	**100.0**
2.	Age Bracket:	18 – 27	5	3.2
		28 – 37	32	20.3
		38 – 47	61	39.1
		48 – 57	31	19.5
		58 and above	28	17.9
		Total	**157**	**100.0**
3.	Educational Qualification:			
		WAEC	7	4.3
		OND/NCE	34	21.9
		HND/First degree	64	40.7
		Masters degree	29	18.5
		Professional Cert.	20	13.0
		Ph.D	3	1.6
		Total	**157**	**100.0**
4.	Length of Service (in years):			
		Below 5 years	16	10.2
		5 – 10 years	40	25.4
		11 – 15 years	69	55.1
		16 and above years	32	20.3
		Total	**157**	**100.0**
5.	Designation:	Production manager	38	24.0
		Quality Control Manager	38	24.0
		Marketing Manager	38	24.0
		Expert/Technician	18	11.7
		Research & Dev. Experts	26	16.3
		Total	**157**	**100.0**

Source: Field Survey, 2022

As could be seen from Table 5.1, the sample consists of more male respondents than female. Similarly, the age bracket analysis showed that 62.6 percent of the sample are within the age interval of 18 to 47 years thus, showing that the sample consists of those who are relatively young. With respect to educational qualification of the respondents, more than 73 percent of them have qualifications ranging from first degree or its equivalent and above, an indication that the sample consists of fairly literate people. From the organizational tenure perspective, the table shows that more than 64 percent of them have worked in their respective organizations for upward of 11 years and above. Also, the designation statistics presented in the table showed that all relevant sections of the production management were adequately represented in the sample. The educational qualification and organizational tenure of the respondents showed that they have enough experience to discuss the subject matter of the study effectively.

Table 4.2: Correlation Analysis

Correlation Matrix

Variables		Operational Performance	Customer Focus	Top Management Support	Continuous Improvement	Product Design
Operational Performance	Pearson Correlation	1	.591**	.607**	.703**	.525*
	Sig. (2-tailed)		.000	.000	.000	.002
	N	157	157	157	157	157
Customer Focus	Pearson Correlation	.591**	1	.528**	.395*	.311*
	Sig. (2-tailed)	.000		.000	.010	.005

	N	157	157	157	157	157
Top Management Support	Pearson Correlation	.607**	.528**	.457**	1	.297*
	Sig. (2-tailed)	.000	.010	.000		.021
	N	157	157	157	157	157
Continuous Improvement	Pearson Correlation	.703**	.395*	.457**	1	.297*
	Sig. (2-tailed)	.000	.010	.000		.021
	N	157	157	157	157	157
Product Design	Pearson Correlation	.525*	.311*	.505**	.297*	1
	Sig. (2-tailed)	.002	.005	.000	.021	
	N	157	157	157	157	157

*: Correlation is significant at 0.01 level (2-tailed).

**: Correlation is significant at 0.05 level (2-tailed).

Table 4.2 showed that positive relationships exist between the dependent and independent variables as well as among the independent variables. However, while the relationship was strong between the dependent and all the independent variables, it was weak among the independent variables in many of the cases. Nevertheless, the relationships showed there was no case of multicollinearity or orthogonal conditions thus indicating that the data is good enough for multiple regression to be performed on them (Koutsoyiannis, 2001).

Table 4.3: Eigen Values, Condition Index and Variables Proportion

Model	Eigen Value	Condition Index					
			Constant	CF	TMS	CI	PD
1.	4.816	1.003	0.00	0.00	0.00	0.00	0.00
2.	0.105	5.562	0.13	0.08	0.35	0.22	0.44
3.	0.073	7.215	0.07	0.09	0.18	0.05	0.49
4.	0.052	9.213	0.06	0.27	0.19	0.24	0.38
5.	0.049	10.439	0.27	0.68	0.42	0.45	0.26

a. Dependent Variable: Operational Performance

Specifications: Eigen values that are close to zero indicates dimension which explain little variance. But for the condition index, the rule is that when the values are more than 15 for any of the independent variables, then there is possibility of presence of multicollinearity in the data. The result presented in Table 4.3 showed there is no presence of multicollinearity. The results equally suggest possibility of long term relationship between the dependent and independent variables.

Table 4.4: Collinearity Statistics

Variables	Tolerance	Variance Inflation Factor (VIF)
1(Constant)	-	
Customer Focus	0.564	2.376
Top Management Support	0.835	1.258
Continuous Process Improvement	0.341	2.049
Product Design	0.577	2.088

Source: Field Survey, 2022

From Table 4.4, it could be seen that the collinearity statistics presented for the independent variables did not suggest presence of multicollinearity because none of the VIF values is up to 5 as specified by O'Brien (2007) before multicollinearity can be suggested. Similarly, the tolerance values are not in any way near the 0.20 or 0.10 limits specification. The collinearity statistics are presented in Table 4.4 has also confirmed the stability of the model as did in the case eigen values, etc.

V. Results of Regression Analysis

In this section, we present the regression results for the operational performance of the firms in the study. Out of the numerous dimensions of total quality management, we identified four which are: customer focus, top management support, continuous process improvement and product design. These were regressed against the operational performance whose measures were also identified as: cost reduction, quality, speed of delivery, flexibility and dependability. The regression sought to determine the effect of TQM elements as stated above on operational performance measures.

Table 4.5: Summary of Analysis of Variance (ANOVA) for the Model

ANOVA[b]

Source of Variation	df	Sum of Squares	Mean Square	F-ratio	Sig.
Regression	4	263.794	65.949	92.495	.000[a]
Residual	145	85.603	0.713	-	
Total	124	349.397	-		

a. Predictor: (constant), customer focus, top management support, continuous process improvement and product design
b. Dependent Variable: Operational Performance

The ANOVA summary presented in Table 4.5 shows that F-Statistic is 92.495 and it means that the model is statistically significant since $P \leq 0.05$ is greater than .000. Therefore, significant relationship exists between dependent and independent variable.

Table 4.6:   Summary of Regression Result for the Model

Model	R	R^2	Adjusted R-Square	Standard Error of the Estimate	Durbin Watson Stat.
I	0.593	0.511	0.475	0.45323	2.019

a. Predictor: (constant), customer focus, top management support, continuous process improvement and product design

Table 4.6 shows that regression coefficient represented by 'R' in the table has a value of 0.593 and it means that 59.3 percent relationship exists between the dependent and independent variables. Similarly, the coefficient of determination represented by 'R^2' in the table, with a value of 0.511 means that 51.1 percent variation in the dependent variable (operational performance measures) can be explained by the independent variables. The Durbin Watson Statistics of 2.019 shows there is no serial autocorrelation in the data.

Table 4.7: Coefficients of the Predictor Variables,t-Values and Significance Levels

Model	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	t	Sig.
1 (Constant)	-.175	.206	-	-.861	.436
Customer Focus	.614	.048	.575	10.303	.000
Top Management Support	.176	.061	.608	3.562	.000
Continuous Improvement	.457	.072	.711	2.205	.010
Product Design	.509	.053	.483	3.417	.015

a. Dependent Variable: Operational Performance

As could be seen from Table 4.7, all the regressors (the independent variables) have positive relationship with the dependent variable. The coefficients are also significant given the t-values and the significance levels. However, continuous process improvement has the highest coefficient followed by top management support thereby showing their relevance in influencing the operational performance measures in the organizations.

Test of Hypotheses

The hypotheses formulated to guide and strengthen the analysis were re-stated and tested in this section through the results obtained from the multiple regression estimation. The results were used to either accept or reject the null hypotheses depending on the values of the coefficients, t-values and the corresponding significance levels. The decisions were taken at 0.05 level of significance.

Statement of the Hypotheses

Both the null and alternative hypotheses were re-stated in this section to ensure that all the hypotheses reflect the content of the objectives as well as the corresponding research questions. Accordingly, the hypotheses were re-stated thus:

1.   Ho: Customer focus does not have significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

     H_1:Customer focus has significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

2.   Ho: Top management support does not have significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

     H_1: Top management support has significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

3.   Ho: Continuous process improvement does not have significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

     H_1:Continuous process improvement has significant and positive effect on operational performance of pharmaceutical manufacturing firms in Anambra State.

4.   Ho: Product design does not have significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

     H_1:Product design has significant and positive effect on operational performance of pharmaceutical manufacturing industries in Anambra State.

Interpretation of Regression Results for Decision Rule

     The coefficients of the independent variables (the dimensions of the TQM identified in this study), the t-values and significance levels were interpreted to decide whether to accept or reject the null hypothesis. Accordingly, the coefficient of customer focus represented in the model by α_1 has a coefficient of .575 and it means that when customer focus is increased by one unit, operational performance measures as identified in the study will also increase by 57.5 percent when other variables in the model are held constant. The t-value of 10.303 and its corresponding significance level of .000 shows that the coefficient is significant and positive because $P \leq 0.05$ is greater than 0.000. Consequently, the null hypothesis was rejected while the alternative which suggests that customer focus has significant and positive effect on operational performance measures of pharmaceutical manufacturing firms in Anambra State was accepted.

     In the same vein, the coefficient of top management support represented in the model by α_2 with a value of .608 means that when top management support is increased by one extra unit, operational performance measures of the firms will increased by 60.8 percent if other factors in the model are not allowed to vary. Also, the t-value of 3.562 and its corresponding significance level of .000 are indications that the coefficient is significant and positive. Therefore, the null hypothesis was rejected and it was concluded that top management support has significant and positive effect on operational performance measures of pharmaceutical manufacturing firms in Anambra State.

     Concerning the continuous process improvement, its coefficient is represented by α_3 in the model and with an estimated value of .711, it means that when it is increased by one additional unit, operational performance measures of the firms will increase by 71.1 percent if the other variables in the model are held constant. Similarly, the coefficient is considered to be significant and positive given the values of t and the corresponding significance level as presented in Table 4.7. Consequently, the null hypothesis was rejected while alternative which states that continuous process improvement has significant and positive effect on operational performance measures of the firms was accepted.

     In a related development, the coefficient of product design which was represented in the model by α_4 with an estimated value of .483, shows that when the variable is increased by one extra unit, the operational performance will increase by 48.3 percent if other variables in the model are held constant. From the t-value of 3.417 and the corresponding significance level of .015, the coefficient is considered significant because $P \leq 0.05$ is greater than .015, Given the weight of evidence against the null, it was rejected and we concluded that product design has significant and positive effect on operational performance measures of the pharmaceutical manufacturing firms in Anambra State.

VI. Discussion of Research Results

The result of the first test of hypothesis showed that customer focus has significant and positive effect on operational performance measures of the pharmaceutical manufacturing firms in Anambra State. The result is consistent with that of Gelan and Dange (2021) when they found from their study of the effect of total quality management on operational performance in manufacturing industries in Dire Dewa, Ethiopia that customer focus and other dimensions of TQM have significant and positive effect on operational performance measures such as quality, cost reduction, speedy delivery, etc, of manufacturing industries selected for the study. Customer focus dimension of the TQM implies doing everything possible to satisfy customers' needs.

The result of the second test of hypothesis showed that top management support has significant and positive effect on operational performance measures of the pharmaceutical manufacturing firms in Anambra State. The result supports the work of Dhieu (2019) when he found that top management support along side other dimensions of total quality management has significant and positive effect on operational performance of manufacturing firms in Nyeri County, Kenya. When executives of an organization actively get involved and insist on accuracy and quality of products/services, the outcomes are always excellent and they reflect on operational performance measures of the organization.

The result of the third test of hypothesis suggests that continuous process improvement has significant and positive effect on operational performance measures of the pharmaceutical manufacturing firms in Anambra State. Again, the result is in line with that of Isichei and Olukade (2021) when they found from their study of continuous process improvement and performance of manufacturing firms in Nigeria that continuous process improvement has significant and positive effect on firm's performance. As a strategy which allows for the combination of varying inputs that help add values and ensure renewal of the existing product or service, continuous process improvement is very crucial to the survival and sustenance of any organization. Business process improvement adds value to the customer and contributes significantly to the performance of the organization.

The result of the fourth hypothesis showed that product design dimension of the total quality management has significant and positive effect on operational performance measures of the pharmaceutical manufacturing firms in Anambra State. Like the others before it the result is in agreement with that of Mohammed, Brahma and Aderaw (2019) when they found from their study of impact of total quality management on operational performance of Ethiopian Pharmaceutical Manufacturing Plants, that product design among other dimensions has significant and positive effect on operational performance measures such as quality, cost reduction, speed of delivery, flexibility to change and dependability. Product design is important because it deals with labelling and packaging of products and labelling in particular performs several functions such as identification of the product/brand, description and promotion of the product through some kinds of attractive designs, which ultimately aims at satisfying the desiresof the customer.

VII. Summary Of Findings, Conclusion And Recommendations

Summary of Findings

Preliminary results showed that regression model is statistically significant and that positive relationship exists between the dependent and independent variables. The regression coefficient represented by 'R' in the table with a value of 0.593 shows that 59.3 percent relationship exists between the dependent and independent variables. Similarly, the coefficient of determination represented by 'R^2' in the table with a value of 0.511 shows also that 51.1 percent of variation in the dependent variable can be explained by the regressors. The rest of the finding are as summarized below:

1.   Customer focus dimension of total quality management has significant and positive effect on operational performance measures of pharmaceutical manufacturing industries in Anambra State.
2.   Top management support dimension of total uality management has significant and positive effect on operational performance measures of pharmaceutical manufacturing industries in Anambra State.
3.   Continuous process improvement element of the total quality management has significant and positive effect on operational performance measures of pharmaceutical manufacturing industries in Anambra State.
4.   Product design component of total quality management has significant and positive effect on operational performance measures of pharmaceutical manufacturing industries in Anambra State.

Conclusion

The study examined the effect of implementation of total quality management principles on operational performance measures of pharmaceutical manufacturing industries located in Anambra State, Nigeria. From the findings of the study, it can be concluded that adoption of total quality management philosophy is very essential for the achievement of firm's enhanced results. The implementation of various dimensions of the total quality management promotes operational performance measures such as improved quality of products/services, cost reduction, speed of delivery of goods/services, flexibility to change and dependability. These operational

performance measures if achieved, put the organization at a very competitive advantage over others in the industry.

Recommendation
The study has revealed that effective implementation of total quality management principles can substantially enhance operational performance pharmaceutical manufacturing industries. Therefore, from the findings and conclusions obtained from the study, we made the following recommendations:
1.   Organizations implementing total quality management principles should endeavour to make customer focus their center of activities because every profit making business is about the satisfaction of the customer.
2.   Top management support is key to a successful business venture. Therefore, top executives of the industries should actively get involved and insist on accuracy and quality so as to maintain competitive edge over other industries in the industry.
3.   Continuous process improvement otherwise known as 'Kaizen' in Japanese business culture is a very strong factor in the realization of industries goal and objectives. There is need to be consistent and persistent in the pursuit of improvement in operations.
4.   Product design is a critical factor in total quality management. Organizations should improve on it to achieve better outcomes.

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