The Impact of Quality Control for Profitability in a Car Brake Pad Manufacturing Industry: A Case Study

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ABSTRACT

The Impact of quality control for profitability in a brake pad manufacturing company was evaluated in this work. The extent to which quality control practices are applied by car brake pad manufacturing firms in Nigeria was examined. The impact of quality control on the profitability of the car brake pad manufacturing firms was determined by establishing the relationship between quality control practices and profitability performance of the manufacturing firms in Nigeria. Also, a conceptual model that correlates quality control practices/techniques and profitability in car brake pad manufacturing firms in Nigeria was developed, in accordance with the third objective. The study used structured questionnaires to generate primary data and descriptive statistical tools were used to analyze the data generated. The study established that the quality control practices (commitment of senior management, training, zero defect, benchmarking, supplier relations, employee focus, process improvement, customer focus and Quality management) have been applied to a large extent by the brake pad manufacturing firms in Nigeria. More so, the study found that there is a positive relationship between dependent variable (profitability) and the independent variables (quality control practices). The relevant statistical methods were also employed to analyze the responses obtained from the structured questionnaires sent to the Brake Pads Production firms. The multiple linear regression results revealed that there is a positive relationship between dependent variable (profitability/productivity performance) and independent variables (commitment of senior management, training, employee focus, zero defects, benchmarking, supplier relations, process improvement, customers focus and Quality measurement). The regression coefficient values represented were all $< 5\%$ (from $0.06 - 0.37$) and only three of them were the predictors used which are significant. Similarly, the sample used Z-statistic represented by **t** since the sample size is more than 30. Three of the **t** values were > 1.96 hence only three values are significant (Commitment of senior management, training and supplier relations.) These findings are in agreement with previous research work that describes the relationship between quality control practices and the financial performance of manufacturing firms as well as the effectiveness of the application of quality control practices in engineering production processes. However, conclusion and recommendations were made to improve upon further research that will be conducted on quality control practices, and how it affects the performance of firms in the manufacturing industry.

Keywords: Quality Control, Profitability, Car brake pad, Manufacturing Industry, Impact

1.0 INTRODUCTION

Producing quality goods and rendering satisfactory services for its customers, as well as also maximizing profit is the principal goal of all manufacturing/producing firms. Thus, quality production is indeed ascertained by various processes: Manufacturing/ Production and Inspection during and after production. Manufacturing/Production is a well-designed and organized procedure to convert a set of input components into detailed set of output features/products. Inspection moreover is carried out after production to sort out the bad and substandard products, as well as save time and cost. Production quality can be confirmed by accepting the unit of items produced, that are up to standard and discard the defective unit (Kaynak & Hale, 2003). Quality control (QC) practice is a simulation spotlighted on the step-by-step improvement of production and operation processes, and also the improvement in quality of goods and services in an organization, which are equally yields of the performed processes. It is a team work that mandates the importance of a new principle, and requests for regulation and quality information/data. According to Saraph et al. (2009), proponents of quality control have identified a number of significant philosophies for effective quality control practices, which include: management commitment at the zenith level, consumer attention, contractor liaison, benchmarking, quality consciousness focus, workers motivation, no defects, method enhancement and quality measurement.

The Production of quality goods/products in competition with other products is determined quickly during production cycle; this is done in other for corrective procedures to be initiated before the occurrence of loss as a result of defective items. With this on ground, a quality control and assurance system is instituted; the structure of the process/practice must definitely factor in inspection. However, the main resolution of such inspection is not to separate standardized items and quarantine items that are defective, but to oversee the production process and offer the required control to maintain performance within limits that are acceptable (Agus, 2001). Apex level management functions as the core driver for quality control execution, crafting standards, objectives and structures to please customers as well as enhance its organization's operation (Ahire et al, 2006). A customer attention makes the business conscious of product environmental changes and delivers the necessary ideas and process for change. Similarly, benchmarking is another tool used, whereby an organization constantly assess and measure up itself/ products against other businesses leaders in the same business environment elsewhere in the world, to ascertain facts and provide recommendations for coherent development objectives for improvement (Boone & Wilkins, 2005). Recently, it has been generally recognised that the greatest treasured resource within an organisation is the work force and keeping them motivated is seemingly significant (workers motivation).

Furthermore, it is of great essence for employees of a firm to be sufficiently and repeatedly trained and refined on recommendations, procedures, and on the model of quality, including QC codes, teamwork, and problem solving approaches on various activities. Regulating an objective for no defects, and renewing one's guarantee to achieving that aim, will steer to advancement that will continually draw near total flawlessness over time (Richman & Zachary, 2003).

Information on QC has acknowledged various revisions through the world. It suggested that QC has the prospective to not just improve competitiveness and administrative effectiveness but to also increase the quality of product and organizational implementation (Ahire et al, 2006). In detail, Powell (2005) raised up a sequences of questions in bordering on the

link between QC and performance, suggesting significant relationships between QC, business operations and viable advantage. Furthermore, a number of investigations have confidently provided proof that TQC impacts financial performance and/or general performance positively (Schaffer & Thompson, 2002). Agus (2001) established the fact that preparation and top level management dedication produce vital responsibility in TQC executions in unrestricted listed manufacturing companies. The general discoveries of that survey point to the importance and constructive influence of QC on competitive advantage and customer contentment, which, in turn, meaningfully develops the financial performance of these companies. Also, advancement in quality produces resultant progression in productivity by decreasing costs, errors and delays (Deming, 2006).

Staying relevant in commercial environment nowadays, managers need integrate their objectives excellently to strive in the dynamic universal economy and concentrate absolutely on client as they forces of the market. Manufacturing contests on price, superiority, time and reaction (Lakhal et al., 2006). Tools such as, flow diagrams, service schemes, process analysis, process re-engineering, link charts, multi-activity analysis, and Gantt charts are for improving production.

Universally, production firms put on quality control practices essentially for meeting customers' contentment. Nevertheless, production management is an approach of refining competitive performance through the combination of inside roles of the firm with outside procedures of manufacturers, customers and added affiliates of the production system (Lee & Kincade, 2003). Production management has moved to a direction of bringing together and formation of methods indispensable in timely manufacture of products and make certain that quality products and service are delivered to customers.

Li et al (2005) claims that quality control practices and production management are the two significant schemes for manufacturing and service firms, which is a criterion for an effective and successful spot in the international market.

Al-Marri et al (2007) acknowledged that proper application of quality control practices guarantee that methods and measures are followed to make certain that customers' are satisfied. Also, Lee & Kincade (2003) noticed that several manufacturing firms are faced with the issue of application of quality control practices, connected with poor leadership in all sectors specifically inside the supply network, principles is also challenged owing to dearth in enthusiasm to acquire and apply quality control. Bayazit (2003) suggest that shortage of recent amenities and technology in application of effective quality control extends manufacture process and delays supply of goods and services to the ultimate end user.

2.0 MATERIALS AND METHOD

In this project the relevant statistical method was employed to analyze the responses generated from structured survey questionnaires from Brake Pads Production Companies. In this research, responses received was analysed with Statistical Package for Social Science (SPSS). The main goal of the investigation is to measure the level of quality of senior level managers or production manager's view of management practices and degree of productivity and profitability in the production industry. Personally, Face to face interviews and discussions was organised with quality control supervisors and production managers to certify information precision, authenticating the result of analysis and understanding as well as accepting practical aspects of quality control principles. The tool designed for analysing this study includes three major parts. Firstly, Section A comprises of general demographic information of respondents, secondly, Section B covering a number of concepts determining QC practices, and lastly, Section C containing performance measurements. To facilitate respondents to point out their responses, the questionnaire was designed to employ a 7–point likert scale. Nine constructs of QC, which have been extensively talked about, was extracted. Owing to the inadequacy of research in Nigeria that studies relationship between QC, productivity and profitability, the

objective of this investigation is to improve top level managerial understandings and involvement of quality control practices, productivity and profitability. This chapter outlines research design, the population of focus population, sampling means/design, collection of data, instrument used and techniques, and the methods of analysing data.

Descriptive survey was employed for this research. Data was acquired to meet up with the principal aims and objectives of the study. Descriptive survey cannot be overemphasised in examining the prevailing relationships between variables taken in this study. A viable assessment is when the sample population is little and flexible, consequently the researcher and his assistants was able cover all the components of the population.

The population sampled were manufacturer of vehicle brake pad in Nigeria. Referencing the Manufacturers Association of Nigeria (MAN, 2013), there are almost 2000 duly registered producing companies in Nigeria with an estimate of about 12 of these producing firms solely manufacturing brake pads. Anambra State was selected because most firms that specialize on the production of automobile brake pad are concentrated in the region.

Stratified sampling method was used to decide the sample of the research, see Appendix III. Four (4) sizeable vehicle brake pads producing firms were sampled within the sample area in Nigeria.

Primary data was collected through a well-structured questionnaire aimed at stimulating unambiguous replies for qualitative and quantitative analysis respectively. Secondary data was gotten from reviewed financial reports of manufacturing firms of brake pads in Nigeria. The questionnaires had three sections. Firstly, Section A comprises of general demographic information of respondents, secondly, Section B covering a number of concepts determining QC practices, and lastly, Section C containing performance measurements.

The respondents selected for this survey were the managers of procurement, sales and quality control departments or their counterparts. These respondents were picked because it is believed they have a good understanding of the process of quality control practices and the impact it has on profitability of manufacturing firms in charge of brake pad production. The questionnaires was distributed by means of "drop and pick later" method within a feasible convenient time.

The instrument utilised for investigation is a questionnaire, designed to assess the companies in term of QC practices. The samples selected for the survey were firms producing brake pads in Nigeria. Companies were randomly sampled from the numerous producing firms of brake pads in Nigeria.

The initial phase of data analysis involved subjecting the nine constructs to reliability and validity tests respectively, and then computing a specific score to stand for each construct. This is achieved by coding and inputting the data into the SPSS software (version 20) and analysing via AMOS version 14. Furthermore, confirmatory factor analysis (CFA) on measurement and structural models was conducted. The uni-dimensionality of specific concept was tested using Cronbach's alpha and principal component analysis to evaluate the validity and reliability of each concept.

The arithmetic mean of the values is given by:

$$\text{Arithmetic mean } (\bar{x}) = \frac{\sum_i^n x_i}{n} \tag{1}$$

Where

n = number of values

$\sum_i^n x_i$ = Sum of the individual values

And the standard deviation of the values if given by:

Standard deviation (s) = $\sqrt{\dfrac{\sum \left(x - \bar{x}\right)^2}{n - 1}}$ (2)

Where

x = individual value

$\bar{x}$ = mean value

Descriptive statistical tools were used to define the connection amongst QC practices, profitability, and productivity. The outcomes displayed, whether there is a substantial correlation between the tested variables. This discoveries was matched with several researches that revealed that QC plans help develop organizational transformations (Agus & Hassan, 2000).

Data concerning the first objective of the survey was evaluated by means of descriptive statistics. Regression analysis was used to analyse data bordering about the second objective of the research. The regression model established the connection between quality control practices and profitability performance of vehicle brake pads production companies within Nigeria. The model employed comprised of nine variables. Further down is the regression model accepted for analysing the collected data from the firms.

The regression algorithm formulated for data analysis is given below as:

$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + e$ (3.3)

Where:

Y	=	Profitability performance
a	=	the Y intercept when x is zero

b1, b2, b3, b4, b5, b6, b7, b8 and b9 are regression weights attached to the variables

$X_1 \ldots X_n$ are the coefficients /indicators

X_1	=	Commitment of senior/top management
X_2	=	Training
X_3	=	No defects
X_4	=	Employee focus/motivation
X_5	=	Benchmarking
X_6	=	Contractor Relations
X_7	=	Process improvement
X_8	=	Customer focus
X_9	=	Quality measurement
e	=	Error term.

The Table 1 illustrates a concise summary of data collection and analysis methods.

Table 1: Concise Summary of Data Collection and Analysis Methods

Objectives	Questionnaire	Data Analysis
General Profile	Section A	Descriptive
Objective 1	Section B	Descriptive
Objective 2	Section C	Multiple Regression

3.0 RESULTS

The analysis of retrieved data and discussion of findings from the selected manufacturing firms was covered in this chapter. The survey was conducted to investigate and establish the relationship between quality control practices and profitability as well as productivity performance in manufacturing firms in Anambra, Nigeria, that deal solely on car brake pads. Descriptive statistics such as percentages, frequencies, mean and standard deviation were the main units of degree used to present the discoveries. An overall of 48 questionnaires (i.e. 12 questionnaires per company) were distributed and 40 correctly and completely filled and returned. Presenting a response rate of 83%, therefore, the data available was satisfactory for the study.

The over-all statistics considered during the study was the present position of respondents in the organization, how long the respondent has worked in his/her current position, respondent years of work experience in the organisation, how long the manufacturing firm has been operational and the total sum of permanent staffs.

i. Respondents Current Position in the Organization

Results in Table 2 and Fig. 1a and 1b show that 20.0% of the respondents pointed out that they were sales managers, 22.50% of the respondents specified that they were assistant sales managers, 30.0% of the respondents revealed that they were quality managers, 12.50% showed that they were assistant quality managers and 15.0% of the respondents belonged to the category of others where you have accountants, general managers, operations managers, production engineers and purchasing officers. And so, 85% of the respondents from the overall respondents were unswervingly involved in occupations related to quality control and sales management in their various organizations.

Table 2: Respondents Current Position in the Organization

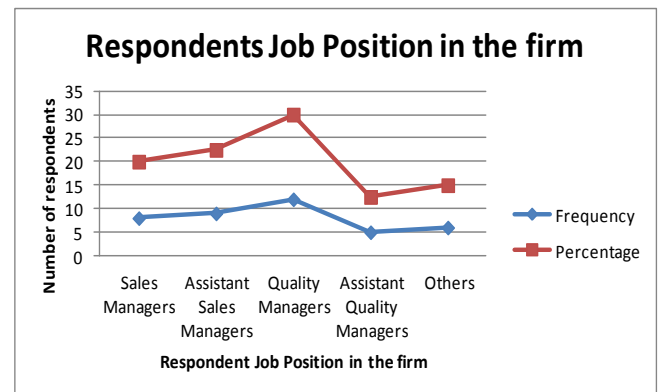|	Frequency	Percentage	Cumulative Percentage
Sales Managers	8	20.0	20.0
Assistant Sales Managers	9	22.5	42.5
Quality Managers	12	30.0	72.5
Assistant Quality Managers	5	12.5	85.0
Others	6	15	100.0
Total	**40**	**100**	

Figure 1b: Respondents Current Position in the Organization

ii. Duration Worked in the Current Position

Results in Table 3 and Fig. 2a and 2b displays that 40% of the sampled respondents have been in employment for less than 5 years in their present job position, 32.5% had between 5 to 10 years work experience in the firm, 12.5% had been functioning in the same position between 11 to 15 years and 15.0 % have worked above 15 years in their present job position. The results revealed that 60% of the overall respondents have been functioning in their present-day position for more than 5 years, therefore, a sign they have an advanced understanding and knowledge of quality control operations in their separate organization.

Table 3: Respondents Duration worked in the Organization

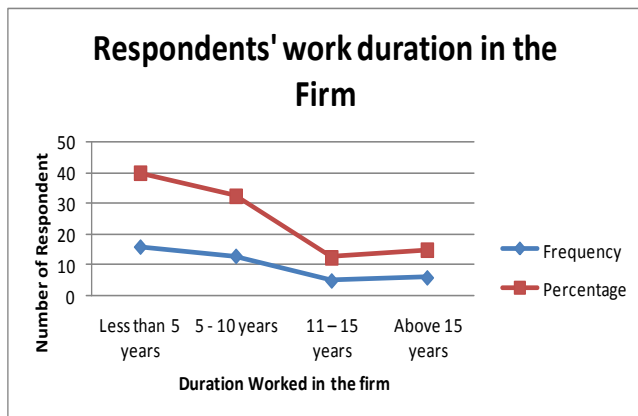|	Frequency	Percentage	Cumulative Percentage
Less than 5 years	16	40.0	40.0
5 - 10 years	13	32.5	72.5
11 – 15 years	5	12.5	85.0
Above 15 years	6	15.0	100.0
Total	40	100.0	

Figure 2b: Duration Worked in the Current Position

iii. Duration the Organization has been in Operation

Results in Table 4 and Fig. 3a and 3b shows that 92.5% of the general respondents point out that their separate organizations have been functional for more than 10 years, whereas 7.5% of the respondents did not specify the duration. As a result, the outcomes show that the organizations have an extensive understanding and knowledge of quality control.

Table 4: Duration the Organization has been in Operation

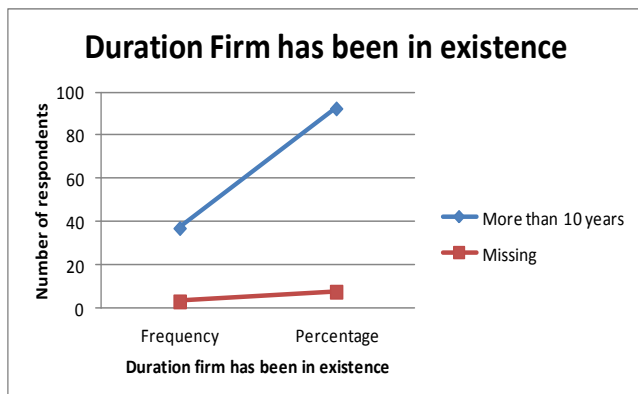|	Frequency	Percentage	Cumulative Percentage
More than 10 years	37	92.5	92.5
Missing	3	7.5	100.0
Total	40	100.0	

Figure 3b: Duration the Organization has been in Operation

iv. Number of Permanent Employees

Results in Table 5 and Fig.4 indicates that 7.5% of the respondents revealed that their establishments has between 2 to 35 permanent personnel, 35% indicated a permanent workforce between 36 to 69 employees, 20% of the respondent suggested that respective establishments had between 70 to 103 stable workers and 32.5% responded that their respective firms had above 103 permanent member of staff. 5% of the respondents did not point out the number of permanent workers in its payroll. Most respondents signified that they have more than 35 permanent personnel, invariably revealing that the organizations have a broader area of operations.

Table 5: Number of Permanent Employees

	Frequency	Percentage	Cumulative Percentage
2 – 35	3	7.5	7.9
36 – 69	14	35.0	44.7
70 – 103	8	20.0	65.8
Above 103	13	32.5	100.0
Total	38	95.0	
Missing	2	5.0	
G. Total	**40**	**100**	

v. Extent to which Quality Control Practices are applied

Determining the level to which quality control practices are applicable in firms manufacturing brake pads in Nigeria was the first objective of the research. Quality control practices includes: Obligation of top level management, Training. No defects, Employee focus, Benchmarking, Supplier Relations, Process improvement, Customer focus and Quality measurement.

Five point Likert scale was employed to investigate respondents the level of quality control practices functional in respectively organisation. Ranging from

1 = "Very small extent", 2 = "Small extent", 3 = "Moderate extent", 4 = "Large extent" and 5 = "Very large extent." The scores of "Very small extent" and "Small extent" have been in use to symbolise a variable of a mean score of 0 to 2.5 on the continuous Likert scale;(0≤ S.E <2.4). Also the scores of "moderate extent" represent a variable with a mean score of 2.5 to 3.4 on the continuous Likert scale: (2.5≤M.E. <3.4) and finally, the scores of both "Great extent" and "Very great extent" represents a mean score of 3.5 to 5.0 on a continuous Likert scale; (3.5≤ L.E. <5.0).

From the outcome of the results it is revealed that the quality control have been carried out generously by the sampled manufacturing firms. From data brought together, it was revealed by respondents that dedication of top level management is practiced between a very large extent and moderate extent. Major activities in devotion of senior management level are accomplished to a large extent (dedication of high-ranking management to provide customers firstly with their wants, supply effectively and efficiently, continual novelty to develop work practices and organization pays more attention to quality improvement) made known by mean scores of 4.0769, 3.9500, 3.9000 and 3.7000 respectively. Just an activity is practiced at a moderate extent, established by a mean score of 3.2632. All other activities demonstrate that Training have been institutionalised in the various organizations at large extent (positive quality goods image branding to customers, measurement, elimination of waste and improving efficiency, quantify and increases high volume production processes and method, data-driven methodology for eradicating defects) by a mean score of 3.9250, 3.8000, 3.6500, 3.6250 and 3.5750 respectively. Every other activities display that Zero or no defects reveals that it has been institutionalised by various organizations at significant extent. It is made known with a mean between 3.8 and 3.6. Overall activities in Employee focus/ motivation indicate great/large extent implementation with a mean of 3.9 and 3.5. Most activities of benchmarking also displays large and moderate extent implementation by various organisation, deduced with a mean between 3.6 and 3.3. Likewise, activities in contractor relation indicate implementation at large extent by various organizations with a mean range of 3.7 to 3.5.

Process improvement activities reveals that it has been applied at large extent with a mean of 3.9 and 3.5. Activities in Customer focus indicates application at both moderate and large extent by respective organizations with a mean ranging between 3.6 and 3.3. In the same way, all the activities of Quality measurement also reveal large extent implementation by the respective organizations.

Outcomes of the results points out those brake pads manufacturing firms in Nigeria have been practicing quality control at a large extent, consequently, improving both sales and supply performance. Like Mutua (2014), quality control practices amongst brake pads manufacturing firms in Nigeria were; Zero defects, Commitment of senior management, supplier relations, benchmarking and Training. But then training has been applied to an insignificant extent. This finding go against Owiti (2014), who established the fact that only benchmarking at largely significant extent has been adapted to while other practices have been utilised in small extent. Likewise, the outcomes undermines Pak (2013), conclusions that quality control practices accomplished are leadership, planning strategically, customer focus, information and analysis, management of people(human resource), process management, and management of suppliers/contractors.

vi. Quality Control Practices and Profitability/Productivity Performance

Establishing the relationship between quality control practices and profitability/productivity performance of firms manufacturing brake pads in Nigeria was the second objective.

vii. Tests of Coefficients

Using the results from the data of the extent to which quality control practices are applied in brake pads manufacturing firms in Appendix IV on the SPSS tool, the coefficients of the model are obtained.

Table 7: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.100	.124		.811	.423
Dedication of Senior/top level management (X1)	.224	.079	.216	2.844	.008
Training (X2)	.218	.073	.202	2.969	.006
Zero Defect (X3)	.071	.065	.064	1.082	.287
Employee focus (X4)	.194	.101	.191	1.930	.062
Benchmarking (X5)	.160	.083	.151	1.927	.063
Supplier Relation (X6)	.228	.105	.237	2.170	.037
Process Improvement (X7)	.194	.101	.191	1.930	.062
Customer Focus (X8)	.160	.083	.151	1.927	.063
Quality measurement (X9)	.228	.105	.237	2.170	.037

a. Dependent Variable: Profitability/Productivity performance

The figure 5 shows a graphical illustration of the multiple linear regression model generated by applying quality control in manufacturing of brake pads. The quality control practices were plotted against their respective coefficients.
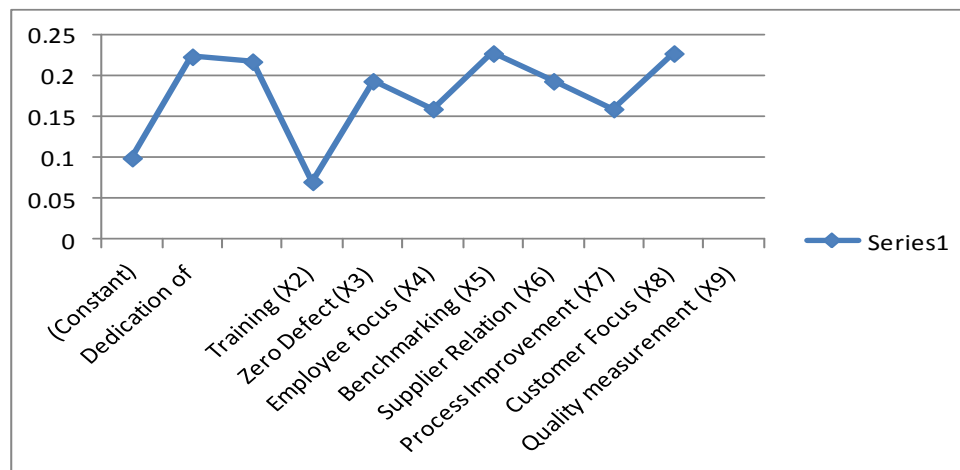

Fig. 5: Graphical illustration of the Multiple Linear Regression Model

From the SPSS generated table above, the regression is:

Y=0.100 + 0.224 X1 + 0.218 X2 + 0.071 X3 + 0.194 X4 + 0.160 X5 + 0.228 X6 + 0.194 X7 + 0.160 X8 + 0.228 X9

The whole independent variables have positive coefficient indicated by the linear multiple regression models as shown in Fig. 4.5 above. Also, the outcome of the regression above shows a positive relationship between dependent variable (profitability/productivity performance) and independent variables (dedication of senior/top level management, training, employee focus, zero/no defects, benchmarking, supplier/contractor relationship, process improvement, customers focus and Quality measurement). From the outcomes, a unit change in commitment of senior/top level management results in an increase of 0.224 units in profitability/productivity performance. A single unit alteration in training, results in 0.218 units increase in profitability/productivity performance. One unit change in employee focus, results to units increase of 0.071 in profitability/productivity performance. One unit change in Zero defects, results to profitability/productivity performance units increase of 0.194. Any unit change in benchmarking, also cause a 0.160 units up surge in profitability/productivity performance. In the same way, a unit change in supplier/contractor relations causes 0.228 units increase in profitability/productivity performance. A unit change in process improvement, causes 0.071 units increase in profitability/productivity performance. One unit change in customers focus, results to 0.160 units increase in profitability/productivity performance. Likewise, a unit change

in quality measurement causes 0.228 units increase in profitability/productivity performance. Significant values denoted by p 3 are all less than 5% (from 0.06 – 0.37) therefore implying that just three of them are the significant forecasters used. Also, Z-statistic denoted by **t,** was used for sampling because the population size is more than 30. Just three of the **t** values are greater than 1.96, consequently making those three significant (Commitment of senior management, training and supplier relations).

Outcomes from this study are comprehensible with a study carried out by Hendricks et al. (2007) has delivered proof of an obtainable relationship between quality control practices and manufacturing firms financial performance as well as the effective application of quality control practices. Choi & Eboch (2008) discovered a major direct connection between quality control practices and a firm performance. Conversely, this study challenges previous literatures that revealed that the effect of quality control practices on financial performance cannot be measured directly as a result of their indirect relationship.

4.0 CONCLUSION

Quality control (QC) makes available an idea of quality improvement in an organization. This idea and dream of pursuing quality enhancement is not just market driven but also to ensure survival. For brake pads producers/Manufacturers to survive and be ahead of the competition, they surely must manufacture quality products that are better, at a short period of

time to meet demand, and at cheaper rates than others. Generally, we can recommend that nothing have greater and positive influence more on productivity and profitability than quality control practices.

The aim of this study is to evaluate the impact of quality control for profitability in the manufacturing of car brake using a case study. A forecast tool, regression model was used to ascertain the impact of quality control practices on profitability performance of firms that manufacture brake pads in Nigeria. Relevant Data bordering around the first and second objective of the survey which include was evaluated with descriptive statistics and regression analysis respectively. While the third objective was designed in the second chapter to indicate the relationship between quality control practices and profitability performance manufacturing firm of car brake pads in Nigeria. The conceptual model adopted consisted of dependent and independent variables: The independent variables: quality control practices while the dependent variable is profitability performance of brake pads manufacturing firms. From the findings, one unit change in commitment of senior management results to 0.224 units increase in profitability/productivity performance. One unit change in training, results to 0.218 units increase in profitability/productivity performance. One unit change in employee focus, results to 0.071 units increase in profitability/productivity performance. One unit change in zero defect, results to 0.194 units increase in profitability/productivity performance. One unit change in benchmarking, results to 0.160 units increase in profitability/productivity performance. Similarly, one unit change in supplier relations, results to 0.228 units increase in profitability/productivity performance. One unit change in process improvement, results to 0.071 units increase in profitability/productivity performance. One unit change in customer focus, results to 0.160 units increase in profitability/productivity performance. Ultimately, a unit change in quality measurement, causes 0.228 units increase in profitability/productivity performance.

To sum up, findings from the empirical investigation are clear, and several suggestions come on board. First of all, it can be said that quality measurement, employee focus/motivation, supplier/contractor relations, benchmarking and training contributes immensely to QC implementations. In addition, QC impact significantly on productivity and profitability of manufacturing firms of brake pads in Nigeria.

Recommendations

Based on the outcome of result and findings of this study, QC is seen as a major player of positive gains, validation of key linkages and supports system of between operations, productivity and profitability in most manufacturing firms. Accordingly, the following recommendations are made to advocate effective quality control practices in manufacturing companies.

i. Quality control makes the process of manufacturing efficient, and productivity seen as output over input will lead to decreased waste, rework and ultimately smoother operations. This will improve processes, eliminate inaccuracies, and go ahead to satisfy customers expectation (customer focus). When this is done, both the company and the customer establishes a relationship over time, whereby the customers are attracted to the product delivered by the company, and the firm profits from sales of the products and services rendered. This is to mean that quality and productivity are highly correlated.

ii. Also, it is imperative that a company research about customers wants and needs as they are the market factors that regulates sales and eventually profitability

iii. Employee involvement is also vital as empowerment and involvement in decision-making process will provide them the enabling environment for work flow and growth. Tapping into their creative ideas, training, skills, innovations, and views fosters the difference between success and failure in a firm.

iv. By reinforcing QC practices, like benchmarking in the organisation, better-quality operations will be expected to occur. This end result, will provides precedence that improving internal practices by observing best practice/top level game players will absolutely influence the most significant performance procedures.

v. Also, manufacturers of brake pads should give emphasis to quality control phases during production and a grander level of attention for quality control programs such as quality measurement, backward and sideward integration and employee motivation. Most importantly human resource and preparing an organization for a quality change, because it is inevitable.

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NOMENCLATURES

N	=	number of pairs of scores
Σxy	=	sum of the products of scores
Σx	=	sum of x scores
Σy	=	sum of y scores
Σx^2	=	sum of squared x scores
Σy^2	=	sum of squared y scores
Y	=	Profitability performance
a	=	the Y intercept when x is zero

b1, b2, b3, b4, b5, b6, b7, b8 and b9 are regression weights attached to the variables

$X_1 \ldots X_n$ are the coefficients /indicators

X_1	=	Commitment of senior management
X_2	=	Training
X_3	=	Zero defects
X_4	=	Employee focus
X_5	=	Benchmarking
X_6	=	Supplier Relations
X_7	=	Process improvement
X_8	=	Customer focus
X_9	=	Quality measurement
e	=	Error term.