

ASSESSMENT OF QUALITY CONTROL PRACTICES IN MANUFACTURING FIRMS IN ONDO STATE, NIGERIA

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ABSTRACT

This study assessed the quality control practices in manufacturing firms in Ondo State. It assessed the quality control practices available, examined factors affecting quality of products, examined the challenges involved in implementing quality control practices and evaluated the relationship between quality control practices and organizational productivity in the manufacturing firms in the study area. To achieve these objectives, a study of four cocoa processing firms in Ondo state was carried out. Fifty- seven questionnaires were distributed and the data were analyzed with the use of Frequency Tables, Mean Ranking, Relative Importance Index and Pearson Correlation Coefficient. The results showed that the Cause and Effects diagram is the most used. Unavailability of funds to cover the needs of quality control ranked highest as the most critical factor that affects quality of products while the need to reduce cost so that products can compete well in the market ranked the most significant problem affecting manufacturing firms in the study area. The findings suggest that strict adherence to best quality control practices should be enforced by management of manufacturing firms and the employment of highly skilled personnel should be improved upon so as to sustain the level of conformity to quality.

Key words: Quality control, manufacturing firms, productivity, Total Quality Management

INTRODUCTION

Nigeria's manufacturing sector is now one of the major driving forces behind the country's economic growth (KPMG, 2015). In light of the plunge in global oil prices during the period of mid-2014, this is even more significant for Nigeria. The West African countries are now the largest economy on the continent following the release of much-anticipated rebased Gross Domestic Product (GDP) statistics during 2014 (KPMG, 2015).

The pressure from globalization has made manufacturing firms to move towards three major competitive areas: quality, cost and responsiveness. Quality is a universal value and has hence become a global issue. In order to survive and be able to provide customers with good products, manufacturing organizations are required to ensure that their processes are continuously monitored and product quality is improved (Hairulliza *et al*, 2011).

Gbadeyan and Adeoti (2005), defined quality as the degree to which a specific product conforms to a design or specification. A product is said to be high in quality if it is functioning as expected and reliable (Hairulliza *et al*, 2011). According to Anyanwu (2013), quality is seen as all of the features and characteristic of a product or service that contributes to the satisfaction of a customer needs. These needs involved price, safety, available, maintainability, reliability and usability.

The development of total quality management from 1950 onwards can be credited to the works of various American experts. Notable among them are Dr Edwards Deming, Dr Joseph Juran and Philip Crosby who have contributed significantly towards the continuous development of quality. The historical evolution of Total Quality Management has taken place in four stages: Quality Inspection; Quality Control; Quality Assurance; and Total Quality Management.



There are seven quality control measures which are popularly referred to as “the seven Quality control tools” which were developed by Kaoru Ishikawa: Process flow charts; Check sheets; Graphs; Pareto analysis; Cause and effect diagrams; Scatter diagrams; Control charts. Quality directly or indirectly affects productivity and cost of the product (Kumari *et al.*, 2013). A large body of literature highlights the positive impact of Quality Control practices on organization performance (Zu, 2009; Kaynak, 2003; Ahire, Golhar, and Waller, 1996; Kaynak and Hartley, 2005; Sila and Ebrahimpour, 2005; Anderson, Rungtusanatham, Schroeder, and Devaraj, 1995; Flynn, Schroeder, and Sakakibara, 1995; Ho, Duffy, and Shih, 1999; Prajogo and Sohal, 2003; Terziovski and Samson, 1999; Choi and Eboch, 1998). Hairulliza *et al.*, (2011) in their study found that the motivating factors for companies to apply quality control comes internally from the management and parent company or externally from customers .Kumari *et al.*, (2013) also asserted that every nation wants to increase productivity and quality of products at lower price. For this they should reduce wastage of resources and must find other substitutes that will be environment-friendly. Izuagbe, (2013), made it clear that TQM does play a significant role in gluing the clients to the organization. This in effect resulted in the growth of the organization’s performance in terms of turnover and profitability.

The Nigerian market is being flooded with a lot of sub-standard products, despite efforts made by the Nigerian government in establishing an enabling Act number 56 of December 1971 known as Standard Organization of Nigeria (SON). One of its objectives is to make sure that manufacturing firms produce standard products, measurement, materials process and service among others (Marire, Nwankwo, and Sydney- Agbor, 2014). The aspect of quality of the outputs produced also remains an under-debated topic and the quality of these outputs produced is paramount and important because it directly or indirectly affects organizations continued existence in the business environment. Organizations are being driven by quality in this competitive world. Hence, every organization should be made aware of the concept of total quality which this study provides.

The aim of this study is to assess the quality control practices in manufacturing firms in Ondo state while the specific objectives of the study are to: assess the quality control practices available in manufacturing firms in Ondo state; examine factors affecting quality of products in these manufacturing firms; examine the challenges involved in implementing quality management procedures in the manufacturing firms; and evaluate the relationship between quality control practices and organizational productivity in manufacturing firms in Ondo state.

METHODOLOGY

Study Area: This study was carried out at four manufacturing firms in Ondo state, Nigeria. Olam cocoa processing company, Plantation cocoa processing industry, Agro Traders Company, Alagbaka and Cadbury Nigeria plc cocoa processing plant at Ile-Oluji, Ondo state, were chosen for the study. Ondo State was used for this study due to the presence of large cocoa processing firms across the state.

Method of Data Collection: Structured questionnaires were employed for the survey. The structured questionnaire for the research study comprised of questions about demographic information of respondents, quality control measures available in the cocoa processing firms, and factors affecting quality of products and the relationship that exists between quality control practices and organizational productivity.

Sample and Sampling Procedure: Purposive sampling technique was employed where a sample size of 57 was purposively selected across the population. All employees in materials management department, total quality management department, production and safety departments in the four manufacturing firms were chosen for the study.

Method of Data Analysis: Frequency distribution in form of tables and simple percentage were used to assess the quality control measures available in manufacturing firms in Ondo state”. “To assess the factors affecting quality of products in manufacturing firms in the study area” and “to examine challenges involved in implementing quality control practices”,



Mean Ranking and Relative Importance Index (RII) were used. A five point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was adopted and transformed to relative importance indices (RII) for each factor as follows:

$$RII = \frac{\sum W/A * N}{N}$$

Where W is the weight given each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e. 5 in this case).

Pearson Product Moment Correlation was used to analyze the fourth research objective “to evaluate the relationship that exists between quality control practices and organizational productivity in cocoa processing firms.

Pearson Product Moment Correlation Co-efficient Model Specification: $\gamma = \frac{(\sum xi yi) - (\sum xi)(\sum yi)}{\sqrt{(\sum xi^2 - (\sum xi)^2 / N)(\sum yi^2 - (\sum yi)^2 / N)}}$, where:

γ = correlation coefficient

Y = organizational productivity

X = quality control practices

N = 60

Σ = Summation

Research Hypotheses:

The hypotheses formulated for investigation in this research are:

Ho = there is no significant relationship between quality control practices and organizational productivity

Hi= there is significant relationship between quality control practices and organizational productivity

DECISION RULE: In case correlation coefficient (γ) is greater than 0, it shows that there is positive correlation between the element tested and if the correlation coefficient (γ) is less than 0 it shows that there is negative correlation. However, if Sig. (2.tailed) $_{cal} < Sig$ (2.tailed) $_{tab}$, The Null hypothesis will be rejected and if otherwise, that is if Sig. (2.tailed) $_{cal} > Sig$ (2.tailed) $_{tab}$. the Null hypothesis will be retained.

Ho = Null Hypothesis

Hi = Alternative Hypothesis

Ho = there is no significant relationship between quality control practices and organizational productivity

Hi= there is significant relationship between quality control practices and organizational productivity

RESULTS

Demographic Information: Table 1 shows that forty-one (41) respondents were male which represented 71.9% while sixteen (16) were female respondents representing 28.1% of the total respondents.

Respondents’ Work Experience: From Table 2 below, it is shown that 8 respondents or 14% have been working for over 15years, 32 respondents or 56.1% have been working with the firms from 10 to 15years and 10 respondents or 17.5% have been working with the firms from 5 to 10years. Also, 7 respondents or 12.3% have been with the firms from 0 to 5 years.

Table 1: Data Analysis of Respondents’ Gender

Gender	Frequency	Percentage
Male	41	71.9
Female	16	28.1
Total	57	100.0

Source: Field Survey, 2017

Respondents’ Career/Profession: From Table 3 shown below, 14 respondents are experts in materials and procurement management which represented 24.6%, 20 respondents are professionals in the area of total quality management which represented 35.1%, 6 respondents possess adequate knowledge in

area of production management which represented 10.5%, 13 respondents are project managers in their respective organizations and they represented 22.8% while 4 respondents are health and safety professionals and they represented 7% of the total respondents sample size.



Table 2: Years of experience

Years of experience	Frequency	Percentage
0-5 yrs	7	12.3
5-10 yrs	10	17.5
10-15 yrs	32	56.1
15 yrs above	8	14.0
Total	57	100.0

Source: Field Survey, 2017

Table 3: Analysis of Respondents Career/Profession

Career/Profession	Frequency	Percentage
Materials& procurement management	14	24.6
Total quality management	20	35.1
Production management	6	10.5
Project management	13	22.8
Health and safety	4	7.0
Total	57	100.0

Source: Field Survey, 2017

Respondents’ Academic Qualifications:

Respondents’ academic level of qualification as depicted in Table 4 below shows that there were 7 respondents with SSCE O’LEVEL as highest level of academic qualification and this represented 12.3%, 11 respondents possessed Ordinary National Diploma (OND)/Nigerian Certificate in Education (NCE) or its equivalent as highest level of academic qualification and this represented 19.3%. A total number of 23 respondents possessed

B.Sc/B.Tech/Higher National Diploma (HND) or its equivalent as highest level of academic qualification and this represented 40.3%, 6 respondents possessed postgraduate diploma (PGD) as highest academic qualification and this represented 10.5%, 5 respondents had M.Sc/M.Tech as highest academic qualification and this represented 8.8%, while 5 respondents possessed other qualifications such as professional certification as their highest academic qualification and this represented 8.8%.

Table 4: Academic Qualification of Respondents

Academic Qualification	Frequency	Percentage
SSCE/GCE	7	12.3
OND/NCE (equivalent)	11	19.3
B.Sc/B.tech/HND	23	40.3
Postgraduate Diploma(PGD)	6	10.5
M.sc/M.Tech	5	8.8
Others	5	8.8
Total	57	100.0

Source: Field Survey, 2017





Assessment of Quality Control Measures available in The Manufacturing Firms: Table 5 shows the quality control tools that are adopted for use by the manufacturing firms in the study area. The Cause and Effect Diagram ranked highest among the

quality control tools with a percentage of 21.46%, thereafter, the Process Flow Chart ranked second with a percentage of 18.62%, followed by the Pareto Analysis which had a percentage of 16.19%. The Graph with a percentage of 6.88% ranked lowest.

Table 5: Quality Control Measures Available in the selected Manufacturing Firms

Quality Control Measures	Responses	
	N	Percentage
Cause and Effect Diagram	53	21.46
Process Flow Chart	46	18.62
Pareto Analysis	40	16.19
Control Chart	37	14.98
Scatter Diagram	31	12.55
Check Sheets	23	9.31
Graph	17	6.88

Source: Field Survey, 2017

Factors Affecting Products Quality: Table 6 shows the factors that affect the quality of products. Unavailability of funds to adequately cover quality assurance and control unit needs was ranked 1, inadequate number of skilled personnel in production

unit was ranked 2, followed by inadequate funds for uninterrupted flow of procurement of raw materials. The factor with the least ranking, 12, is inadequate storage facilities for raw materials.

Table 6: Factors affecting Quality of Products

S/N	FACTORS	SA	A	N	D	SD	RII	Rank
1.	Unavailability of funds to adequately cover quality assurance and control unit needs	33	11	8	5	-	0.853	1
2.	The required equipment and tools are not available due to lack of funds	15	24	6	4	8	0.719	4
3.	Inadequate funds for uninterrupted flow of procurement of raw materials	8	34	12	-	3	0.754	3
4.	Poor or substandard raw materials for production	8	25	17	5	2	0.712	6
5.	Absence of top management concern towards quality of products	21	8	14	9	5	0.709	7
6.	Inadequate number of skilled personnel in production unit	23	17	7	5	5	0.768	2
7.	The lack of coordination among production personnel	7	23	16	6	5	0.674	9
8.	Workmanship not meeting the right specifications	4	34	9	4	6	0.691	8
9.	Improper inspection of inputs by inspectors	6	27	18	6	0	0.716	5
10.	Inexistence of structured market for quality cocoa products	6	17	14	14	6	0.611	11
11.	Inadequate storage facilities for raw materials	0	17	24	14	2	0.596	12
12.	Inadequate storage facilities for production output	4	21	18	12	2	0.646	10

Source: Field Survey, 2017



Challenges Involved in Implementation of Quality Control Practices: Table 7 below shows the challenges involved in implementation of quality control practices in the selected manufacturing firms in the study area. The need to reduce cost due to competitive markets had a mean of 4.51 and mean ranking of 1. Lack of focus on customer satisfaction

ranks second with a mean of 4.16, followed by the problem of Inadequate production equipment due to high cost with mean of 4.11 and mean ranking of 3. The problem of poor storage conditions of raw materials and inadequate storage facility in workplace ranked lowest (8th and 9th respectively).

Table 7: Challenges involved in implementing quality control Practices

S/N	FACTORS	SA	A	N	D	SD	Mean	Rank
1	Obsolete production machinery and equipment	7	23	16	6	5	3.37	7
2	Inadequate number of skilled production personnel	8	33	14	2	-	3.82	5
3	Inadequate human resource development	10	33	3	2	9	3.58	6
4	Inadequate production equipment due to high cost	20	24	10	2	-	4.11	3
5	Lack of commitment by workers	16	29	7	3	2	3.95	4
6	Inadequate storage facility in workplace	5	3	24	17	8	2.65	9
7	Poor storage conditions of raw materials	-	15	24	12	6	2.84	8
8	Need to reduce cost due to competitive markets	36	14	7	-	-	4.51	1
9	Lack of focus on customer satisfaction	22	22	13	-	-	4.16	2

Source: Field Survey, 2017; SA= Strongly Agree (5), A= Agree (4), N= Neutral (3), D= Disagree (2), SD= Strongly Disagree (1).

Hypothesis Testing: From the result of the Pearson Product-Moment Correlation, the coefficient of correlation (r), showed a positive correlation (r

=0.639) and is significant ($p \leq 0.01$). Also, coefficient of determination ($r^2 = 0.408$) This is presented in table 8 below.

Table 8: Hypotheses test

Correlations		Quality Control Practices	Organizational Productivity
Quality Control Practices	Pearson Correlation	1	0.639**
	Sig. (2-tailed)		.000
Organizational Productivity	Pearson Correlation	0.639**	1
	Sig. (2-tailed)	.000	

** . Correlation is significant at the 0.05 level (2-tailed); Source: Field Survey, 2016

DISCUSSION

This study showed that the manufacturing firms' personnel is dominated by male workers, which can be deduced from the fact that the industry is characterized by hazards which might not encourage

more number of female workers. Also, most of the respondents are experienced because they have spent between 10 to 15 years and have adequate knowledge of the various production processes and obstacles that characterize the manufacturing industry.



The result obtained further shows that B.Sc/B.Tech/HND ranked the highest percentage of the respondents' academic qualification, and the respondents on the average are skilled personnel, they possess adequate level of education, knowledge and information about their organizations which implies that the data and information gotten from the respondents is liable to be relied upon for the research study.

From the result of the assessment of the quality control tools that are adopted for use by the manufacturing firms in the study area, the Cause and Effect Diagram ranked highest among the quality control tools, thereafter, the Process Flow Chart ranked second, followed by the Pareto Analysis. The Graph ranked lowest. Hence, the assessment of these quality control tools in order of significance as depicted by respondents' view can be buttressed by a report compiled by United Nations Industrial Development Organization (UNIDO) on Product Quality (UNIDO, 2006) which stated that the Cause and Effect diagram which is also referred to as the Ishikawa diagram or the Fishbone diagram is an important quality control tool.

The second research objective of this study, to examine the factors affecting quality of products was analyzed by the use of the relative importance index (RII). The majority of the respondents' view was that the unavailability of funds to cover the needs of quality control is the most critical factor that affects quality of products and thus was ranked first. The least critical factor affecting quality of products is the inadequate storage facility for production raw materials which ranked twelfth.

The need to reduce cost due to competitive markets is the most significant challenge involved in implementation of Quality Control Practices. Lack of focus on customer satisfaction ranked second as the next most significant problem, followed by the problem of Inadequate production equipment due to high cost. The problem of poor storage conditions of raw materials and inadequate storage facility in workplace ranked lowest. These findings are in line with Anu and Satish, (2005) which stated resource limitations, lack of management commitment among others as obstacles to TQM adoption and

Abdulrahman, (2013), that higher-level Quality Management implementation leads to greater productivity and, ultimately, greater profitability. In Mohrma *et al.*, (1995) there is a significant and positive relation between the extent of TQM adoption and efficiency of employee and capital utilization.

The Pearson Product-Moment Correlation Coefficient was used in the analysis to establish the relationship between quality control practices and organizational productivity. The coefficient of correlation (r), showed a positive correlation ($r = 0.639$) and is significant ($p \leq 0.01$). The positive nature of the correlation implied that quality control practices in cocoa processing firms increases organizational productivity. Also, coefficient of determination ($r^2 = 0.408$) shows that (40.8%) change in organizational productivity can be explained by change in quality control practices. Hence, quality control practices significantly have positive effect on organizational productivity as organizational productivity would both be assessed from the internal customers (employees) and the external customers.

CONCLUSION

The manufacturing sector contributes a substantial quota to the overall gross domestic product of Nigeria, and it is a key part of the sector whose impact on the nation's economic development cannot be overemphasized. Manufacturing firms in Ondo State have been faced with problems affecting the products quality ranging from inadequate funding problems to cover different costs to the problem of skilled personnel and improper inspection. Quality being a major determinant of efficiency of output and productivity is important to ensure the continued improvement of manufacturing firms' productivity. Hence, the adoption of quality control practices helps manufacturing firms meet specific objectives, majorly meeting customer requirements and maximizing profit and these objectives would be achieved with increased productivity and quality control practices.



RECOMMENDATIONS

The following recommendations are the most important ones that can be deduced from the results obtained in this research study:

1. Management of manufacturing firms should ensure there are adequate policies formulated to meet requirements of quality.
2. Strict adherence to best quality control practices should be enforced so as to ensure increased productivity.
3. The funding gap faced by manufacturing firms in Ondo State should be mitigated by support from government, in order to enable the organizations provide for the funds needed by their quality control departments.
4. Employment of highly skilled personnel should be improved upon so as to sustain the level of conformance to quality.
5. Replacement of obsolete and archaic machinery should be ensured as at when due so as to encourage quality improvement of their output.

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AUTHOR'S CONTRIBUTIONS

All authors (Ogunjobi V.O. and Akinbogun O.T) contributed to the completion of this research work and were actively involved in the presentation of this manuscript

