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Enhancing Economic Performance of Nigerian Manufacturing Firms Using Quantity - Reorder Point Inventory Control System

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Abstract
Purpose: *The purpose of the study is to explore whether there is a relationship between quantity Reorder Point Inventory Control and Economic Performance of the manufacturing firms in Nigeria. Using flour mills as a focal point*
Design/methodology/approach*: A quantitative research design was employed, of which secondary data obtained from the annual report and account of ten-year period (2004-2013) from the studied firms was used. Data collected were estimated using regression models of which Ordinary Least Square (OLS) form the basis for estimation. Using OLS, the various cost functions were estimated.*
Findings: *The relationship between profit and inventory; Total Cost and Inventory were also determined. Reorder point, that is the level to which stock of wheat material is allowed to fall before ordering for another raw material was equally determined for each of the studied firms. The study found out that there is a significant positive relationship between profit and demand for wheat inventory; Total cost and Inventory at the studied firms. There is a significant relationship between Reorder Point and Time at the studied Firms also;*
Research limitations/implications: *The study is limited to flour manufacturing companies in Nigeria whose transactions and financial records are made available at Nigeria stock exchange. The assumptions that the estimated cost functions in the study are linear is also a limitation. Normally, carrying cost and ordering cost are quadratic while total cost is cubic which is beyond the scope of the study.*
Practical Implications: *To achieve better economic performance in any organization, the firm has to meet the three fundamental attributes of customer service which are availability; operational performance and service reliability. Availability explains the capacity of a firm having inventory when desired by a customer. Operational performance is all about required time to deliver customers' order. Service reliability involves the combined attribute of logistics and the firm's ability to perform all related activities as well as customer provision in critical information regarding operational logistics and status. The attributes involves shipment of damaged free goods; accurate invoicing and error free. All these are found to be enhanced by the use of Reorder Point Inventory Control System.*
Originality/value: *The paper identified attributes of Quantity Reorder Point Inventory Control System as a technique that can enable flour manufacturing firms achieve economic performance. The findings are acknowledged to be unique because they emerged from a well-organized study that employed quantitative research design.*
Keywords: *Inventory, Economic Performance, Economic order quantity, Q/R Operating System, Flour, Ordering Cost, Carrying Cost, Total Cost*

I. Introduction

With today's uncertain economy, companies are searching for alternative methods to keep ahead of their competitors by effectively driving sales by cost reduction, Gonzalez and González (2010). Big retail companies do not stand a chance in today's environment if they do not have an appropriate inventory control model intact. Economic performance can be defined as the assessment of any organization in relation to its assets, liabilities and market strength. It is an indication of its ability to make profit. Profit is the reward of the entrepreneur and the motive for doing business (Elijah, 2009). It is most often used for measuring performance index. Elijah (2009) further explained that profit is what is usually left after costs have been deducted in the revenue from sales. Hence, profit is controllable especially if the management can channel its revenue through output on one hand and cost on the other hand so as to enhance economic performance of their organization.

Inventory is any stored resource required to satisfy a current or future demand (Oduala, 2011). These according to Elijah include work in progress, spare parts and finished goods. Inventory, is one of the expensive assets of any organization, particularly manufacturing organizations, and could represent as much as 40% of invested capital. Production planning in manufacturing companies has two distinct goals, meeting customers demand and reducing cost. These two goals may not be consistent because increase in inventory level maximizes the meeting of customers demand while cost held so long may be too high leading to increase total cost.

Does quantity reorder point inventory control system then support the improvement in economic performance of manufacturing companies by meeting customers' demands and reducing cost?

Stock out are common in manufacturing firms (Mekel, Anantadjaya and Lahindah, 2014), flour manufacturing companies in Nigeria run out of stock several times. Most of the products manufactured experienced stock out at times. This reduces sales and decrease in revenue. This study aims at determining Economic Order Quantity (EOQ) model that can be useful in determining numerous units of items ordered per time and re-ordering point (ROP).This Is the level at which the stock of raw materials are allowed to fall before ordering for other raw material in selected manufacturing flour firms in Nigeria. The objective of quantity reorder point (Q/R) inventory control system is to minimize the total cost of holding inventory. The total cost to be minimized is the sum of costs associated with ordering and holding the stock for a period of time.

Using the theory of constraint as the theoretical underpinning for this study we argue that firms with good inventory management techniques have a competitive advantage over firms that do not. Further we argue that economic performance by making managers aware of customer demands of goods and services. Firms without a strong market orientation and EOQ will be unaware of the changes in demand which may result in under stocking or over stocking of material that may jeopardize economic performance.

Proper management of materials is important because it accounts for the substantial portion of production cost and time. Wheat, the major source of material for producing flour is, imported. This accounts for a gap between the ordering and the delivering period (lead time). The selected flour mills are among the largest flour mills in Nigeria. In these firms, raw material (wheat) are ordered from experience or by monitoring the inventory levels at monthly or quarterly bases (Dangote flour mills Plc Calabar store, 2014). Sometimes, raw materials (wheat) are ordered based on daily stock taking by the staffs in the warehouse. This implies that the firm does not employ the proper way to manage their inventory. This results into under stocking that causes delay in production or overstocking. This brings a problem of high storage cost and level of material rejects which lead to increase in total number of cost that adversely affect their economic performance in terms of profit and output.

Anichebe and Agu (2013) argued that inventory represent an important decision variable at all stages of manufacturing process, sales and distribution in addition of being major portion of total current asset of many organizations. In agreement to Moore, Lee and Taylor (2003), Anichebe and Agu (2013) suggest that inventory represent 33 percent of company's asset and as much as 90 percent of their working capital. This is in line with Sawaya and Giauge (2006) opinion. In view of the foregone, Anichebe and Agu (2013) suggested that good inventory management should be practiced to ensure growth and profitability in any organization. Horngren, Datar and Foster (2013) believe that inventory management is about planning, coordinating, and controlling activities related to the flow of inventory of any organization. Sharma (2011) defined inventory as that resource kept/stocked to satisfy the present as well as future needs of any organization. The resource according to Sharma (2011) must have economic value. He classified resources into three main categories namely:

i) Physical resources such as raw materials, semi-finished goods, finish goods, spare parts, lubricants etc.
ii) Human resources such as unused labour and Financial resources such as working capital'

II. Literature Review

2.1 Theoretical framework

The theory of constraint upon which this study is based was propounded by Goldratt, (1984). This is a managerial philosophical theory that seeks to increase manufacturing, efficiency or system performance. It measured sales by identifying those processes that constrain manufacturing system (Goldrath, 2004). Kazin (2008) argued on the theory of constraints based on the principle that chain is as strong as the weakest link or constraint and the management of every firm must alleviate and manage the constraint. Goldratt (1984) noticed that every system has at least one constraint that limits its performance which he referred to as system's "weakest link". According to him, a system can have one constraint at a time while other areas of weakness may be termed "non-constraints" until they become weakest link also.

Goldratt (1984) identified five focusing steps as necessary conditions by which constraints can be overcome. The five steps are:

1) Identifying the system's constraint, that prevent the organization from obtaining more than one goal at a time. Mabin (1990) opined that the identification of the constraint is paramount because it limits the overall performance of the firm which he contended that may be physical or constraint policy.
2) Deciding how to exploit the system's constraint(s) as well as how to getting the most out of the constraint. Bates (2004) argued that there is no choice in the matter, if you fail to manage the constraint, the constraint will manage you! This is because the constraint determines the output of the system.
3) Subordinating everything to the decisions above, aligning the whole system or to support the decisions made. According to Mabin (1999) operation managers are advised to link output of other operations that will reduce constraint and work flow so as to avoid buildup of work-in-process inventory. However,

Anderson (1999) suggested that management should direct efforts toward improving performance of the constraining task that will directly affect production process.

4) Elevate system constraint(s) and make up changes needed to increase the constraining capacity.
5) Goldratt (1980) warned that if the previous step breaks a constraint, we should go back to the first step. However, organizations should not allow inertia to cause a system's constraint. Goldratt (1990) argued that the step is consistent with a process of ongoing improvement of the system.

Theory of constraint has the appealing quality of future sales by increasing quality, lowering response time and reducing operating cost. Goldratt (1984) stressed that the focus of the firm should be on discovering constraints and administer the five necessary steps in overcoming them.

2.2 Empirical Review

The following are some of the related literature reviewed in this study:

Sarpong (2008) in Ghana conducted a study on effective inventory control. The study was a survey type which employed the questionnaire containing open and closed-ended questions to generate responses from a sample of a population. The study identified a list of problems such as shortages, overstocking and delay in deliveries. The study revealed that the store personnel did not have any professional training in inventory practices. The study suggested that management should consider inventory management as part of corporate planning so as to save cost.

Adeyemi and Salami (2010) conducted a study on "Inventory Management: A tool for Optimizing Resources in a Manufacturing Industry" at Ilorin. The objective of the study was to determine inventories in the Nigerian Bottling Company, Ilorin plant using existing tools to control optimization in inventory management. They employed Variance Analysis, Economic Order Quantity (EOQ) model and chi-square as the methodology. In their findings they discovered that Coca cola does not adopt the EOQ model in placing orders for raw materials which accounted for excess investment in their inventory. They concluded that inventory usage depends on sales. Thus, as sales increases, inventory usage also increases.

Egberi, *et al* (2011) also conducted a study on "inventory control and management as effective and efficient tool in achieving organizational growth in Nigeria", with Eternit limited, Sapele, Delta State as a focal point. The objective was to determine the organizational productivity on Eternit Limited.

The methodology employed is survey design in which structured questionnaires were administered to 140 respondents out of the sample of 216 member staff of Eternit limited. Data collected from the respondents were analyzed with simple percentages and chi-square (X^2) statistical tool. In their findings, they discovered a significant relationship between inventory control and production cost. The study concluded that inventory control contributes to the growth of organization and also help in improving their profitability and cost minimization. They recommended that a concerted attention should be given to inventory management and adequate storage facilities of inventories should be provided in addition to maintaining a proper record of inventories in organizations.

Sahari, *et al* (2012) in their study "Inventory Management in Malaysian Construction Firms: Impact on Performance" empirically examined the relationship between inventory management, firms performance and intensive capital on a sampled financial data from 82 construction firms in Malaysia from 2006 to 2010. The objective of the study was to investigate the relationship between inventory management, performance and intensive capital. Inventory management in their study was measured using days of inventory (which equals Q = D.Lt) formula to find out how long inventory is held. By employing regression and correlational techniques, they found out that inventory management has a positive correlation with firms' performances. This implies that improving organizational inventory management leads to improvement in organization's efficiency.

Lawrence (2013) conducted a study on "inventory management system and performance of food and beverages companies in Nigeria". The objective of the study was to determine the relationship between inventory control and industrial performance of food and beverages industries in Nigeria. The methodology employed is descriptive and secondary data obtained from annual financial reports and accounts of food and beverages companies enlisted in the Nigerian Stock Exchange. The data obtained were analyzed using multiple regression analysis. The study found customer satisfaction, on time delivery and ordering fulfillment as the three key qualities essential in inventory management decisions for manufacturing organizations. The study concluded that firms should manage their inventory effectively to avoid stock out, negative feedback and negative customer relationship so those optimal inventories are kept to fulfill customers requirement at all times.

Muninarayana and Aggarwal (2013) conducted a study on the cost impact of holding inventory for profit and sales in BHEL using ABC analysis and EOQ study. The objective of the study was to find proper inventory management will minimize its impact on the company's profit and sales. The methodology is regressional and correlational statistical analysis, ABC analysis and to EOQ model. They found out that the

company has a strong inventory holding and a centralized inventory control. There was also a correlation between holding sales and cost of inventory up to 90.2%; between holding inventory and profitability up to 67.4%.

Ebenezer and Asiedu (2013) conducted a study on the relationship between working capital management and the profiting on listed manufacturing companies in Ghana. The objective was to examine the effect of working capital management on profitable companies listed on the Ghana Stock Exchange market. The methodology adopted a secondary data from Ghana Stock Exchange Market. It examined working capital management influence on the profiting companies in the country. The study discovered the major component of working capital as days of inventory, payable account and cash conversion cycle influencing profiting of manufacturing companies. The study recommended the adoption of efficient and effective ways in managing working capital components.

Kundu, Chakrabarti and Chakrabaati (2013) also conducted a study on EOQ model depending on deteriorating items with alternative demand rates that allow shortages by considering valued money time. The objective of this study was to determine the optimal ordering quantity with deteriorating items. The second objective was to minimize the total cost function of the inventory system over a long period of time. They argued on the demand changing rate as being deterministic or uncertain while the deterioration rate of the item takes time. In their analysis, the holding and shortage cost are taken as linear function of time. They observed the total cost function per unit of time and later developed a model using gradient based non-linear optimization techniques illustrated by numerical example.

2.3 HYPOTHESES

The theory of constraint sees inventory as a resources that gives the firm the capability to generate intelligence related to customer's attitude changes in demand for goods and services. The level of commitment of any organization to serve the customer for making availability, a service or product is vital to enhancement of economic performance. This commitment Sharma (2011) asserts is a function of a tradeoff between holding cost, shortage cost and probability of stock out during replenishment order cycle.

H_1: Economic order point Quantity directly and positively affects the total cost of inventory at the studied firms. Inventories are essential to manufacturing as well as retail organizations. Anichebe and Agu (2013) argued that inventory represents an important decision variables at all stages of manufacturing process, sales and distribution in addition to being major portion of total current assets of many organisations. Inyang et al (2013) argued that there is a positive relationship between material management and corporate profiting. This implies that manufacturing firms achieve significant cost savings through production efficiency and increased profiting through effective management of materials. Therefore we hypothesize the following

H_2: Raw material inventory directly and positively affect profit at the studied firms.
The theory of constraint is a management philosophy theory that seeks to increase manufacturing efficiency at system performance. It is a principle of optimization in which constraint are identified and managed and overcome. In manufacturing organization, overstocking and under stocking of raw materials inventory is a constraint that has to be managed properly to enhance cost minimization. Reorder point shows the numbers of days in a production horizon a given firms will replenish its stock of inventory after demand (depletion) has reached a certain level to optimize the raw material inventory management. We therefore hypothesize the following:

H_3: reorder point of wheat inventory at the studied firms depends on time.

III. Methodology

This study employed quantitative research design. The research design attempts to build mathematical models that capture the relationship between modeled variables. The focus of the study was on raw material (Wheat) inventory and its cost and demand requirements at the three selected flour manufacturing firms. The costs associated with the raw material inventory is divided into two, carrying cost and ordering cost. Ordinary Least Square (OLS) formed the estimating bases of the regression models.

Discrete "Optimization": The Economic Order Quantity (EOQ)
In reference to Equation 1, the Economic Order Quantity, (q*) or the quantity that discretely minimize total cost is achieved when the ordering cost equals the carrying cost of inventory. This may be presented as:

$$\frac{C_0 d}{q} = \frac{C_c q}{2} \quad (1)$$

This implies that $q^2 = \frac{2dC_c}{}$ such that,

$$q^* = \sqrt{\frac{2dC_0}{Cc}} \qquad (2)$$

Where: q* = economic order quantity
d = Annual demand
C_0 = Ordering cost
Cc= Carrying cost

Following Adeyemi and Salami (2010) the carrying cost (Cc) is estimated as 15 percent of cost of sales for each of the studied firms to enhance the determination of the E0Q (q*) for the studied firms. Equation (3) was used in a deterministic or discrete sense to compute the economic order quantity (q*) of wheat inventory, taking cognizance of the inventory's ordering cost, carrying cost, lot size, and annual demand for it, the relationship between inventory and profit for each of the studied firm was estimated using the model below:

PRO = f(Qw)

This implies that $PRO = a_0 + a_1Qw + \varepsilon$ (3)

Where, Qw is quantity of wheat inventory for the ith firm, Out represents the Output (flour), PRO represents the profit of the ith firm, a_0 and a_1 are the parameters to be estimated and ε is the error term.

Reorder point Determination

Reorder point shows the number of days in a production horizon, a given firm will replenish its stock of wheat inventory after demand (depletion) has reached a certain level. Following the model used by Kuo*et al* (2012) and adopted in Abara, Nwekpa and Ewans (2015), the reorder point of wheat inventory was estimated using the following model:

$Q_{wi} = \alpha + \beta t + \varepsilon_I$ (4)

Where Q_{wi} is quantity of wheat inventory always available at the beginning of a production process for the ith firms, α and β are the parameters to be estimated, and ε_I is the stochastic disturbance. Equations (2), (3), and (4) were estimated for each firm using Ordinary Least Square (OLS) criteria on the strictest assumption that the estimated functions are linear.

IV. Results

Table 1 Analysis of discrete EOQ for wheat inventory at Honey Well Flour Mills PLC

d	c_o	c_s	$c_c = 0.15c_s$	$2dc_o$	$\frac{2dc_o}{c_c}$	$f_o = \sqrt{\frac{2dc_o}{c_c}}$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
140377.4	52020	6304490	945673.5	14604864696	15443.88	124.2734	76.13958	5797.236	120.44
43398.1	49830	6912730	1036910	4325054646	4171.101	64.58406	16.45025	270.6109	5.622054
34253	48320	10862148	1629322	3310209920	2031.648	45.07381	-3.06	9.363593	0.194533
16073.4	45000	13245102	1986765	1446606000	728.1212	26.98372	-21.1501	447.3262	9.293389
15972.1	45300	16345616	2451842	1447072260	590.1979	24.29399	-23.8398	568.3371	11.80744
279470	34916	37159301	5573895	19515949040	3501.313	59.17189	11.03808	121.8392	2.53126
25388	35380	47444473	7116671	1796454880	252.4291	15.88802	-32.2458	1039.791	21.60209
33150	37440	63108525	9466279	2482272000	262.2226	16.19329	-31.9405	1020.197	21.19502
10283.2	37800	70169638	10525446	777409920	73.86005	8.594187	-39.5396	1563.382	32.47991
12473.2	32000	75916975	11387546	798284800	70.10156	8.372668	-39.7611	1580.948	32.84486
						393.429			258.0106
						39.3429			

Source: Microsoft excel

$$f_e = \frac{\sum f_o}{n} = \frac{393.429}{10} = 39.3429$$

Table 2: Analysis of EOQ for wheat inventory at flour mills of Nigeria Plc

d	c_o	c_s	$c_c = 0.15c_s$	$2dc_o$	$\frac{2dc_o}{c_c}$	$f_o = \sqrt{\frac{2dc_o}{c_c}}$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
958502.7	32000	198611642	29791746	61344172800	2059.1	45.3773	-2.75651	7.598333	0.157859
534372.8	37800	156992997	23548950	40398583680	1715.515	41.41878	-6.71503	45.09163	0.936797
398099.9	37440	108744832	16311725	29809720512	1827.503	42.7493	-5.38451	28.99295	0.602341
575417.1	35380	218559730	32783960	40716513996	1241.965	35.24152	-12.8923	166.2112	3.453108
708756.6	34916	91684824	13752724	49493890891	3598.843	59.99036	11.85655	140.5777	2.92056
456873.9	45300	133311104	19996666	41392775340	2069.984	45.49708	-2.63673	6.952369	0.144438
629950.3	45000	218702439	32805366	56695527000	1728.239	41.5721	-6.56171	43.05605	0.894507
720109.4	48320	141860123	21279018	69591372416	3270.422	57.1876	9.053795	81.9712	1.702986
755399.1	49830	162714347	24407152	75283074306	3084.468	55.53799	7.404175	54.82181	1.138946
940539.3	52020	202445764	30366865	97853708772	3222.384	56.76605	8.632239	74.51555	1.548092
						481.3381			13.49963
						48.13381			

Source: Microsoft Excel

$$f_e = \frac{\sum f_o}{n} = \frac{481.3381}{10} = 48.1381$$

Table 3 Analysis of EOQ for wheat inventory at Dangote Flour Mills PLC

d	c_o	c_s	$c_c = 0.15c_s$	$2dc_o$	$\frac{2dc_o}{c_c}$	$f_o = \sqrt{\frac{2dc_o}{c_c}}$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
3038553	32000	32544309	4881646	1.94467E+11	39836.44	199.5907	151.4569	22939.18	476.5711
6395624	37800	37859786	5678968	4.83509E+11	85140.33	291.7882	243.6543	59367.44	1233.383
6179911	37440	41899086	6284863	4.62752E+11	73629.57	271.3477	223.2139	49824.43	1035.123
8386006	35380	28011379	4201707	5.93394E+11	141226.8	375.8016	327.6678	107366.2	2230.577
5397449	34916	24078077	3611712	3.76915E+11	104359	323.0465	274.9126	75576.96	1570.143
3248788	45300	31842774	4776416	2.9434E+11	61623.65	248.2411	200.1073	40042.93	831.9086
2926685	45000	33659644	5048947	2.63402E+11	52169.62	228.4067	180.2729	32498.32	675.1661
4899136	48320	31737937	4760691	4.73453E+11	99450.38	315.3575	267.2237	71408.53	1483.542
7317448	49830	28740533	4311080	7.29257E+11	169158.7	411.2891	363.1553	131881.8	2739.899
7686291	52020	22728987	3409348	7.99682E+11	234555.6	484.3094	436.1756	190249.2	3952.506
						3149.178			16228.82
						314.9178			

Source: Microsoft Excel

$$f_e = \frac{\sum f_o}{n} = \frac{3149.178}{10} = 314.9178$$

Table 4: Relationship between profit (PRO) and raw material inventory (QW)at Honeywell Flour Mills Plc

PRO = f (QW)

Dependent Variable: LPRO
Method: Least Squares
Sample: 2004 2013
No. of observations 10

Variable	Co-efficient	St.error	t-Statistic	Prob.
C	**21.00280**	**5.113172**	**4.107587**	**0.0034**
LQW	**2.110286**	**0.488910**	**4.316307**	**0.0000**

Source: Eviews 7

R^2 =0.778

P = f(QW)
P = $a_0 + a_i$ QW + ε
P = 21.00 + 2.11QW

Table 5: Relationship between profit and raw material inventory at Flour Mills of NigPlc

PRO = f (QW)

Dependent Variable: LPRO
Method: Least squares
Sample: 2004 2013
No. of observations 10

Variable	Co-efficient	St.Error	t-statistic	Prob.
C	-3.185457	0.650607	-4.896131	0.0198
LQW	2.511423	0.723791	3.469818	0.0104

Source: Eviews 7

R^2 =0.632346
P = f(QW)
P = $a_0 + a_i$ QW + ε
P = -3.185 + 2.5QW

Table 6: Relationship between profit and wheat inventory at DangoteFlour Mills Plc

PRO = f (LQW)

Dependent Variable: LPRO
Method: Least Squares
Sample: 2004 2013
No. of observations 10

Variable	Co-efficient	St.error	t-statistic	Prob.
C	15.28669	3.956611	3.863582	0.0048
LQW	-1.575465	0.255806	-6.158829	0.0007

Source: Eviews 7

R^2 = 0.803143
P = f(QW)
P = $a_0 + a_i$ QW + ε
P = 15.29 – 1.58QW

Table 7: Relationship between profit and wheat inventory of the AGREGGATE firm studied

PRO = f (QW)

Dependent Variable: LPRO
Method: Least squares
Sample: 2004 2013
No of observations 10

Variable	Co-efficient	St.error	t-statistic	Prob.
C	10.20737	16.93312	0.602805	0.5633
LQW	0.361273	1.084891	6.333004	0.0000

Source: Eviews 7

R^2 =0.813672
P = f(QW)
P = $a_0 + a_i$ QW + ε
P = 10.20 – 0.36QW

Table 8: Reorder points of wheat inventory at Honeywell flour mills plc with respect to time

LQW = f(LT)
Dependent variable: **LOG(QW)**
Method: **Least squares**
Sample: **2004 2013**
No. of observations **10**

Variable	Coefficient	St. Error	t-statistic	Prob.
C	11.47146	0.335660	34.17584	0.0000
LT	-0.855677	0.201860	-4.238968	0.0028

Source: Eviews 7

R^2 = 0.691939

Table 9: Reorder Point of Wheat Inventory at Dangote Flour Mills Plc with Respect to Time

Dependent Variable: **LOG(QW)**
Method: **Least Squares**
Sample: **2004 2013**
No of observations: **10**

Variable	Coefficient	St. Error	t-statistic	Prob.
C	20.23744	3.351274	6.038731	0.0000
LT	-4.458868	1.041468	-4.281332	0.0002

Source: Eviews 7

R^2 = 0.728641

Table 10: Reorder Point of Wheat Inventory at Flour Mills of Nigeria PLc with Respect to Time

LQW=f(LT)
Dependent variable: LOG (QW)
Method: Least squares
Sample: 2004 2013
No. of observations: 10

Variable	Co efficient	St.error	t-statistic	Prob.
C	8.086415	2.057393	3.930418	0.0022
LT	-8.762045	1.625522	-5	0.0007

Source: Eviews 7

R^2 = 0.638409

V. Structural Model Assessment

Structural model results are presented in tables 1 to 10. Ordinary least square method provides information necessary to assess the significance of each of the coefficients of the modeled variables. Economic order quantity has a significant relationship total cost of inventory at the studied firms was evaluated following the results on the carrying cost and total cost functions for the raw material inventory used during the production run in each of the studied firms.

Table 7: shows the relationship between profit and raw material inventory at Aggregate firm. The model regressed LPRO on LQW. The coefficient of the constant term is 10.2. The associated t-value is not statistically significant at 5 percent level, however, it indicates that keeping the independent variable constant, Profit (PRO) will increase by 10% approximately. The regression coefficient of LQW carries a positive sign and the t-value is statistically significant at 5%. This implies that QW has significant and positive relationship with Profit (PRO). The significance of the parameter (Demand [QW]) is confirmed by the t-probability (0.0000). More so, it is found that increase in the (Demand [QW]) of Honeywell mills of Plc (PRO) will contribute to increase in the Profit (PRO) of the firm by 0.4%. The R^2 of 0.814 implies that 81.4% of the total variation in the profit of the firm is accounted for, by the independent variable namely (Demand [QW]). The findings support earlier research by Anichebe and Agu (2013), Muninarayana and Aggarwal (2013), Inyang *et al* (2013) and Ebenezer and Asiedu (2013) who found a positive relationship between raw materials inventory and corporate profitability. The computed DW is 2.14. At 5% level of significance with one explanatory variable and 10 observation, the tabulated DW for dL and du are 0.879 and 1.320 respectively. The value of computed DW is greater than the upper limit. Therefore, we conclude that there is no evidence of positive first order serial correlation.

Table 10: shows the reorder point (ROP) coefficient function for wheat material inventory at Flour Mills of Nigeria Plc. The equation in the model regressed LQW on LT. The coefficient of the constant term is

8.09. The associated t-value is statistically significant at 5 percent level, indicating that keeping the independent variable, LQW will increase by 8.09%. The regression coefficient of LT carries a negative sign and the t-value is statistically significant at 5%. This implies that LT has significant and negative relationship with LQW. The significance of the parameter (Time indicated by LT) is confirmed by the t-probability (0.0007). More so, it is found that increase in time (LT) will contribute to decrease in Q wheat of the firm by 8.8%. The finding support Kundu, Chakrabarti and Chakrabarti (2013) who found that the time at which demand rate changes can be determined and deterioration rate of inventory is time dependent. The R^2 of 0.638 implies that 63.8% of the total variation in the Q wheat of Flour Mills of Nig. Plc is accounted for, by the independent variable namely time (LT). The computed DW is 2.3. At 5% level of significance with one explanatory variable and 10 observation, the tabulated DW for dL and du are 0.879 and 1.320 respectively. The value of computed DW is greater than the upper limit. Therefore, we conclude that there is no evidence of positive first order serial correlation.

VI. Conclusion

5.1 DISCUSSION OF THE FINDINGS

The result indicate that manufacturing firms with adequate knowledge of quantity reorder point inventory control system are more likely to develop and implement management techniques resulting in improved economic performance. Following the theory of constraint, this would suggest the creation of a new since of competitive advantage enhancing superior performance in the industry.

5.2 LIMITATION OF THE STUDY

Although the objectives of the study are accomplished, it is important to note limitations to the study. The sample under study is from selected flour manufacturing firms in Nigeria, replication with new samples from other manufacturing sectors is necessary for generalizability of the results. The assumptions that the estimated functions in the study are linear is also a limitation. Normally carrying cost and ordering cost are quadratic while the cost is cubic which is beyond the scope of the study.

5.3 FUTURE RESEARCH

Additional research is necessary to validate the findings from the study that reorder point inventory control system enhances economic performance of manufacturing organizations other than flour mills

5.4 THEORETICAL AND MANAGEMENT IMPLICATIONS

From theory of constraint perspective, firms with a good knowledge of inventory management develop strategies capabilities that result in identification of constraints that limit their organization performance, and decides how to exploit the systems constraint as well as getting the most out of the constraint. This is because the constraint determines the outputs of the system. This detection and action leads to the refinement of business process that is focused on customers demand satisfaction that enhances economic performance of the organization.

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