Profitability of Listed Food and Beverage Firms in Nigeria: Inventory Flow Management Impact Analysis

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Abstract: Inventory management seeks to promote industrial efficiency through planning, coordinating, controlling and organizing of appropriate levels of raw materials, work-in-process, and finished goods. This minimizes cost associated with ordering, holding, and stock-out; and ensures reliable sales forecasts, provided usage of stored product is steady and annual demand requirements are known, among other assumptions. For this significance, the purpose of this study is to examine the extent to which inventor flow management impacts profitability of listed food and beverage firms in Nigeria. Secondary data covering five years (2013-2017) were gathered from annual reports of the firms, and analysed using descriptive and inferential tools, aided by Statistical Package for Social Sciences (SPSS). With Economic Order Quantity (EOQ) and Return on Assets (ROA) as operational dimensions, the results indicated a correlation coefficient (R) of 0.575; and coefficient of determination (R^2)of 0.331, which attributes 33.1% variations in ROA to changes in EOQ. Also favourable are Durbin-Watson statistic of 1.667 (1.5 < d-w < 2.5) and other features of the model (β = 575, T-value = 2.722, p-value = 0.016 < 0.05). Based on these results, the null hypothesis is rejected, in favour of the alternative hypothesis which states that EOQ significantly impacts ROA. The study, therefore, concludes that inventory flow management significantly impacts profitability of listed food and beverage manufacturing firms in Nigeria. In the light of the conclusion, it is recommended that managers of the listed firms should sustain EOQ-based practices and promote cost management principles to boost industrial productivity and profitability.

Keywords: Food and beverage firms, Inventory flow, Productivity, Profitability

1. Introduction

Industrial survival depends largely on the ability of firms to efficiently and effectively manage working capital, especially as manufacturing firms keep one form of inventory or another. The importance borders on the implications of depreciation, pilferage and wastages. Insufficient inventory holding by organizations has adverse consequences on the daily running of business, while excess inventory level would increase in carrying cost and lower profit. The appropriateness of inventory, therefore, is of essence to the growth and achievement of financial success and profitability of firms.

Also, a good inventory system impacts on a firm's total performance and well-being of the managers; hence, it helps to ensure that a firm keeps at all times an optimal level of assets (Anichebe & Agu, 2013; Akindipe, 2014). Inventories are assets which are easily convertible to other forms of working capital (receivables and cash) in the short- run. They form part of the current assets of firms, stockpiled as raw materials, supplies, machine parts, Work-In-Progress (WIP) and finished goods. The efficient management of inventory involves purchasing, co-ordination, control, and utilization of materials with a view to making the right quantity available at the right place and at the right time (as

required for production); thereby preventing stock-out, spoilage and theft (Ballon, 2004; Pandey, 2005).

In view of the above submissions regarding the significance of inventory management, this study seeks to examine the impact of inventory flow management on the profitability of food and beverage manufacturing firms in Nigeria. The general purpose is to investigate the impact of inventory flow management on the profitability of food and beverage manufacturing firms in Nigeria. With economic order quantity and return on assets as proxies for inventory flow management and profitability respectively, the specific objective is to examine the impact of economic order quantity on return on assets of food and beverage manufacturing firms in Nigeria. To actualize the objective, the research hypothesis is as follows:

> Ho: Economic order quantity does not significantly impact return on assets of
> listed food and beverage manufacturing firms in Nigeria.

2. Literature Review

In accounting, inventory represents the aggregate of tangible property held for production/sale in the ordinary course of business. It includes raw materials, WIP, and finished goods,

as well as spares. Arnold (2008) equally posited that inventory comprises three elements such as raw materials, WIP, and finished goods. Raw materials have to do with goods delivered by a supplier to purchaser's warehouse but are not yet been taken into the production process. They are basic inputs/parts of a product that are yet to be converted through the manufacturing or transformational process (Cinnamon, Helweg-Larsen & Cinnamon, 2010). WIP, on the other hand, refers to products that have left the raw material storage area, but are not yet declared ready for sale and delivery to customers. They are semi-finished (partly manufactured) products that are at various stages of completion in the production process.

Finished goods are products that have passed through and completed the various stages of production, thereby awaiting distribution, while being stock-piled in the warehouse, waiting for sale and delivery to customers. From the fore-going, inventories are stockpiles of raw materials, WIP, and finished goods which feature at various points throughout a firm's production and logistics channels; as maintained for the running of the business. They are items manufactured for further production or trade (Ballon, 2004). They, thus, represent a large portion of the business investment and must be well managed in order to enhance profitability.

Inventory is also considered a vital part of the production process because it links the firm's products to marketing, customer demand, consumption (Pandey, 2005). In relation to the manufacturing industry, inventories are stocks kept in order to manufacture products for further production or sale. For this course, managers endeavour to achieve a balance between good customer service and reasonable cost, which is focus of inventory management. Considering the time and volume of replenishment, inventory holding is managed to facilitate a firm's operations while ensuring efficient reordering, carrying, and stock out costs. An inventory system refers to a set of policies and controls that a firm puts in place to monitor and determine inventory levels, volume, and schedule of replenishment to be maintained. Inventory requires planning, coordinating, controlling and organization of appropriate levels of raw materials, WIP and finished goods. This is necessary because adequate inventory is needed to minimize the rate of stock outs in a firm. In setting inventory levels, firms consider costs relating to ordering, holding and stock-out.

Ordering costs are incurred in placing and receiving an order for the supply of inventory; such as costs associated with preparing invoices, transportation, inspecting goods, communication and paper work, insurance, etc (Drury, 2004; Prempeh, 2016). Holding costs are costs incurred in carrying inventory for current and future demand; such as costs associated with tax, theft, interest on funds, insurance, handling, obsolescence, opportunity given up, etc. These costs are positively related to changes in inventory level (Lwiki, Ojera, Mugenda & Wachira, 2013). Stock-out or shortage cost, on the other hand, results when a firm is dealing on slow moving items; but with efficient inventory

management, firms are enabled to reduce it alongside the ordering and holding costs; so as to generate more profit, while satisfying customer's demands. It guarantees that items of stock are sustained in the right quantity and quality; and obtainable at the right place and time.

The various techniques used in ensuring efficient inventory management include Economic Order Quantity (EOQ), inventory turnover ratio, Just-In-Time (JIT), vendor managed inventory, Pareto ABC analysis, etc. This study focuses on the foremost among them, which is the EOQ approach. The EOQ as an inventory control model seeks to ensure minimization of costs in relation to stock holding and ordering (Drury, 2004). It determines the ordering quantity at which holding cost is equal to the ordering cost; and this suggests the point of optimality. By use of the EOQ model, firms adopt an effective inventory management system that ensures reliable sales forecasts to be used in ordering purposes, based on the following assumptions:

i.   Usage of stored product is steady,
ii.   Only one product is produced,
iii.   Annual demand requirements are known,
iv.   Demand rate is evenly spread throughout the year and is constant,
v.   Lead time does not vary,
vi.   Ordering costs are constant,
vii.   Carrying costs of inventory are constant per unit of inventory,
viii. Each order is received in a single delivery, and
ix.   There is no quantity discounts.

From the fore-going, the EOQ model focuses mainly on variable costs, while fixed costs may be considered relatively.

The second (dependent) variable of the study is profitability, which is considered the main goal of business. Profitability shows the ability of the firm to generate earnings from the use of its assets over a period of time. It implies the capacity to make benefits from all business operations (Niresh & Velnampy, 2014; Muya & Gathogo, 2016). Profit, in particular, serves as the entrepreneur's reward for investing, the main motivation for doing business. It is also an index for business performance measurement, being the difference between revenue received from sales and total costs, including material, labour, and related costs (Ogbadu, 2009). In order to improve profitability, firms spend countless hours seeking to reduce operating costs and increasing sales. Making profit remains an important precondition for long-term survival and success of a firm. It attracts investors and increases the likelihood of business to survive for a long time. Profitability may be expressed in terms of accounting profit or economic profit, depending on its emphasis the main goal of business. It portrays the efficiency of the management in converting the firm's resources to profits (Anene, 2014; Farah & Nina, 2016).

In this study, the proxy for profitability is return on assets, also referred to as return on total assets. It is a profitability ratio that measures the net income produced by total assets,

thus, comparing the profit a firm generates to the capital invested in assets. The ratio is calculated by dividing net income by average total assets. Arnold (2008) submits that the ration may also be represented as a product of profit margin and total asset turnover. By this, it measures how efficiently a firm can manage its assets to produce profits during a period. It indicates how well a firm is performing, as higher return is associated with more productive and efficient management (in utilizing economic resources of the firm). It is, therefore, adopted in this study as the dependent variable.

Table 1: Listed Food and Beverage Firms in Nigeria

S/N	NAME OF FIRM
1	7UP BOTTLING CO. PLC
2	FLOUR MILL PLC
3	NESTLE NIG. PLC
4	CADBURY NIG. PLC
5	DANGOTE FLOUR MILLS
6	DANGOTE SUGAR REF. PLC
7	HONEYWELL F/MILL PLC
8	NASCON PLC
9	UACN PLC
10	CHAMPION BREW Plc
11	TANTALIZERS PLC
12	UNION DICON SALT PLC
13	GUINNESS NIG. PLC
14	NIGERIAN BREWERIES PLC
15	N/N FLOUR MILLS
16	INT'S BREWERIES PLC
17	MC NICHOLS PLC

Source: NSE Publication (2018)

From the annual reports of the above listed firms, secondary data on economic order quantity and return on assets are drawn, for the years 2013-2017. Descriptive statistics are used in the preliminary analysis of data, while the inferential statistics that support the test of hypothesis include correlation and regression analyses. The model summary, thus, seeks to explain the extent to which economic order quantity impacts the return on assets of the firms. The main indicators focused are the coefficient of correlation (R) and coefficient of correlation (R^2). Regression analysis, especially, is concerned with how one or more variables determine or explain changes in another variable (Freedman, 2009). The basic regression model is stated as:

$$y = \beta_0 + bx + e \quad … (1)$$

Where:

y =   Outcome variable
β_0 =   Constant term
x =   Predictor variable
b =   Coefficient of the predictor variable
e =   Error term

3. Methodology

This research design employed in this study is *ex-post facto* survey, which facilitates investigation of relationships by observing existing conditions and searching back in time for the probable associated factors. By this, it seeks to determine cause - effect relationship among variables by closely examining the conditions, using relevant available information. Hence, it addresses events that have already taken place ((Ajoku, 2006; Ebirien 2019). The study population comprises 17 manufacturing firms listed on the Nigerian Stock Exchange (NSE) as at 2018 and have consistently submitted their annual reports over the period 2013-2017. They are as identified in Table 1:

For this study, the independent variable, Inventory Flow Management (INVFM), has Economic Order Quantity (EOQ) as the operational dimension; while the dependent variable, Firm Profitability (FIRMP), has Return on Assets (ROA) as operational proxy. The general and operational model specifications for this study are:

FIRMP= *f(INVFM)*   … (2)
FIRMP= *f(EOQ)*   … (3)
$ROA_i = \beta 0 + b_1(EOQ)_{i,} + e$ … (4)

With Analysis of Variance (ANOVA) approach the significance of variability is tested and the appropriate decision rule applied at the 0.05 level, aided by Statistical Package for Social Sciences (SPSS).

4. Results

The secondary data on EOQ and ROA, sourced from annual reports of the firms, are presented in Tables 2 and 3; while the results of descriptive and inferential analyses are contained in Tables 4 to 8:

Table 2: EOQ of the Listed Firms

S/N	FIRMS	2013	2014	2015	2016	2017
1	7UP BOTTLING CO. PLC	48	50	44	48	12
2	FLOUR MILL PLC	38	31	33	33	23
3	NESTLE NIG. PLC	44	42	27	78	11
4	CADBURY NIG. PLC	57	7	8	27	16
5	DANGOTE FLOUR MILLS	79	24	27	67	17
6	DANGOTE SUGAR REF. PLC	75	30	71	26	24
7	HONEYWELL F/MILL PLC	45	43	74	54	36
8	NASCON PLC	52	3	12	18	19
9	UACN PLC	11	16	10	21	15
10	CHAMPION BREW Plc	1	1	5	5	8
11	TANTALIZERS PLC	95	46	50	34	50
12	UNION DICON SALT PLC	12	1	6	2	8
13	GUINNESS NIG. PLC	22	49	26	50	79
14	NIGERIAN BREWERIES PLC	59	9	78	88	18
15	N/N FLOUR MILLS	12	12	2	2	11
16	INT'S BREWERIES PLC	96	11	13	12	51
17	MC NICHOLS PLC	30	26	52	75	41

Source: Firms' Publications (Various years).

Table 3: ROA of the Listed Firms

S/N	FIRMS	2013	2014	2015	2016	2017
1	7UP BOTTLING CO. PLC	5.56	11.52	10.65	4.94	12.38
2	FLOUR MILL PLC	3.67	4.64	1.05	4.47	2.86
3	NESTLE NIG. PLC	20.60	20.92	19.91	4.68	22.98
4	CADBURY NIG. PLC	15.31	7.42	4.06	1.05	1.07
5	DANGOTE FLOUR MILLS	8.97	7.77	8.81	15.79	9.71
6	DANGOTE SUGAR REF. PLC	14.95	12.24	11.83	8.07	13.08
7	HONEYWELL F/MILL PLC	5.13	5.25	16.37	3.98	3.81
8	NASCON PLC	23.62	14.87	12.93	9.82	17.74
9	UACN PLC	26.00	16.30	12.71	8.92	9.58
10	CHAMPION BREW Plc	12.90	7.87	0.75	5.33	6.47
11	TANTALIZERS PLC	9.86	15.65	13.90	20.50	10.98
12	UNION DICON SALT PLC	1.02	5.33	3.85	30.12	10.81
13	GUINNESS NIG. PLC	9.80	7.25	6.38	1.48	1.32
14	NIGERIAN BREWERIES PLC	17.05	12.16	10.67	7.73	7.74
15	N/N FLOUR MILLS	6.22	7.15	8.24	11.34	0.38
16	INT'S BREWERIES PLC	10.11	8.64	6.46	7.93	2.30
17	MC NICHOLS PLC	7.29	10.72	11.73	11.78	6.32

Source: Firms' Publications (Various years).

In Table 4, EOQ has a mean of 19.46794, standard deviation of 5.171560, minimum value of 11.742, and maximum of 27.728. This indicates that, on the average, for every ₦1 spent on the EOQ, the companies minimally earn ₦19.46794. ROA has a mean of 19.25318, standard deviation of 12.633835, minimum value of 5.246, and maximum of 47.818. This indicates that, on the average, for every ₦1 invested on assets, the companies earn ₦19.25318. Also, the EOQ Skewness and Kurtosis calculated mean values -1.03 (that is, (-.070/.550) and 1.29 (that is, (1.370/1.063) respectively are within the normal distribution (Z-value) range of -1.96 and +1.95. The same applies for ROA, implying the feature of normally distributed data.

Using the benchmark provided by Salkind (2010), for interpreting correlation coefficient (r), the parameters adopted in this study are:

±0.80 - 1.00　　=　　Very Strong relationship,
±0.60 - 0.79　　=　　Strong relationship,
±0.40 - 0.59　　=　　Moderate relationship,
±0.20 - 0.39　　=　　Weak relationship, and

±0.01 - 0.19　　=　　Very weak or no relationship
The positive sign (+) implies direct positive relationship while a negative sign (-) implies inverse relationship. Where the probability value (p-value) is less than the 0.05 alpha the null hypothesis is rejected. This implies acceptance of the alternative hypothesis, that there is a significant relationship between the study variables.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.575[a]	.331	.286	10.675259	1.667

a. Predictors: (Constant), EOQ
b. Dependent Variable: ROA
Source: SPSS Data Analysis Result (2018).

In Table 5, the correlation coefficient (R) is 0.575, which indicates a strongpositive correlation between EOQ and ROA. The R^2 of 0.331implies that 33.1% variations in ROA is attributed to changes in EOQ, with Durbin-Watson (d-w) of 1.667; which is within the two critical limits ($1.5 < d\text{-}w < 2.5$. By this, there is no first order linear auto-correlation in the data; hence the model is of good fit.

Table 6: ANOVA Results

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	844.403	1	844.403	7.410	.016[b]
	Residual	1709.417	15	113.961		
	Total	2553.820	16			

NB: Dependent Variable: ROA
　　　Predictors: (Constant), EOQ
Source: SPSS Data Analysis Result (2018).

In Table 6, the F-value of 16.421 is greater than the p-value of .016, which is less than 0.05 (p-value < 0.05). This indicates that the regression model predicts the dependent variable significantly; hence there are no major outliers (from the line of best fit) relating ROA and EOQ.

Table 7: Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	46.600	10.375		4.492	.000
	EOQ	1.405	.516	.575	2.722	.016

NB: Dependent Variable: ROA
Source: SPSS Data Analysis Result (2018).

Table 8: Hypothesis Test Summary

Hypothesis	Statistical Tool	R	R^2	P-value	Level of Significance	Decision
Ho	Simple Regression Analysis	.575	.331	0.016	0.05	Reject

Source: SPSS Data Analysis Result (2018).

The results in Table 7 indicate a constant value of 46.600 and EOQ coefficient of 1.405, implying that for every 1 unit increase in EOQ, ROA rises by 140.5%. On the other hand, Beta (β) is 575 and T-value is 2.722, with p-value = 0.016 (<

0.05). By the results in Table 8 also, the null hypothesis is rejected, which establishes that there is positive and significant relationship between ROA and EOQ in food and beverage manufacturing firms in Nigeria.

5. Discussion of Findings

The concept of inventory flow management requires that inventory should be available in the right quantity at all times, neither more nor less than what is required; as inadequate inventory adversely affects smooth running of business, whereas excess of inventory holding attracts extra cost, thus reducing profit margins which in the long-run affects the existence, growth and survival of the business. Inventory establishes an effective link between production and sales level; hence, is critical for firms to effectively and efficiently manage their inventories. The prime objective of inventory management is the minimization of total cost (of ordering, holding and distributing inventories) to ensure profitable operations (Maama, Kusi & Nsowah, 2016).

Many researchers have investigated and established a significant link between inventory and profitability of firms. Prempeh (2016) established that effective inventory management allows a distributor to meet or exceed customer's expectations of product availability with the amount of each item that will maximize their company's net profit or minimize total inventory investment. In another study, Panigrahi (2013) found that effective inventory management helps firms to know what products obtain in the market, how much of each item they have, and exactly where each piece of each product is located in the warehouse, thus, ensuring that all items of inventory remain in saleable or usable condition, to minimize the cost of meeting customer's orders.

Sitienei and Memba (2015) examined the effect of working capital management on the profitability of cement manufacturing firms in Kenya, using secondary data for a 15-year period (2000-2014). The results established that inventory conversion period positively and significantly influences profitability while average receivables period had positive but insignificant relationship with profitability. There existed also a positive significant relationship between leverage and profitability while liquidity and size of the firm had positive but insignificant relationship with the profitability. The conclusion was that the inventory-related features positively influenced the profitability of the firms.

Mogere, Oloko & Okibo (2013) analysed the effect of inventory management practices on operational performance of a tea processing firm, focusing on the effect of material requirement planning on operational performance. Purposive sampling and stratified random sampling techniques was adopted to enumerate a sample of 55 out of 119 respondents; with targeted to establish the influence of continuous replenishment on operational performance; the extent to which distribution resource planning influences operational performance; and the effect of vendor managed inventory on operational performance. The findings revealed that a positive relationship exists between the use of inventory control systems and operational performance of the firm. In the study conducted by Chopra & Mendl (2013), in which gross operating profit was adopted as a measure of

profitability, the results established a positive relationship between inventory management and profitability.

This study which investigated the impact of inventory flow management on the profitability of food and beverage firms in Nigeria has also established that, in terms of the operational dimensions, EOQ significantly impacts on the ROA of the firms.

6. Conclusion and Recommendations

The viability and survival of any business to a great extent depends on the ability of firms to effectively manage inventory. To this extent, when there is poor management of inventory, funds may be unnecessarily tied up in idle assets. Furthermore, it reduces the liquidity of the company (Etale & Bingilar, 2016). In this regard, emphasis is equally laid on the theory of constraints, as propounded by Eliyahu Moshe Goldratt in 1984; which identifies the factors that hinder organizations from achieving set goals and objectives, particularly the making of profit and remain in business (as going concern). There is also special focus on continuous improvement and increased efficiency in order to attract higher profits. In context, a constraint is any factor or element that hinders the system from doing more of what it was designed to accomplish), implying that it limits the performance of an organization. Every system with a focus (goal) will always have such limitation (constraint), tending to hinder it from actualizing greater results. Thus, identifying and directing improvement efforts on tackling the constraints give the firms more leverage to achieve higher performance in relation to accomplishing the set goals and objectives.

The key steps required to successfully address the constraints are:
  i. Identify the systems constraint,
  ii. Decide how to exploit this constraint,
  iii. Subordinate everything else to exploit this constraint,
  iv. Elevate the system's constraint, and
  v. If, in any of the previous 4 steps, the constraint has been *broken*, repeat Step 1 on the next constraint.

A constraint may either be physical or a matter of policy. The physical manifest includes:
  i. *Capacity constraint*, which occurs when an organization's operations reveal a lack of capacity to satisfy demand for its products and services in the market;

  ii. *Market constraint,* which occurs when a company has more than enough capacity (to the point that it has idle time and resources), but there is not enough demand in the market to translate into sales and, eventually, profit;

  iii. *Material constraint,* which occurs when a company's operations experience in trouble

obtaining the materials and supplies needed to make and sell products to meet market demand; and

iv. *Cash constraint,* which occurs when there are difficulties in cash flow, since they could mean an inability on the part of a firm to meet its working capital requirements and continue making and selling its products and services.

By addressing these constraints, firms are better placed to achieve their goals. Baring on any constraints, the results of this study have established that there is a strongpositive linear relationship between EOQ and ROA of listed food and beverage manufacturing firms in Nigeria. In the light of this, it is concluded that inventory flow management significantly impacts the profitability of listed food and beverage manufacturing firms in Nigeria. Based on this conclusion, it is recommended that managers of the firms should:

i. Sustain the adoption EOQ-favourable practices to boost industrial productivity and profitability; and

ii. Promote more efficient and effective inventory cost management practices with the aid of modern technology to further enhance their returns.

To drive the efficient inventory management process, there should be adequacy of competent human resources; who should be provided ample opportunity for training/retraining on the job, specially focusing on the dynamics of inventory flow management in modern industrial organizations, to achieve higher enhancement of profitability in the listed firms.

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