

# **Inventory Management and Financial Performance: Efficiency Level Investigation of Listed Food & Beverage Manufacturing Companies**

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## **Abstract**

Efficient inventory management is key to the success of every business, specifically the manufacturing firms which make use of all the three classes of inventory; either as raw material, work in progress or finished goods. This study investigated the effect of inventory management on net operating profits of listed Food & Beverage manufacturing companies from 2009-2018. The main aim was to measure how average days to sell inventory, inventory turnover rate, and inventory conversion period efficiently affect net operating profit of these companies. Ex post facto research designed was employed, and data were obtained from the published financial reports of the firms under study, while the analytical techniques used for the study were the descriptive statistics, unit root test and panel regression model. Findings revealed a significant positive effect of average days to sell inventory and inventory turnover on the net operating profit of the listed manufacturing firms. However, inventory conversion period showed an inverse relationship with net operating profit of the firms. The study concluded that inventory management is an integral part of a firm's existence, as a mismanagement of inventories may lead to serious financial problems and in the long run, threatens the going concern of these firms. It was recommended that, managers of manufacturing firms should adopt current inventory forecasting techniques that will help them estimate the desirable inventory levels to hold at any given time, identify fast or slow-moving items as this will always ensure a low average days to sell inventory. Furthermore, manufacturing firms should adopt a perpetual inventory control system as described in IAS 2, to enable them track inventories on real-time basis.

**Keywords:** Inventory management, financial performance, average days to sell inventory, inventory turnover, inventory conversion period, net profit margin.

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## Introduction

Inventories as defined by Ahmed (2016) in accordance with the International Accounting Standard (IAS 2) are assets held for sale in the ordinary course of the business, in the process of production for such sale, or in the form of materials or supplies to be consumed in the production process or in the rendering of services. Several decades ago, inventories of raw materials, Work-In-Progress (WIP) components and finished goods were kept as high as possible against the possibility of running out of materials in stock, the problems associated with these practice were that inventory holding costs ran too high, and there was also the issue of working capital crunch (Salawati, Tiggi & Kadri 2012). On the other hand, keeping fewer inventories resulted in lower sales, increase in idle time, dissatisfied customers as well as an indication of poor purchasing/sales strategy on the part of management. The above listed problems adversely affect the financial performance of firms, hence, there is need for proper inventory management as both excessive and inadequate inventories are not desirable (Effiong & Akpan, 2019).

According to Anshur, Ahmed and Dhodi, (2018) financial performance is a subjective measure of how properly a firm can use resources from its essential method of enterprise and generate sales. The term is additionally utilized as a general measure of a company's general economic health over a given timeframe and can be utilized to analyze comparative firms within a similar industry or to look at ventures or segments in a competition.

Jeanet and Mulyungi (2018) viewed inventory management as keeping or maintaining a firm's stocks at a level that a firm will only incur the least cost consistent with other management's set objectives, it entails ensuring that all input materials of production available to the firm are maintained at a level where production is not interrupted as well as ensuring that operational cost is kept at a minimal level without affecting operation efficiency. Akindipe (2014) argued that mismanagement of Inventories may lead to significant financial problems for a firm, as inaccurate records of inventory held increases pilferages and theft as well as maintains inadequate levels and disrupts operations. Proper inventory management is also an indicator of a highly liquid firm, which in turn is a measure of financial performance.

Nevertheless, empirical literature has shown disagreement among different researchers on the relationship between inventory management and financial performance. While one array of the literature indicates that there is a positive relationship between the two, others show that there exist no relationship between inventory management and financial performance. Akinlibi (2014), Edori & Ohaka (2012), Eneji, Nweze & Udeh (2012) all observed that there is a significant positive relationship between inventory management and performance of manufacturing firms in Nigeria.

Otuya and Eginiwin (2016) discovered a negative, non-significant relationship between inventory conversion period and profitability of SMEs in Delta state. Consequently, this study examined the effect of inventory management on financial performance of listed manufacturing firms in Nigeria, using average days to sell inventory, inventory turnover and inventory conversion period as proxies for inventory management, as well as net profit margin as the proxy for financial performance. Net profit was selected for the study because it helps investors assess if a company's management is generating enough profit from its sales and whether operating costs and overhead costs are being controlled.

The scope of this study was the food and beverage subsector of manufacturing firms for from 2009 to 2018. This sector was chosen because it is Nigeria's largest manufacturing

sector, contributing 22.5% of the manufacturing industry value and 4.6% of the country's GDP (Flanders Investment & Trade, 2020)

### ***The Theory of Economic Order Quantity***

The economic order quantity (EOQ) theory was proposed by Harris in 1913, to determine the optimal inventory level. EOQ refers to an inventory level that can minimize both inventory holding cost and inventory ordering cost (Lwiki, Ojera, Mugenda & Wachira, 2013). The EOQ model is used to determine an optimal ordering size that will minimize the sum of ordering and carrying costs (Lwiki et al., 2013). This model was found on the assumption that demand equals annual total quantity ordered by the firm at any point in time.

The EOQ model considers a tradeoff between storage cost and ordering cost when making a decision on the quantity to use when replenishing inventory items. Ordering frequency is usually reduced by a larger amount of quantity ordered, hence reduced ordering cost but increases storage costs and requires a larger space for storage too (Nwosu, 2014). Some costs decline with holding inventory, while other holding costs increase, and that the total inventory-associated cost curve has a minimum point (Lwiki et al., 2013). Ordering costs refers to those costs which are incurred when additional inventories are procured or purchased while carrying costs are the costs incurred for inventory holding. Thus, EOQ is determined by the intersection of the ordering cost curve and carrying cost curve. At this point total carrying cost and total ordering cost are equal to each other (Kumar, 2016). The EOQ is a very useful tool for inventory management and it can be applied to finished goods, work-in-progress and raw material inventories.

### ***The Just in Time Model***

Just in Time (JIT) was propounded by Taiichi Ohno in 1993. JIT is a management concept that was invented to specifically help firms in waste avoidance/reduction; it encourages waste minimization as well as productivity enhancement. The JIT model is based on three crucial principles: waste elimination, continuous improvement in product and service quality and involvement of staff/workers in planning and implementation of the firm's strategies (Eneje, Nweze & Udeh, 2012). Just-In-Time (JIT) is about having right items, right quality and right quantity at the right time and place. If JIT is implemented well, it has the potential of enhancing production quality, increase productivity, improve production efficiency and finally reduces wastes and other avoidable costs associated with production.

### ***Average Days to Sell Inventory***

Average Days to Sell Inventory (ADI) or Days Sales in Inventory (DSI) is a measurement of the average number of days required for a business to convert its inventory into sales (Vedran, Ari-Pekka, & Weiss, 2016). The ADI value is calculated by dividing the inventory balance (including work-in-progress) by the amount of cost of goods sold, this number is then multiplied by the number of days in a year, quarter, or month.

Generally, a lower (shorter) day's sale of inventory is preferred, but it is important to note that the average days sales of inventory varies from one industry to another. While a lower days sales in inventory reflects fast sales of inventory stocks and thus minimizes handling costs, as well as increase cash flow, a higher days sales in inventory value, on the other hand, indicates either a slow sales performance or an excess of purchased inventory (the company is buying too much inventory), which may eventually become obsolete. However, it may also mean that a company with higher day's sales in inventory has been maintaining high inventory levels to meet high customer demands.

The carrying cost of inventory, which includes, rent, insurance, storage costs, and other expenses related to holding inventory, may directly impact profit margin if not managed properly. In addition, the longer the inventory is kept, the longer its cash equivalent is not able to be used for other operations, and thus the opportunity cost is a loss (Panigrahi, 2013).

### ***Inventory Turnover***

Inventory turnover is a measure of the number of times inventory is sold or used in each period. It is calculated to see if a business has an excessive inventory in comparison to its sales level. The equation for inventory turnover equals the cost of goods sold divided by average inventory. Mwangi and Thogori (2015) state that a low turnover rate may point to overstocking, obsolescence or deficiencies in the product line or marketing effort. However, in some instances a low rate may be appropriate, such as where higher inventory levels occur in anticipation of rapidly rising prices or expected market shortages. Another insight provided by the inventory turnover ratio is that if inventory is turning over slowly, then the warehousing cost attributable to each unit will be higher. Conversely, a high turnover rate may indicate inadequate inventory levels, which may lead to a loss in business as the inventory is too low. This often can result in stock shortages.

### ***Inventory Conversion Period***

The inventory conversion period is the time required to obtain materials for a product and process it into finished goods. The inventory conversion period is essentially the time period during which a company must invest cash while it converts materials into a sale (Gerhard, 2017). It is calculated as inventory divide by cost of sales multiplied by the number of days in the period. Etale and Bingilar (2016) are of the view that the inventory conversion period is a metric that expresses the time (measured in days) it takes for a company to convert its investments in inventory and other resources into cash flows from sales. It attempts to measure how long each net input is tied up in the production and sales process before it gets converted into cash received.

Inventory conversion period is one of several quantitative measures that helps to evaluate the efficiency of a company's operations and management (Eneje, Nweze & Udeh, 2012). A trend of decreasing or steady inventory conversion period values over multiple periods is a good sign, while rising ones should lead to more investigation and analysis based on other factors.

### ***Net Profit Margin***

Net profit margin (also called profit margin) is the most basic profitability ratio that measures the percentage of net income of an entity to its net sales (Cinca & Larraz 2009). It represents the proportion of sales that is left over after all relevant expenses have been charged. The net profit margin is a measure of the overall financial success of a business, high net profit margin indicates that a business is pricing its products correctly and is exercising good cost control. It is useful for comparing the results of businesses within the same industry, since they are all subject to the same business environment and customer base, and may have approximately the same cost structures (Gombola & Edward 2011).

Empirically, Lyndon & Paymaster (2016) studied the effect of inventory cost management on profitability, with inventory cost management proxied by raw materials cost, work in progress cost and finished goods cost, and regressed against profitability, proxied by gross profit margin. Secondary data were sourced from the annual reports and accounts of six selected brewery companies from the Nigerian Stock Exchange from 2005 to 2014. Multiple regression technique was used to establish the relationship between the variables and the study

revealed that efficient inventory cost management has positive influence on the profitability of brewery companies in Nigeria.

Boute, Lambrecht, Lambrechts, and Sterckx (2008) analyzed the differences in inventory turnover between manufacturing, wholesale and retail sectors. They only considered 2004, since their study aimed to express cross-sectional differences. The data were extracted from Bel-First which contains statistics on Belgian and Luxembourg companies. They include 883 retailers, 3386 wholesalers and 1000 manufacturing firms. Data were analyzed using ANOVA. Findings reveal that the type of production process affects work-in process inventory. They further stated that inventory turnover is significantly higher in retail than wholesale.

Chen, Frank and Wu. (2005) investigated whether the inventory turnover for U.S. retail and wholesale firms has improved or not over 1981 to 2004. Three hundred and fifty three publicly listed US retail/wholesale firms were sampled. They found out that the average inventory that the firms carry decreases in retail and wholesale firms, so wholesale firms increased their inventory turnover year by year. On the other hand, until 1995, inventory turnover ratio of retail firms remained stable. After 1995, retail firms started to improve the inventory turnover. Comparing the financial impact of inventories on the performance of the firms, it was discovered that firms with high inventory turnover perform poorly.

Koumanakos (2008) studied the effect of inventory management on the performance of manufacturing firms operating in three industrial sectors in Greece. Food, textiles and chemicals industries were used in the study covering 2000–2002. The sample size consisted of all manufacturing firms with the corporate form of societies. The hypothesis that lean inventory management leads to improvement in a firm's financial performance was tested. The findings suggested that the higher the level of inventories preserved (departing from lean operations) by a firm, the lower the rate of return. He concluded that most of the studies reviewed concentrated on conventional firm level variables such as inventory levels, demand and lead time.

Panigrahi (2013) examined the relationship between inventory conversion period and profitability of top 5 cement firms in India from 2001 - 2010 using regression analysis. Gross operating profit was used as a measure of profitability while current ratio, financial debt ratio and size of the firm were used as control variables. The results of the study established a negative significant linear relationship between the inventory conversion period and profitability. The study also established that the Inventory conversion period has an inverse relation with profitability of the firms.

Lyndon and Paymaster (2016) studied the effect of inventory cost management on profitability of listed Brewery companies in Nigeria, from 2009 – 2018. This study was set to cover a period of 10 years to help come up with appropriate recommendations based on current facts on the relationship between inventory management and performance of manufacturing firms in Nigeria.

Furthermore, authors whose works were reviewed used basically one or two proxies for inventory management, this study employed three different indices; average days to sell inventory, inventory turnover and inventory conversion period as indices for inventory measurement.

## **Methodology**

The ex-post facto research design was adopted for the study, the choice of the ex-post facto design was because the research relied on already recorded events, and the researchers

did not have control over the relevant variables studied with a view to manipulating them. The population of study comprised all the listed Food and Beverage manufacturing firms listed on the Nigerian Stock Exchange Market. There were a total of fifteen (15) Food and Beverage companies listed on the Nigerian Stock Exchange as at the time of this research, (NSE 2018). The choice of these companies was based on the fact that they fully satisfied the listing requirements of the Nigerian Stock Exchange (NSE). Eight (8) out of the fifteen listed food and beverage sub – sector of the manufacturing companies in Nigeria were sampled with the aid of judgmental sampling technique. The researcher ascertained that the selected companies were the most appropriate for this study based on availability of data. The firms selected comprised approximately 53% of the total population. They include Nestle Nigeria Plc, Cadbury Nigeria Plc, Guinness Nigeria Plc, Dangote Flour Mills Ltd, Nigerian Breweries Plc, Champion Breweries, PZ Cussons and Unilever Nigeria Plc. Secondary data were collected and computed from 2009-2018, specifically from the annual reports of the studied firms. Panel data covering a period of 10 years were estimated using diverse techniques, such as descriptive statistics, unit root test and multiple regression.

In line with existing studies in the area of inventory management, for instance, the work of Shin, Ennis & Spurlin, (2015) and Ahmed (2016), the model for this study is represented as follows:

$$NP = F(ADI, IT, ICP) \quad (1)$$

Where:

NP = Net Profit

ADI = Average Days to Sell Inventory

IT = Inventory Turnover

ICP = Inventory Conversion Period

Expressing the model econometrically, we have:

$$NP_t = \beta_0 + \beta_1 ADI_t + \beta_2 IT_t + \beta_3 ICP_t + \mu \quad (2)$$

$\beta_0$  = Constant Term

$\beta_1$  = Coefficient of Average Days to Sell Inventory

$\beta_2$  = Coefficient of Inventory Turnover

$\beta_3$  = Coefficient of Inventory Conversion Period

$\mu$  = Error Term

### Results and Discussion

The normality test was ascertained with the components of descriptive statistics such as skewness, kurtosis and Jarque-Bera Statistics and its probability value.

**Table 1: Descriptive Statistics**

|              | ADI       | IT       | ICP       | NP        |
|--------------|-----------|----------|-----------|-----------|
| Skewness     | -1.760525 | 1.911133 | -2.131903 | -3.449442 |
| Kurtosis     | 7.909166  | 7.889597 | 10.60630  | 15.39737  |
| Jarque-Bera  | 121.6590  | 128.3929 | 253.4526  | 670.9644  |
| Probability  | 0.000000  | 0.000000 | 0.000000  | 0.000000  |
| Observations | 80        | 80       | 80        | 80        |

**Source:** Authors' Computation from E-view 9.0

Table 1 describes the variables under study using the components of descriptive statistics such as Skewness, Kurtosis and Jarque – Bera Statistics. The table shows that average days to sell inventory, inventory conversion period and net profit ratio are negatively skewed relative to normal while inventory turnover is positively skewed relative to normal. It was also

shown that all the variables are leptokurtic as their kurtosis values are greater than three (3). Since the probability values of all the variables are less than 0.05 and their Jarque-Bera statistics are greater than 2.5, these mean that they are all normally distributed.

Unit Root Test measures the stationarity properties of the variables

**Table 2: Pooled Unit Root**

| Variables | LLC                         |                      | ADF – FISHER             |                      | PP – FISHER                |                      |
|-----------|-----------------------------|----------------------|--------------------------|----------------------|----------------------------|----------------------|
|           | Test Stat.                  | Order of integration | Test Stat.               | Order of integration | Test Stat.                 | Order of integration |
| ADI       | -2.75667<br>(0.0029<0.05)   | I(0)                 | -                        | -                    | 28.7039<br>(0.0260 < 0.05) | I(0)                 |
| IT        | -4.64109<br>(0.0000 < 0.05) | I(1)                 | 38.9093<br>(0.0011<0.05) | I(1)                 | 63.1799<br>(0.0000 < 0.05) | I(1)                 |
| ICP       | -1.85342<br>(0.0319 < 0.05) | I(0)                 | -                        | -                    | 62.4775<br>(0.0000 < 0.05) | I (0)                |
| NP        | -6.73051<br>(0.0000 < 0.05) | I(0)                 | 30.9737<br>(0.0136<0.05) | I(0)                 | -                          | -                    |

**Source:** Authors' Compilation from E-view 9.0

LLC = Levin, Lin and Chu Test

IPS = Im, Pesaran and Shin W – Stat

ADF FISHER = Augmented Dickey Fuller Fisher Chi – Square Test

PP FISHER = Philip Peron Fisher Chi – Square Test

Table 2 shows that average days to sell inventory, inventory conversion period and net profit ratio are integrated of order zero or are stationary at level while inventory turnover is integrated at first difference.

**Table 3: Regression results**

| S/N | Attributes          | Values   |
|-----|---------------------|----------|
| 1   | R-squared           | 0.785935 |
| 2   | Adjusted R-squared  | 0.653801 |
| 3   | F-statistic         | 5.786209 |
| 4   | Prob. (F-statistic) | 0.001285 |
| 5   | Durbin-Watson stat  | 2.252177 |

**Source:** Researchers' Compilation from E-view, 9.0

Table 3 shows that the  $R^2$  is 0.785935 which is about 79%. The  $R^2$  is used to explain the goodness of fit. Therefore, since it is about 79%, it implies that about 79% change in the net profit ratio is explained by the independent variables, and the higher the  $R^2$  the better fit the independent variables. Since the F – statistics is 5.786209 which is greater than 2.5 and the probability value is 0.001285 is <0.05. This shows that the model is significant and has a high goodness of fit. The Durbin – Watson stat is approximately equal to two (2) indicating the absence of autocorrelation.

**Table 4: Test of Hypothesis One**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | -0.159686   | 0.108363   | -1.473628   | 0.1447 |
| ADI      | 0.000182    | 0.000785   | 4.232100    | 0.0171 |

**Source:** Author's Compilation from E-View 9.0

H<sub>01</sub>: Average days to sell inventory has no significant effect on net profit of listed manufacturing firms in Nigeria

Table 4 shows the t-statistic of ADI as 4.232100 > 2.0 with a probability of 0.0171 < 0.05, hence the null hypothesis is rejected and concluded that Average days to sell inventory has positive and significant effect on the net profits of listed manufacturing firms in Nigeria.

**Table 5: Test of Hypothesis Two**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | -0.159686   | 0.108363   | -1.473628   | 0.1447 |
| IT       | 0.025604    | 0.007406   | 3.457115    | 0.0009 |

**Source:** Authors' Compilation from E-View 9.0

H<sub>02</sub>: Inventory turnover has no significant effect on net profit of listed manufacturing firms in Nigeria

Table 5 shows the t-statistic of IT as 3.457115 > 2.0 with a probability of 0.0009 < 0.05, hence the null hypothesis is rejected and concluded that inventory turnover has positive and significant effect on the net profit of listed manufacturing firms in Nigeria.

**Table 6: Test of Hypothesis Three**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | -0.159686   | 0.108363   | -1.473628   | 0.1447 |
| ICP      | -0.000866   | 0.000917   | -0.945055   | 0.3476 |

**Source:** Authors' Computation from E-View 9.0

H<sub>03</sub>: Inventory conversion period has no significant effect on net profit of listed manufacturing firms in Nigeria.

Table 6 shows the t-statistics of ICP as -0.945055 < 2.0 with a probability of 0.3476 > 0.05, the null hypothesis is accepted and concluded that inventory conversion period has a negative and significant effect on the net profit of listed manufacturing firms in Nigeria.

### Discussion of findings

The regression results reveal that average days to sell inventory has a positive and significant impact on net profit of listed manufacturing firms in Nigeria based on the premise that the t-statistics of ADI which was 4.232100 was greater than 2.0 while the probability of the t-statistics of 0.0171 was less than 0.05. This implies that, all things being equal, a unit increase in ADI will lead to a 0.16% decrease in the net profit of the firms studied. In the same vein, if the ADI of these firms decreases their net profit will also increase by the same magnitude, though there are other economic variables that might act to negatively influence the net profit margin of manufacturing firms such as changes in exchange rate, inflation rate, and economic tumult as seen in the recent covid-19 pandemic. This discovery agrees with the findings of Mshelia (2015). The author researched on the effects of inventory management on the performance of small and medium scale enterprises in Nigeria and found out that inventory

management showed significant and positive relationship with performance of SMEs in Kaduna at 5% level of significance. Kairu (2015) further corroborates the result of this study he investigated the role of strategic inventory management on performance of manufacturing firms in Kenya. The author's finding was that inventory control had a positive influence on performance of manufacturing firms.

The study also discovered that inventory turnover has positive and significant effect on net profit of listed manufacturing firms in Nigeria based on the premise that the t-statistic of IT which was 3.457115 was greater than 2.0 while the probability of the t-statistic of 0.0009 was less than 0.05. For inventory turnover to have a positive and significant impact on net profit of listed manufacturing firms in Nigeria implies that the number of times inventory is sold or used in a time period in such companies is high. This result is in line with the findings of Effiong, and Oti, (2012). A business with a high inventory turnover is likely to better react to market demands and have lower carrying costs per item, making it more profitable than one with a low inventory turnover. This discovery is in agreement with the findings of Lyndon & Paymaster (2016), who revealed a positive relationship between inventory cost management and profitability of brewery firms in Nigeria.

Finally, the study discovered that inventory conversion period has no significant effect on net profit of listed manufacturing firms in Nigeria as the t-statistics of ICP of -0.945055 was less than 2.0, while the probability of the t-statistic of 0.3476 was greater than 0.05. This result indicates that the number of days between the date that raw materials of these companies are acquired and the date that a product converted to finished goods is high. It shows that it takes longer time for that process to happen. Decreasing an inventory conversion period improves a company's cash conversion cycle, which, in turn, reduces the organization's working capital requirements and increases its cash flow which invariably promotes net cash flow. This study is in agreement with the findings of Panigrahi (2013), who examined the relationship between inventory conversion period and profitability of top 5 cement firms in India from 2001-2010 using regression analysis. The results of the study established a negative significant linear relationship between the inventory conversion period and profitability.

## **Conclusion and Recommendations**

Findings from this study show that ADI, IT along sides other non-financial variables influence the financial performance of firms positively while ICP inversely affects the financial performance of these firms. The study concludes that inventory management significantly affects the financial performance of listed manufacturing firms.

The following recommendations are made: that the Managers of manufacturing firms should adopt current inventory forecasting techniques that will help them estimate the desirable inventory levels to hold at any given period of time as this will always ensure a low average days to sell inventory; manufacturing firms should adopt a perpetual inventory control system as described in IAS 2, this will enable them track inventories in real-time; that manufacturing firms should ensure availability of raw materials, segment and prioritize customers by size, importance or risk profile and implement proactive collection procedures, which should help to reduce overdue invoices, while defining roles and responsibilities across production, sales, customer service and credit control will also help to accelerate the resolution of any disputes thereby decreasing inventory conversion period

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