Inventory management and financial sustainability: insight from quoted manufacturing firms in Nigeria

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Abstract: This study analysed inventory management emphasis and its possible effect on financial sustainability of Nigerian quoted manufacturing firms. The study made use of the research design, ex-post facto. The study focused on manufacturing firms and ten were purposely sampled from the Nigerian Stock Exchange. Secondary data were obtained from the annual financial reports of the selected manufacturing firms over a ten-year period, 2008–2017. Descriptive statistics and inferential statistics (panel regression) were the analyses conducted for the study. The findings which emanated from the analysis indicated inventory turnover having a significant positive effect on financial sustainability. The conclusion of the study was that inventory management influences financial sustainability significantly. It also recommended that management of companies should develop and implement policies that will ensure good inventory management and also consider the policies of their suppliers and customers purchase pattern in order to have sustainable financial performance.

Keywords: inventory management; inventory turnover; ITO; financial sustainability; return on asset; ROA; debt to equity; earning capacity; relative solvency ratio; RSR; manufacturing companies; Nigeria.

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1 Introduction

The business world is presently characterised by competition resulting from globalisation, increased technological advancement and consumer awareness. Hence, organisations that are driven towards large scale growth are striving to remain relevant in the market at all times by promoting its product availability and quality as customers can easily divert their patronages to competitors. The major concern of any organisation in this modern and competitive world (both in the private and public sector) is to remain financially sustainable by optimising the use of resources.

According to Gorton (2016), as business environment continues to evolve so does the need for organisational survival, financial sustainability and stability. The author also observed that financial sustainability is one of the major problem faced by many manufacturing firms around the world and despite many organisations around the world making massive profits in one year after three or four years, same companies run into bankruptcy and eventual liquidation which has created a massive problem to both stakeholders and management. Enyi (2011) noted that coming afloat is one thing, and

remaining afloat is another different thing. This has led to the shift from organisational profitability and performance to financial sustainability and long term growth of manufacturing firms both in Nigeria and globally (Adamu, 2016).

Sustainability entails the ability of an institution to engage in more activities which enable it to adapt to its dynamic environment via ecological and social, and its economic environment, and also the control of every possible potential risk. Between the year 2000 to 2010, quite a good number of the manufacturing companies (850) had fizzled away or put an end to their production temporarily, and this is as a result of poor financial sustainability (Imhanzenobe, 2020).

Maverick (2016) stated that long-term solvency and liquidity are part of the financial indices used to correctly assess the long-term sustainability and financial status of a firm.

As highlighted by Chalotra (2013) the management of inventory is essential for an organisation's survival and the main objective of the management of inventory is for organisations to have sufficient quantities of the right quality of items available for production and to meet customer needs, even while minimising the related inventory holding and ordering costs. Although many organisations implement inventory management practices with a major focus on cost reduction, a major goal which enhances the financial performance of a firm, and also firms have employed techniques for a suitable inventory management practice which has led to the enhancement of its liquidity, profitability, solvency and operational efficiency (Tungo, 2014).

Swaleh and Were (2014) asserts that the industrial revolution of the 21st century changed the inventory management process and practices and this is because efficiency, effectiveness and mass production became the main focus of businesses. In view of attaining financial sustainability and stability, many manufacturing organisations globally have embraced modern inventory management practices and systems in their manufacturing process. These inventory management practices which are management driven include just-in-time (JIT), total quality management (TQM), materials requirement planning (MRP), flexible manufacturing systems (FMS) and enterprise resource planning (ERP), also some recent studies explains that inventory management is influenced by the marketing strategies and demand of a firm's product (Christopher, 2016). Modern inventory management techniques like supply chain management, electronic data interchange and economic order quantity has been adopted by various manufacturing firms around Europe, Asia and US.

However, despite the increasing attention given to inventory management, the manufacturing firm's performances in Nigeria have been very disappointing (Eneje et al., 2012). From the news flash of Central Bank of Nigeria (CBN) (2018), the purchasing managers index which indicates the manufacturing sector's economic status, showcased a decrease in performance of the industrial sector from the time between 2014 to 2016.

The decrease in the production of the industrial sector was evidenced from the index that was below 50-point index from June 2014 through November 2016. Also there were a lot of challenges the sector faced, from deficit infrastructure, limited foreign exchange, lack of inventory and raw materials, and also the skyrocketed bank charges too.

The Manufacturers Association of Nigeria (MAN) (2017) reported that as much as 40% of inventory held by Nigerian manufacturing firms are financed by trade loans and bank loans with the goods pledged as security. The capital structure and level of gearing of Nigerian manufacturing firms have become a major dilemma to management and many authors have argued on the right level of gearing that a firm can maintain to ensure financial sustainability. Currently, a lot of local industries in Nigeria are functioning

under unfavourable conditions like security issues, lack of funding access, bank loans with high rate of interest, to mention a few, which has always hindered growth in the manufacturing sector (Akinlo, 2011).

As highlighted by Anene (2014), many manufacturing firms in Nigeria are having liquidity problems because of poor management of working capital in which inventory is a major constitution and this has increased financing cost and interest expenses paid to finance providers by manufacturing firms in the country. Inventory ties up substantial amount of a firm's capital and the efficient management of the inventory would ensure the survival and sustainability of the firm

Several empirical studies have been embarked upon on inventory management on aspects of financial performance but no research has been done on inventory management and financial sustainability. A lot of researchers looked at inventory management and its effect on financial performance (Karadag, 2018; Amahalu et al., 2018; Wanjira and Njagiru, 2018; Bawa et al., 2018; Mulindabigwi and Mulyungi, 2017), likewise inventory management and its effect on profitability (Otuya and Eginiwin, 2017; Nirujah, 2015). To the best of our knowledge, there hasn't been any research on inventory management and its effect on financial sustainability.

To address this gap and also contribution to empirical literature, this study looked at inventory management and its effect on financial sustainability of Nigerian manufacturing firms.

The rest of the paper is organised into several sections thus; Section 2 looks at the literature review where the main concept of the study was discussed and other related studies reviewed accordingly. Section 3 discussed the methodology adopted for the study, variable description and model specification. Section 4 discussed the data analysis including descriptive and inferential analysis and also the discussion of the results accordingly. Section 5 and the last have the conclusion of the study and recommendation discussed accordingly.

2 Literature review

This study is based on resource-based theory. This theory was adopted based on its relevance to inventory management and financial sustainability. Resource-based theory states that a firm owned resource places it at a competitive advantage over other firms. The ability of a firm to device practices to manage and increase its turnover will enable it achieve financial sustainability and by so doing achieve competitive advantage. The management of inventory should be of great importance to manufacturing firms since it ties up substantial amount of organisations capital and this will lead to improved efficiency and productivity. Ashok (2013) viewed inventory as those stock of items which a firm makes available for sale in various parts such as raw material, stock in process and finished stock which make up the product.

Muhayimana (2015) further stated that one of the major resources of a firm is its inventory. Furthermore, its cost includes holding, ordering and processing cost. The mismanagement of inventory will lead to financial distress on the part of manufacturing companies, even if there is shortage or surplus as a result of the mismanagement. Luthubua (2014) pointed out that there is a down side to holding too much inventory as it can tie down capital if the goods are held for too long and also the associated cost of holding inventory such as warehouse cost and insurance which will lead to increase in

expenses and result in profit reduction. Wanjohi et al. (2013) opines that effective management of inventory is reflected in the inventory turnover (ITO) of an organisation. The ratio which indicates the number of times a company sold and replaced its stock of goods at a period of time is what Adeyemi and Salami (2010) referred to as ITO. The ITO ratio measures the success of managers in inventory management. Owoeye et al. (2014) pointed out that inventory management entails keeping record of material quantity and the number of stock which should be present at a particular point in time, also supplying data for the manufacturing process and the bookkeeping record as well.

Kwadwo (2016) stated that the practice of inventory management can be explained to be the way of utilising the stock of goods invested upon, which a firm decides to adopt. The practice of inventory management is characterised by recording of stock of goods available, monitoring the inventory level, analysing future demands as well as knowing the best time to reorder more stock of goods. An effective system of inventory management is one that reduces the overall cost of managing inventory and also having high ITO (Muhayimana, 2015). According to Ogbo et al. (2014), Inventory management has an important part it plays in the survival and growth of manufacturing companies in Nigeria because an inefficient and ineffective inventory management system will only result to loss of customer and decline in sale of stock.

The inventory management practice to be employed by every company solely varies in relation to the objective, nature of product, information technology, the type of customers, supplies and external environment. There are practices such as JIT, economic order quantity, activity-based costing, bar coding to mention a few. As regards this study, ITO was used as a measure of inventory management.

The Association of Local Governments in Australia (2015) described financial sustainability as the ability of a firm to manage its finance to enable them meet up with their current and future spending commitment as well as cover short term economic shocks (Sontag-Padilla et al., 2012). According to Banafa et al. (2015) corporate firms have some measures of financial sustainability which are profitability, liquidity, efficiency and solvency. Most firms have had tough time since the start of the economic recession and the finances of many are fragile. With this, the firms are having depleted reserves and reduction in operational capacity and most are not financially sustainable.

According to Khidmat and Rehman (2014) and Saleem and Refigure (2013), the major measure of solvency of an organisation is by using ratio analysis from its financial statements. The solvency ratios signify if a company can meet its debt obligations both now and in the future. The financing of a firm's long and short term funding which is done majorly through equity and debt finance is regarded as the firm's financial leverage. Kaur (2010) defined liquidity as the ability to convert assets to cash easily with little risk of losing the principal.

As stated by Okoye et al. (2017), to measure firm financial sustainability, return on asset (ROA) which is a profitability ratio indicates the efficiency and profitability of a firm in the utilisation of its assets. Stakeholders such as investors, managers and some other financial analysts use this profitability ratio to determine the efficiency of a firm in generating earnings from the assets at its disposal. The Enyi's relative solvency ratio (RSR) according to Enyi (2018) measures working capital available vis-à-vis the need of an entity's operation and productivity. More so, a firm's RSR helps in predicting every tendency of insolvency and possible future occurrence.

Multiple researchers have covered the discuss of inventory management. Amahalu et al. (2018) studied inventory management and its effect on financial performance. Expo

facto research design was employed and panel data was obtained from listed brewery firms from 2010–2016, from Nigerian Stock Exchange. Stata 13 was used to analyse the data through ordinary least square regression. The study found out a positive significant effect between inventory conversion period and ROA.

With similar results, Wanjira and Njagiru (2018) evaluated inventory management and its effect on financial performance of SMEs in Kenya. A sample of 100 SMEs were used and primary and secondary data was obtained from them. Using SPSS to analyse the data, the finding of the study revealed inventory management having a significant positive effect with financial performance. Results were also similar for Mulindabigwi and Mulyungi (2017) in Rwanda, Ashraf and Muhannad (2017) in Jordan and Ahmed (2016) in Nigeria.

In contradiction, Bawa et al. (2018) using expo facto research design and secondary data obtained from 14 listed manufacturing companies in Ghana within 2007–2016 found out an insignificant negative effect between inventory conversion period and ROA. The study recommended that practices such as JIT be adopted for effective inventory management. Results were also similar for Otuya and Eginiwin (2017) in Nigeria and Nirujah (2015) in Sri Lanka.

Imhanzenobe (2020) studied financial practices and its effect on financial sustainability of manufacturing companies in Nigeria. Secondary data was collected from 17 Nigerian manufacturing companies for a period of nine years (2008–2016). The result of the findings revealed that the financial practices (asset turnover, net profit margin, current ratio, Tobin's Q) all have a positive effect with sustainable growth rate. Karadag (2018) investigated inventory management, cash and receivables and their association with financial performance. Primary data was sourced through the administration of questionnaire to 188 SMEs from Turkey. The findings which emanated from the study revealed receivables and cash having a positive association with financial performance. Kroes and Manikas (2017) examined inventory stickiness and its effect on firm performance. Secondary data was obtained from manufacturing firms. The findings of the study revealed inventory stickiness having a negative effect with firm performance. Steinker et al. (2016) investigated inventory management during the period of financial distress. The study used secondary quarterly data obtained from US manufacturing firms for a period of 13 years (1995–2007). The result revealed inventory management having a positive effect with an improved performance. Magerakis (2020) studied the effect of cash holding on financial crisis from Greece. Secondary data was collected from financial statement of non-financial firms for a period of 12 years (2003–2014). The study found out that Greece firms held more cash in financial crisis period, and also capital expenditure having a positive effect with cash-to-sales ratio. Rossi et al. (2016) studied corporate characteristics and its impact on the financial decisions of agro-food micro companies (SMEs) in Italy. Secondary data was extracted from AIDA database of Bureau van Dijk and also from the survey of companies with a target of CFOs and managers in charge of capital budgeting. 80 interviews out of 153 interviews were conducted, which got 52% response rate. The conclusion drawn out of the study was that unlike the sophisticated financing decisions employed by decision makers with formal accounting training, the ones without formal accounting training made use of overdrafts and bank loans. Also, company size has a positive influence in manager's financial decisions. In other words, there is an increased influence with an increased company size.

Rossi (2016) carried out a study on age and its effect on firm performance. The review paper studied several related works in different categories such as firm age and

innovation performance, longevity and financial performance, and longevity and organisation change. He pointed out that there exist mixed results on the relationship and also the importance of conducting a study on the different categories to enable a better exploration of the subject. The mediating effect of green innovation on the link between ESG and financial performance was carried out by Chouaibi et al. (2021). Secondary data was obtained from 90 German companies and 115 UK companies for a period of 15 years (2005–2019). Using a panel linear regression, the result of the findings depicted a positive influence between ESG practices and financial performance, and also green innovation having a mediating effect on the link between ESG and financial performance.

3 Methodology

The study examined inventory management and its effect on financial sustainability of Nigerian quoted manufacturing firms. The research design adopted was expo facto and secondary data was obtained from the financial statement of ten quoted manufacturing firms, consisting of five consumer and five industrial goods in Nigeria covering a period between 2008–2017.

Inventory management was measured by ITO whereas financial sustainability was measured by the fourth root of the product of ROA, debt to equity ratio (DER), earning capacity (EC) and RSR.

In analysing the data for study, descriptive and inferential statistics were employed. Panel OLS regression was used in determining the significance and effect between the dependent and independent variables.

3.1 Measurement of variable

3.1.1 Inventory turnover

The number of times a company's stock of goods are sold out or been replaced within a period of time is regarded as inventory management. It measures the success of a manager in the management of its stock in trade.

Formula:

$$\frac{\text{Revenue}}{\text{Average inventory}}$$

3.1.2 Financial sustainability

Banafa et al. (2015) noted that profitability, solvency, liquidity and efficiency of a firm are basically the measures of financial sustainability.

Formula:

$$= \sqrt[4]{ROA \times DER \times EC \times RSR}$$

3.1.3 Return on asset

ROA measures the profitability of a firm vis-à-vis its total assets. Managers, investors and financial analysts are able to dictate the firm's management efficiency in generating revenue through the utilisation of its assets.

Formula:

$$Profit\ before\ interest\ and\ tax\ /\ total\ asset$$

3.1.4 Debt to equity ratio

Debt to equity indicates the amount of debt funding a company uses in financing its assets vis-à-vis its equity funding.

Formula:

$$\frac{Debt}{Equity}$$

3.1.5 Earning capacity

The recovery of the operating cost of an entity and also having markup for the sustenance of future operations and growth is regarded as earning capacity ratio. The earning capacity highlights if a firm has been efficient in utilising input or resources (Enyi, 2018).

Formula:

$$\frac{P}{T-P}$$

where

P profit before tax

T turnover (operating income)

$T-P$ total operating cost inclusive interest and depreciation.

3.1.6 Relative solvency ratio

The Enyi's RSR according to Enyi (2018) measures the availability of a firm's working capital in relation to the productive capacity and operational needs of an entity. More so, a firm's RSR helps in predicting every tendency of insolvency and possible future occurrence.

Formula:

$$104P(A-L)/T(T-P)$$

A current assets

L current liability

P profit before tax

T turnover.

3.2 Model specification

In examining the independent variable and its effect on the dependent variable, a model was developed as follows:

$$FS_{it} = \alpha_0 + \beta_1 ITO_{it} + \mu_{it}$$

whereas

FS financial sustainability $(\sqrt[4]{ROA \times DER \times EC \times RSR})$

ROA return on asset

DER debt equity ratio

EC earning capacity

RSR relative solvency ratio

ITO inventory turnover

μ error term

β_1 coefficient of independent variables

α_0 constant.

Subscript $_{it}$ represent the time period for the cross-section of companies.

4 Data analysis

4.1 Interpretation

Table 1 shows the mean, which is a measure of central tendency, standard deviation which is a measure of dispersion, computed to show the distribution of the variables. The following are the highlights of Table 1.

Table 1 Descriptive statistic output

Variables	*Mean*	*Std. dev.*	*Min*	*Max*
ITO	7.5506	3.6036	1.0918	19.0151
ROA	0.1026	0.0866	–0.1277	0.2857
DER	1.2031	1.4899	–9.4585	5.2690
EC	0.8921	1.0788	–0.4960	5.7214
RSR	–2.8063	35.9376	–347.2918	48.3551

Source: Researcher's study, 2019

ITO shows 7.506 as the mean value. This implies on the average that, the sampled quoted manufacturing firms turn over their inventories 8 times. The maximum value of 19.0151 and the minimum value of 1.0918 shows that the number of times the sampled manufacturing firm's turnover inventories differ over the years, this further suggests that

as some companies are having high ITO some were also recording very low ITOs. In addition, the standard deviation of 3.6036 which is the measure of volatility or the degree of change suggests that the ITO of the sampled quoted manufacturing firms was relatively constant overtime.

ROA shows 0.1026 as the mean value. This implies on the average that, the sampled quoted manufacturing firms have a ROA of 1.03%. The maximum value of 0.2857 and minimum value of –0.1277 shows that the ROA of the sampled quoted manufacturing firms differ over the years. In this regard, the ROA standard deviation of 0.0866 depicts that there is no much volatility of the ROA values from its mean as the standard deviation is not up to 1.

Debt-equity ratio (DER) shows 1.2031 as the mean value. This implies that on the average, the sampled quoted manufacturing firms have a DER of 1.2. The maximum value of 5.2690 and minimum value of -9.4585 shows that the DER of the sampled quoted manufacturing firms differ over the years. In addition, the standard deviation of 1.4899 suggests that the ROA of the sampled quoted manufacturing firms were relatively constant overtime.

Earning capacity (EC) shows 0.8921 as the mean value. This implies on the average that, the sampled quoted manufacturing firms have an earning capacity of 89%. The maximum value of 5.7214 and minimum value of -0.4960 shows that the earning capacity of the sampled quoted manufacturing firms differ over the years. In addition, the standard deviation of 1.0788 suggests that the earning capacity of the sampled quoted manufacturing firms were relatively constant overtime.

RSR shows –2.8063 as the mean value. This implies on the average that, the sampled quoted manufacturing firms have a RSR of –2.8 which signifies that most of the manufacturing firms did not pass the relative solvency test measure of liquidity. The maximum value of 48.3551 and minimum value of –347.2918 shows that the earning capacity of the sampled quoted manufacturing firms differ over the years. In addition, the standard deviation of 35.9376 suggests that the RSR of the sampled quoted manufacturing firms relatively differed overtime and very volatile in the RSR data.

Table 2 Correlation

	ITO	*ROA*	*DER*	*EC*	*RSR*
ITO	1.000000	0.513190	0.081089	0.400580	0.013248
ROA	0.513190	1.000000	0.243317	*0.619270*	*–0.153326*
DER	0.081089	0.243317	1.000000	–0.073424	0.007174
EC	0.400580	*0.619270*	–0.073424	1.000000	–0.215589
RSR	0.013248	*–0.153326*	0.007174	–0.215589	1.000000

Source: Researcher's study, 2019

Table 2 shows the correlation that exists among the variables. It is also used to detect any multicollinearity problem that exists among the variables. It is observed that the least correlation is –0.15 which is found to exist between RSR and ROA, whereas the highest correlation is 0.62 which exists between ROA and earning capacity (EC). According to Olaoye and Okeke (2020), 0.8 or 80% is the benchmark for multicollinearity test.

$$FS_{it} = \alpha_o + \beta_1 ITO_{it}$$

$$FS = 0.4438 + 0.320ITO_{it}$$

The estimation on Table 3 is the regression analysis which showed that ITO has a significant positive effect on financial sustainability (FS). The coefficient sign of $\beta_5 = 0.0320 > 0$ revealed this. This result aligned with *a priori* expectation of the study as expected that a positive effect will exist between ITO and financial sustainability. Also, coefficient of 0.0320 implies that every increase in the unit of ITO, will result to a boast in financial sustainability (FS) by 0.0320 units. Furthermore, the t-statistics of 0.025 implies that at 5% level of significance, it is statistically significant.

Table 3 Regression

Variable	*Coefficient*	*Std. error*	*t-stat.*	*Prob.*
Constant	0.4438	0.1476	3.01	0.003
ITO	0.0320	0.0140	2.28	0.025
R-squared		0.0161		

Note: Dependent variable: FS

Source: Researcher's study, 2019

4.2 Discussion of findings

This study examined inventory management and its effect on financial sustainability of quoted manufacturing companies in Nigeria. The regression output depicted inventory management having a significant positive effect on financial sustainability with t-statistics of 0.025 and coefficient of 0.0320. It also means that one unit increase in ITO will improve the financial sustainability of Nigerian manufacturing companies by 0.0320. This finding is in line with the works of Ahmed (2016) who found out a positive effect between inventory management and profitability. Similar results were also found in Mulindabigwi and Mulyungi (2017) in Rwanda and Ashraf and Muhannad (2017) in Jordan. The findings of this research contradicts that of Bawa et al. (2018) which discovered an insignificant negative effect between inventory conversion period and ROA and likewise findings of Otuya and Eginiwin (2017) in Nigeria and Nirujah (2015) in Sri Lanka.

The research findings also throw light on the relevance and accuracy of the resources-based theory which posits that the ability of a firm to device practices to manage and increase its turnover will enable it achieve financial sustainability and by so doing achieve competitive advantage.

5 Conclusions and recommendation

The study sought to evaluate inventory management and its effect on financial sustainability. Secondary data were obtained from ten quoted manufacturing companies in Nigeria for a period of 10. The findings from the study provide relevant empirical evidence by showing inventory management having a significant positive effect on financial sustainability of Nigeria quoted manufacturing firms. Our findings imply that inventory optimisation is an indispensable part of a complete as well as successful turnaround corporate strategy and financially distressed organisation ought to always

view this strategy as a means to prevent bankruptcy. However, this study will be significant to managers of firms as they'll understand the need to manage their inventory efficiently in other to achieve financial sustainability.

The recommendation of the study is for management of companies to develop and implement policies that will ensure good inventory management and also consider the policies of their suppliers and customers purchase pattern in order to have sustainable financial performance.

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