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Firm Size as a Mediator between Inventory Management and Performance of Nigerian Companies

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Abstract:- This study employed a dissimilar methodology in investigating the mediating role of firm size on the relationship between inventory management and performance of non-finance companies publicly listed on the Nigerian Exchange Group. The study was hinged on just-in-time paradigm while variables of inventory management and financial performance were obtained from the annual reports and accounts of 76 non-finance companies. The results obtained from the structural equation modelling showed that size of firm mediates on the relationship between inventory management and financial performance measures of the study and it was found to be significantly positive. On the basis of this, it was suggested that companies need to strengthen inventory management practices as well as increasing their sizes. The size of companies can be increased by way of investing more funds in their asset structures.

Keywords:- *Return On Asset; Firm Size; Return On Equity; Inventory Management; Return On Capital Employed.*

JEL Classification: M10; M19

I. INTRODUCTION

Realistically, limited resources have always been a major problem to most organizations to the extent that it tends to daunt management from realizing their goals/objectives. Hussain, Nguyen, Nguyen, Nguyen and Nguyen (2023) opined that for organizations to realize their goals/objectives which include profit maximization, growth, sustainability, among others, they must be able to effectively and efficiently manage their inventories. Thus, to maintain and/or maximize profitability or performance, management of organization would strive to ensure the prevention of material wastages, time, discouraging under-utilized labour force among others (Odiri, 2015; Odiri, 2016a; Odiri, 2016b; Odiri & Akpocha, 2020).

In a developing economy like Nigeria, non-finance companies play a fundamental role in promoting economic prosperity; however, most of these non-finance companies have been ineffective and inefficient in their inventory management. In other words, non-finance companies find it cumbersome to install enhanced inventory management methods and practices aimed at enhancing financial performance (Abbas & Isiaka, 2021; Odiri, 2020; Odiri, 2019; Odiri, 2015; Odiri,, 2014a; and Odiri, 2009). According to Umenzekwe, Okoye and Aggreh (2021), inventory management is widely acknowledged as a vital means of augmenting performance, quality products, product positioning, intra and inter-organizational network as well as inter-firm relationship.

Nguyen, Pham and Nguyen (2020) asserted that inventory management leads to enhanced competitive capability and market share for organizations, particularly those that use raw materials. Impliedly, inventory management is an essential mechanism for controlling goods used for production, stored/exchanged for money (Kimaiyo & Ochiri, 2014; Hiram & Willy, 2017).Supporting the above view, Oseifuah (2018) emphasized that inventory management aids companies to avoid holding too much or too little inventories. The major rationales why organisations engage in inventory management are to discourage incurring numerous costs like storage, pilferage, spoilage, obsolescence and the overall aim which is to ensure that goods are available as at when necessary for the companies to efficiently function (Odiri & Ideh, 2020; Alsoboa, Al-Ghazzawi & Joudeh, 2015; Odiri, 2014a, and Odiri,, 2014b).

Inventory management is the mechanisms put in place by a company in ensuring that the current assets of the organization are efficiently converted to cash or account receivables within the stipulated period (Chan, Ngai & Moon, 2017). According to Adekola, Samy and Knight (2017), inventory management is the lifeblood or controlling nerve of an organization without which it cannot run smoothly. Similarly, Uwaoma and David (2017) contended that a well-planned inventory system can probably contribute considerably to a company's profitability or financial performance. Hence, the efficient utilization of raw materials or resources, which underscores the import of inventory management and financial performance, is highly demanded in a competitive business environment (Ajayi, Segun & Taiwo, 2017; and Odiri, 2015).

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Odiri(2016) opined that performance is an issue of concern to all organization.Attaining increased performance makes an organization a going-concern and makes it increase in size; for an organization to be seen as a going-concern, it may depend on how inventories are managed (Akyuz & Erkan, 2010) and more also, the largeness of companies (Okoro & Ekwueme, 2021). Thefew empirical studies had prompted the researchers in assessing if size of firm mediates the link between inventory management and financial performance in Nigeria.

II. REVIEW OF RELATED LITERATURE

➢ *Inventory Management*

Inventory according to Abbas and Isiaka (2021) is quantity of supplies of raw materials, work in progress and finished goods stored for use by an organization as the need arises. Inventory entails all cycle in the production process starting from raw form to the final form so as to ensure that the production process is adequately complete and met (Kimaiyo & Ochiri, 20214). Inventory management is theprocess of maintaining stock level of a given material in order to incur least-cost coherent with management goals and objectives.

Nguyen, et al (2020) see inventory management as a set of standards or policies for controlling and monitoring inventory levelsand in determining the levelsof inventories that should be maintained, how inventory orders should be made and when inventory should be replenished. Odiri (2015) opined that there are certain key issues that must be taken into cognizance in inventory management: re-order level and periodic review system of inventories. First, re-order level involves verifying quantities of inventories via the use of bin system. Most organizations operate re-order level that triggers-off the required replenishment order. Second, periodic review system is like physical counting method in which inventories are cross-checked/updated from time to time or at fixed intervals.

➢ *Firm Size*

Notably, shareholders (both existing and potential) largely depend on a number of factors in assessing the viability of companies. Fundamental among these factors include but not limited to the firm size, age, industry type, financial position (i.e. whether a firm is levered or not, etc.) (Ekinci & Poyraz, 2019). According to Ironkwe and Adee (2013), there are opportunities for a firm that grow in size to operate in bigger environment.

In views of Onyali and Okafor (2018), size of the firm is related to industry-profitability; hence, larger firms are more probable to have more layers of management, increased level of performance, greater number of units, increased specialization of skills, etc than smaller ones. When linked to the stakeholder's theory, larger firms should have more stakeholders than smaller ones; this is why larger firms should have improved performance as well as efficient inventory management systems.Research has found a link between size of the firm and inertia; inertia can be caused by constraints or actions associated with size of the firm; this measured size of firm using logarithm of total assets.

➢ *Financial Performance*

In the management literature, several metrics have been used to measure performance: non-financial and financial. While non-financial performance entails metrics such as efficiency, effectiveness, innovation, customers' and employee satisfaction, quality products and service, etc, financial metrics include but not limited to ROA, ROE, ROCE, Tobin's Q, EPS and DPS (Okoro & Ekwueme, 2021); this study was hinged on financial performance metrics.Financial performance refers to the benefit emanating from an organization's shares and from its operations. It can be gauged using profitability ratios (EPS, ROA, ROE, BVPS, etc).

In this study, three(3) financial performance metrics were employed: return on asset, return on equity and return on capital employed. First, return on asset (ROA) is a financial ratio that evaluates the operating income to total asset; second, return on equity (ROE) is a ratio of profit after tax to equity; and third, return on capital employed (ROCE) evaluates profit after tax to shareholders' capital. There is a consensus that most organizations focus on the financial performance metrics while little attention is given to the non-financial performance metrics. On the basis of the above, the study was aimed at examining if firm size mediates the link between inventory management and non-finance firms' performance in Nigeria.

➢ *Theoretical Anchorage*

The Just-in-Time (JIT) paradigm formed the theoretical anchorage, which according to Odiri(2015) is a strategy or tactics that is designed to improve financial performance of companies by reducing excessive inventory together with all associated costs. Alsoboa, et al (2015) noted that JIT model is hinged on certain principles which include waste eradications, uninterrupted and improvements in product and service quality, employees' participation in planning and implementation of companies' strategies among others. Thus, JIT model offers organizations mechanisms aimed at encouraging waste minimization and increased performance or productivity.

JIT model promotes the right items, quality and quantity of products. Impliedly, if JIT model is efficiently implemented, there is the likelihood that financial performance and production quality will be enhanced while other avoidable costs linked with production will be discouraged (Abbas, et al, 2021; Chan, et al, 2017; Odiri, 2015). The relevance of JIT model to this study is that when companies are able to efficiently implement JIT, it would result to increased performance. On the basis of the review, a conceptual model was designed to evaluate the mediating role of firm size (*FSIZE*) on the relationship between inventory management (*INVGMT*) and financial performance.

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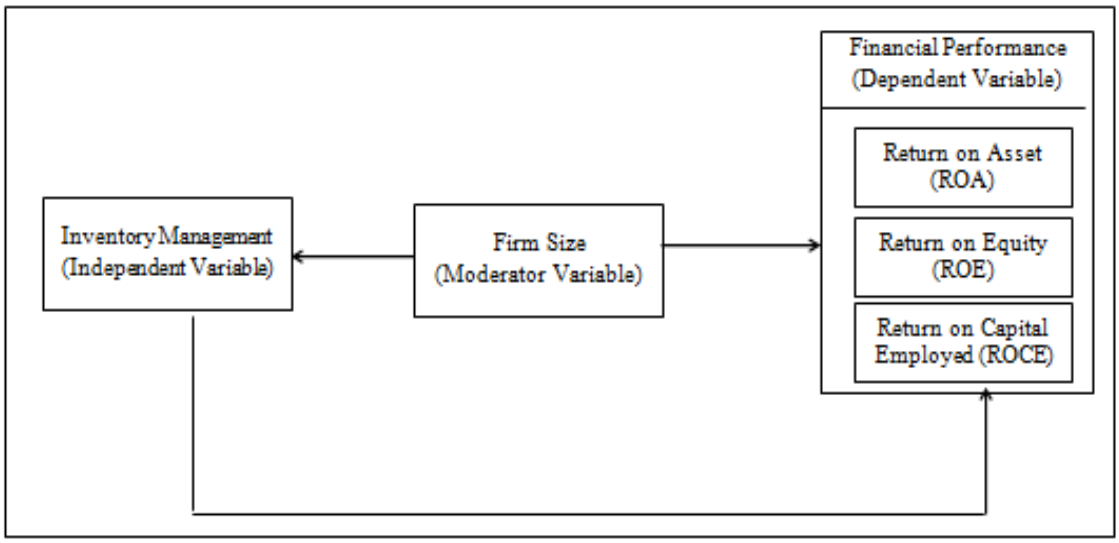

Fig 1: Conceptualized Model by Researchers (2024)

III. METHODOLOGY

In this study, *ex-post facto* design was employed; the data originates from yearly accounts of the non-finance companies on the Nigerian Exchange Group (NGX) from 2013-2022. The study population consist all publicly quoted non-finance companies on NGX as of December 31st, 2022. As of December 31st 2022, there were about one hundred and sixty-one (161) non-finance companies publicly quoted on the NGX (NSE, 2022). Sample size of 115 was obtained while inclusion and exclusion criterion was used in selecting 76 companies out of 115 non-finance companies. The choice of the criterion was to enable the researchers select non-finance companies that had disclosed dataset required for the investigation. Firm size (moderator variable); inventory management (independent variable); and performance (independent variable –ROA,ROE, and ROCE) were used.

Data obtained were analyzed via descriptive (mean, median, standard deviation, minimum value, maximum value, kurtosis, skewness, Pearson product moment correlation), diagnostic (Cameron and Trivedi's Decomposition test) and inferential (structural equation modelling) statistical tools. Hence, a disaggregated empirical model was estimated as follows:

$$FPerf = f(invmgt, fsize) \quad \text{eq. 1}$$

Substituting equation (1) into equation (2), we have:

$$ROA, ROE, ROCE = f(invgmt, fsize) \quad \text{eq. 2}$$

Equation (2) was disaggregated as follows:

$$ROA = f(invgmt, fsize) \quad \text{eq. 3}$$

$$ROE = f(invgmt, fsize) \quad \text{eq. 4}$$

$$ROCE = f(invgmt, fsize) \quad \text{eq. 5}$$

Integrating the element of cross-sectionalism of the research design, the following models were estimated:

$$ROA_{ij} = f(invgmt_{ij}, fsize_{ij}) \quad \text{eq. 6}$$
$$ROE_{ij} = f(invgmt_{ij}, fsize_{ij}) \quad \text{eq. 7}$$
$$ROCE_{ij} = f(invgmt_{ij}, fsize_{ij}) \quad \text{eq. 8}$$

Where i is individual companies in Nigeria; stating equations 6-8 in econometric forms, the following empirical models were estimated:

$$ROA_{ij} = \delta_0 + \delta_1 invgmt_{ij} + \delta_2 fsize_{ij} + u_{it} \quad \text{eq. 9}$$
$$ROE_{ij} = \delta_0 + \delta_1 invgmt_{ij} + \delta_2 fsize_{ij} + u_{it} \quad \text{eq.10}$$
$$ROCE_{ij} = \delta_0 + \delta_1 invgmt_{ij} + \delta_2 fsize_{ij} + u_{it} \quad \text{eq.11}$$

Where: *ROA:* return on assets; *ROE:* return on equity,*ROCE*: return on capital;*invgmt*: inventory management; *fsize*: firm size; u_t: stochastic error-term; α_o: regression intercept; $\alpha_1$and α_2: regression coefficients.

Table 1: Variables Operationalisation

S/N	Variable(s)	Measurement(s)
1	Return on Asset	Profit after tax scaled by total asset at time *t*
2.	Return on Equity	Profit after tax scaled by equity at time *t*
3.	Return on Capital Employed	Profit after tax scaled by shareholders capital at time *t*
4.	Inventory management	Natural logarithm of material storage costs at time *t*
5.	Firm Size	Natural logarithm of total asset at time *t*

Source: Compiled by the Researchers (2024)

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IV. RESULTS

Table 2: Summary of Descriptive Statistics

Statistics	ROE	ROA	ROCE	INVMGT	FSIZE
Mean	1.3063	6.8941	6.5754	9.7487	7.0893
Median	2.6500	7.7800	6.7800	9.1100	7.0050
Standard Deviation	16.973	20.818	17.531	13.510	12.862
Skewness	-1.1571	21.074	0.0394	1.8050	0.1398
Kurtosis	4.6410	4.2802	4.4632	7.3361	2.5995

Source: Authors' Compilation, (2024)

Table 2 showed the summary of descriptive statistics for inventory management and the performance of non-finance companies in Nigeria from 2013-2022. First, return on asset (*ROA*) showed the highest mean (6.8941) in terms of performance; this was accompanied by return on capital employed (*ROCE* = 6.5754) and lastly by return on equity (*ROE* = 1.3063). ROA showed the highest dispersion (20.818) while ROE showed the least dispersion (1.973). The standard deviation values for the financial performance variables (*ROE, ROA, ROCE*) revealed that the sampled non-finance companies' performance are alike.

Furthermore, inventory management (*INVMGT*) and firm size (*FSIZE*) showed means of 9.7487 and 7.0893 respectively. The mean value for *INVGMT* revealed that the non-finance companies recorded an efficiency ratio in their storage costs (13.5years) which is above 12years. The skewness for *ROE* (-1.1571) is negative; indicating that it moved in opposite direction from the other variables while the other variables (*ROA, ROCE, INVMGT, FIZE*) moved in the same direction, given the positive signs attached to the skewness values. Kurtosis for *FSIZE*is greater than 3 (mesokurtic curve), implying that firm size would lead to increased tremendous positive financial performance while the other variables (*ROE, ROA, ROCE*, and *INVMGT*) are less than 3 (leptokurtic curve), indicating that these variables would lead to greater chance of extreme negative financial performance.

Table 3: Pearson Correlation

Statistics	ROE	ROA	ROCE	INVGMT	FSIZE
ROE	1.0000				
ROA	0.0658	1.0000			
ROCE	0.0923	0.0979	1.0000		
INVGMT	0.0524	0.0769	0.0630	1.0000	
FSIZE	0.1606	0.0247	0.1748	0.0631	1.0000

Source: Authors' Compilation, (2024)

It was shown (Table 3) that *ROE, ROA, ROCE* are positively correlated with FSIZE and *INVGMT*. This indicates that there is positive relationship between the mediating, independent and dependent variables of the study. The correlation results showed that the mediating and independent variables were not perfectly correlated since none of the coefficients exceed 0.8 (Gujarati, 2003 as cited in Okoro, 2014; Okoro & Ekwueme, 2021; Imasuen, Okoro & Yahaya, 2022).

Table 4: Variance Inflation Factor (VIF)

Statistics	VIF	1/VIF
FSIZE	1.00	0.9960
INVMGT	1.00	0.9960
Mean VIF	1.00	

Source: Authors' Compilation, (2024)

Mean VIF is 1.00 and is less than accepted mean VIF of 10;an indication that there is absence of multicollinearity in the model of inventory management and financial performance in Nigeria.

Table 5 Ramsey RESET Test

F-Ratio	=	16.02
Probability F	=	0.0000

Source: Authors' Compilation, (2024)

The resultsin Table 5 showed that the F-ratio is 16.02 and F-Prob. is 0.0000; an indication that the powers of the fitted values have no relationships which serve to describe that the models have no omitted variables; thus the model of inventory management and financial performance do not suffer from omitted variables or functional misspecification.

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Table 6a: Fixed/Random Effect Regression

Estimator(s)	***Fixed Effect (FE)***		***Random Effect (RE)***	
Variable(s)	***Coefficient***	***Probability***	***Coefficient***	***Probability***
INVGMT	0.0767 (1.70)	0.0900	0.0788 (1.75)	0.0810
FSIZE	3.3558 (4.73)	0.0000	3.2393 (4.58)	0.0000
_cons.	-23.539 (-4.58)	0.0000	-22.742 (-4.44)	0.0000
F-value	12.18			
F-Prob.	0.0000			
R^2 (within)	0.0316		0.0316	
R^2 (between)	0.1808		0.1742	
R^2 (overall)	0.0297		0.0297	
Wald Ch2(4)			23.11	
Ch2 Prob.			0.0000	
Hausman	Chi2(2) = 4.02		Prob>Chi2= 0.6940	

Source: Authors' Compilation, (2024)

Using the random effect(RE) result as shown in Table 6a, it was found that the coefficients are 0.0788(INVGMT) and 3.2393(FSIZE), suggesting that the non-finance companies in Nigeria inventory management and firm size will lead to approximately 7.9% and 32.4% changes in return on asset (*ROA*). While *INVGMT* was statistically insignificant for both FE (t =1.70; Prob.. = 0.0900 > 0.05) and RE (z = 1.75; Prob. = 0.0810 > 0.05), *FSIZE* was statistically significant for both FE (t =3.3558; Prob.= 0.0000 < 0.05) and RE (z = 3.2393; Prob. = 0.0000 < 0.05) at 5% significance level.

Hausman specification test (Prob>Chi2= 0.6940 > 0.05) suggests that RE is more efficient than FE; hence, it was found that *INVGMT* and *FSIZE* jointly predict ROA at approximately 2.97%; this implies that there are other variables that predict ROA which were not captured in the model. Also, it was revealed that *INVGMT*and *FSIZE*jointly affect ROA (Wald Ch2 = 23.11; P-value=0.0000 < 0.05).

Table 6b: Fixed/Random Effects Regression

Estimator(s)	***Fixed Effect (FE)***		***Random Effect (RE)***	
Variable(s)	***Coefficient***	***Probability***	***Coefficient***	***Probability***
INVGMT	2.4679 (2.26)	0.0240	2.3593 (2.17)	0.0300
FSIZE	15.827 (0.92)	0.3550	13.950 (0.82)	0.4140
_cons.	-139.24 (-1.12)	0.262	-124.4 (-1.01)	0.315
F-value	2.87			
F-Prob.	0.0575			
R^2 (within)	0.0076		0.0076	
R^2 (between)	0.3553		0.3527	
R^2 (overall)	0.0068		0.0068	
Wald Ch2(4)			5.16	
Ch2 Prob.			0.0758	
Hausman	Chi2(2) = 3.24		Prob>Chi2= 0.7610	

Source: Authors' Compilation, (2024)

It was shown that (Table 6b) coefficients are 2.3593 (INVGMT) and 13.95 (FSIZE), suggesting that non-finance companies' inventory management and firm size will lead to approximately 23.6% and 140% changes in *ROE*. While *INVGMT*is significant for both FE (t =2.26; Prob.. = 0.0240 < 0.05) and RE (z = 2.17; Prob. = 0.0300 < 0.05), *FSIZE* was insignificant for both FE(t =0.92; Prob.= 0.3550 > 0.05) and RE (z = 0.82; Prob. = 0.4140 > 0.05) at 5% significance level.

Hausman specification test (Prob>Chi2= 0.7610 > 0.05) suggests that RE is more efficient than FE; hence, it was shown that *INVGMT* and *FSIZE* jointly predict ROA at approximately 0.68%; this implies that there are other variables that predict ROA which were not captured in the model. Also, it was revealed that *INVGMT* and *FSIZE* jointly insignificantly affect ROE(Wald Ch2 = 5.16; P-value = 0.0758>0.05).

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Table 6c: Fixed/Random Effects Regression

Estimator(s)	***Fixed Effect (FE)***		***Random Effect (RE)***	
Variable(s)	***Coefficient***	***Probability***	***Coefficient***	***Probability***
INVGMT	0.0966 (2.08)	0.0380	0.0964 (2.08)	0.0380
FSIZE	3.7732 (5.16)	0.0000	3.651 (5.01)	0.0000
_cons.	-21.504 (-4.06)	0.0000	-20.634 (-3.91)	0.0000
F-value	14.87			
F-Prob.	0.0000			
R^2 (within)	0.0383		0.0383	
R^2 (between)	0.2781		0.2757	
R^2 (overall)	0.0361		0.0361	
Wald Ch2(4)			28.25	
Ch2 Prob.			0.0000	
Hausman	Chi2(2) = 5.17		Prob>Chi2= 0.9942	

Source: Authors' Compilation, (2024)

It was shown that (Table 6c) the coefficients are 0.0964 (INVGMT) and 3.651 (FSIZE), suggesting that INVGMT and FSIZE will lead to approximately 9.64% and 37% changes in *ROCE*. Also, *INVGMT* was significant for both FE (t =2.08; Prob.. = 0.0380 < 0.05) and RE (z = 2.08; Prob. = 0.0380 < 0.05)and *FSIZE* FE(t =5.16; Prob.= 0.0000 < 0.05) and RE (z = 5.01; Prob. = 0.0000 < 0.05) at 5% significance level.Hausman specification test (Prob>Chi2= 0.9942 > 0.05) suggests that RE is more efficient than FE; hence, it was found that *INVGMT* and *FSIZE* jointly predict ROCE at approximately 3.61%; this implies that there are other variables that predict ROCE which were not captured in the model. Also, it was found that *INVGMT* and *FSIZE* jointly significantly affect ROCE (Wald Ch2 = 28.25; P-value = 0.0000 <0.05).

Table 7: Fit Indicators of INVGMT, FSIZE and ROA, ROE, ROCE

Fit Indicator(s)	**Coefficients**	**Decision**
GFI	0.92	Significant
AGFI	0.93	Significant
CFI	0.93	Significant
RMR	0.07	Significant
RMSEA	0.06	Significant

Source: Authors' Compilation, (2023)

The structural equation Modelling(SEM) results indicated that measurement modelsoffer absolute fit to the data (GFI=0.92; AGFI=0.93; CFI=0.93, RMR=0.07, and RMSEA = 0.06) since the fit indicators (GFI, AGFI, and CFI) beat the threshold of 0.9, while RMSEA is less than the threshold of 0.08. This implies that approach used in modelling the mediating effect of FIZE between INVGMT and financial performance fits properly.

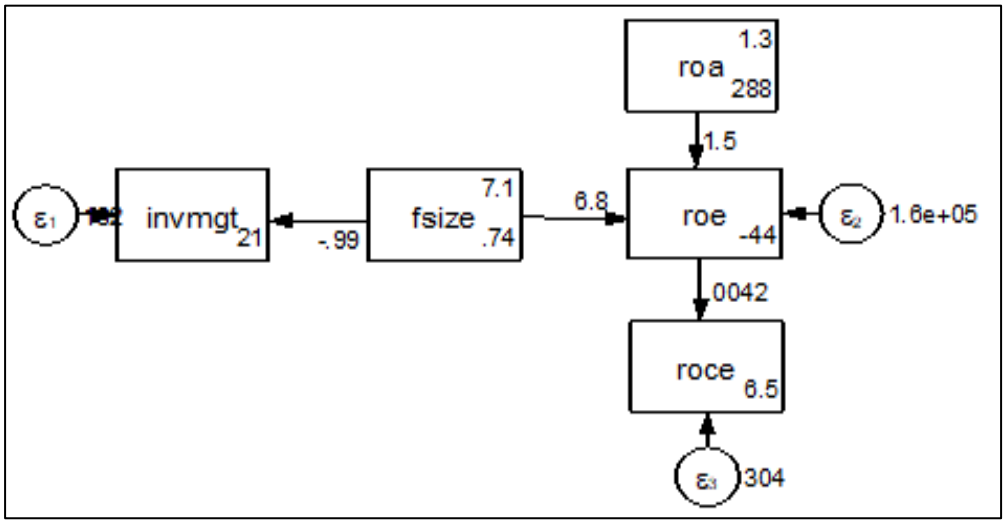

Fig 2: Path of SEM
Source: Conceptualized by Authors (2024)

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The SEM result (figure 2) was supported; implying that FSIZE mediates the relationship between INVGMT and financial performance significantly. In terms of the coefficients, ROA is 1.5, ROE (0.0042) while ROCE is 0.304. Theabove results thus showed that INVGMT and FSIZE are vital metrics enhancing performance of non-finance companies.

In reality, enhancing the financial performance of companies has been a fundamental issue for both the board of directors and management due to the role the board and management play in devising strategies aimed at reducing excess inventory and other associated costs; a view that is supported by the JIT model. In the views of Mwai, Memba and Njeru (2018), the performance of companies relates to improvement in financial variables like ROA, ROE, EPS, Tobin's Q, etc) as well as non-financial variables (operational efficiency, service quality,innovation, etc.).

There has been limited literature that had assessed whether size of firm mediates on the link between INVGMT and performance of non-finance companies in Nigeria.Aligning the study with JIT model, it was shown that while INVGMT positively affects the performance of companies, it was also found that FSIZE plays a mediating role on the link between INVGMT and the performance of non-finance companies in Nigeria. Findings of this study in part, corroborate with the views of Hussain, et al (2023); Abbas and Isiaka (2021); and Nguyen, et al, (2020)who found that inventory management significantly affects the performance.

V. CONCLUSION AND RECOMMENDATIONS

In the literature, there is lack of empirical studies that had investigated whether size of the firm mediates on the relationship between inventory management and the performance of publicly quoted companies in Nigeria. Using the SEM results, we concluded that FSIZE plays a major role in mediating the relationship between INVGMT and the performance of publicly quoted companies in Nigeria. On the basis of the above, it was recommended that there is a need for companies to strengthen their inventory management practices as well as increasing their sizes. In addition, there is the need for companies to have more assets by way of investing more funds in their asset structure.

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