

## **Intangible Asset Innovation And Firm Value Of Quoted Manufacturing Firms In Nigeria**

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### **Abstract**

Despite that globally, investments in intangible assets have become widespread among firms, in Nigeria, its applicability is limited because traditional accounting practices do not recognize intangible assets on the balance sheet. It is against this backdrop that this paper investigated intangible asset innovation and firm value of quoted manufacturing firms in Nigeria. This objective was achieved using Pooled Mean Group (PMG), Mean Group (MG) and Dynamic effect of Panel Autoregressive Distributed Lag (ARDL) model. The results the long-run and short-run estimates of the panel ARDL shows that expenditures on research and development (ROA), human capital development (HCD), advertisement (ADVT) are significant and positively related to quoted manufacturing firms' value proxied by return on asset (ROA). Based on this finding, the paper recommends that Nigerian manufacturing firms should intensify investment on intangible assets to enhance its values especially return on assets.

**Keywords:** *Intangible Asset, Innovation, Firm Value, Manufacturing Firms.*

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### **I. Introduction**

The role of intangible assets on the success and survival of firms in every economy is well documented in extant literature. Thus, many established literatures have shifted emphasizes from traditional financial statements that is premised on tangible assets to intangible asset innovation accumulated through improved research and development, advertising, and human capital development (Hyeon & Younglum, 2020). Therefore, in a dynamic, globalized, and competitive business environment, firms try to acquire strategic assets that serves as fulcrum for generating and preserving their competitive advantage. One of such strategic assets is intangible assets innovation. This intangible asset innovation is a crucial driver of knowledge business environment (Olaoye & Akingbade, 2020). Consequently, to remain competitive and relevant, besides the relative importance of tangible asset, firms have to engage in modern strategies and programs in pursuit of market flexibility and development made possible via intangible asset innovation (Hejazi, Ghamberi & Alipour, 2016).

Furthermore, developments in the knowledge driven economy have engender pressure on firms to use intangible assets efficiently as a major factor of value chain creation (Nuryaman, 2015). Accordingly, intangible assets are important strategic resources as they are tremendously fundamental in generating value chain (Gamayuni, 2015)

Globally, investments in intangible assets have become widespread among firms in USA, Europe as well as Japan. In this regard, the case of supply value chain of Apple and Pfizer, Coke, and Amazon as well as Walmart critically demonstrate the importance of intangible assets in improving value chain (Noradiva, Parastou & Azlina, 2016). Also, Organization for Economic Cooperation and Development (OECD) (2017), posits that global investment on intangible assets have surpassed those in traditional capital like machineries, equipment, and building. Thus, for firms to sustain existence, it must add value to its assets as a firm which cannot create value through intangible asset innovation is purposeless (Kraaijenbrick & Spender, 2014). Thus, as global economy is knowledge – based with emphasis on investment on intangible asset innovations with immense future benefits is fast moving, Nigerian manufacturing firms' value built significantly on financial reporting of tangible fixed asset appear uncompetitive.

The Nigerian economy is an emerging one with several firms competing for survival. However, manufacturing firms are one of such firms with numerous challenges as traditional, conventional, and tangible assets requirements are grossly inadequate to bring out the needed value in the sector (Ibadin & Oladipupo, 2015). Hence, lack of investment on intangible asset innovation is critical to manufacturing firms' value. Nonetheless, it is difficult to document intangible asset innovation effect on manufacturing firms' value because traditional

accounting practices do not recognize most internally – generated intangible assets on the balance sheet. However, spendings on research and development (R& D), human capital development, advertising which are intangibles are significantly linked with firms' value like return on assets, return on equity among others (Quresh & Siddiqui, 2020). Also, while investment on tangible assets like structures, facilities and equipment continue to be the key factors at manufacturing firms' production process, its relative relevant has decline over time as importance of intangible asset innovation are at front burner (Hadi & Ghazail, 2018). It is in a bid to contribute to this body of knowledge that this paper investigated intangible asset innovation and firm value of quoted manufacturing firms in Nigeria. Following the introduction, the rest of this paper is structured thus: Section 2 reviews relevant extant studies, Section 3 outline the methodology employed in the study, Section 4, deals with discussions of the results while Section 5 encompasses the conclusion and policy implications of the findings.

## **II. Literature Review**

### **Theoretical Review**

**Firm value theory:** This firm value theory developed by Modigliani and Miller (1958) serves as the theoretical underpinning of this paper. The firm value theory posits that market value of a firm determine its earning power as well as the risks underlying its assets. Also, that firms' value is independent of the way firms choose to fund their investment. The core of the firm value lies in its value creation implying that firms should try and add value to their assets to actually sustain them. Thus, when firms fail to create value, their existence are purposeless. To the firm value theory, intangible asset innovations are exclusively treated as expenses when they are included on the balance sheet of firms. Finally, that firms' value is an efficient measure of value creation that culminates to return on asset and return on equity.

### **Empirical Literature Review**

Extant empirical literatures on intangible asset are basically divided into three strides. One stride is the existing studies like Ibadin and Oladipupo, 2015 that centers on the determinants of intangible. The other stride of existing studies like Olaoye and Akingbade, 2020, Zarroug and Mawih, 2017 are more disposed on discussing intangibles asset and financial performance and lastly, existing studies such as Hyeon and Younglum, 2020 concentrate mainly on intangible asset and Small and Medium Enterprises (SMEs).

To put it briefly, Olaoye and Akingbade (2020) looked into the financial performance of Nigeria's deposit money institutions and their intangible assets. The study, which used panel ordinary least square regression, discovered a positive but negligible correlation between the profitability of Nigeria's deposit money institutions' intangible assets. The analysis concluded that in order to increase profitability, the company needed increase its investment in intangible assets.

The impact of intangible assets on the financial strategies and performance of the business value in the Omani industrial sector listed on the Muscat Securities Market was examined by Zaroug and Mawih (2017). The study found that asset turnover has an impact on the Tobin's Q model in the Omani industrial sector by using Tobin's Q as the estimation technique. Additionally, that a firm's Tobin's Q value is satisfactory if it has a high level of leverage debt and intangible assets, as these indicators are associated to high levels of the firm. Moreover, the value of enterprises and intangible assets are positively correlated. The research suggested that Omani industrial businesses increase their investments in intangible assets in light of these findings.

Ibadin and Oladipupo (2015) investigated the factors that influence the declaration of intangible assets in Nigerian listed firms. Using a fixed effect model, the study discovered that voluntary disclosure of intangible assets related to implementation was the least disclosed intangible asset while voluntary disclosure of intellectual capital was the most disclosed. In addition, the study suggested that rewards be instituted in order to promote greater voluntary disclosures.

Hyeon and Younglum (2020) investigated small and medium-sized enterprises (SMEs) in Korea and the investment in intangible assets. SMEs' profitability and value are positively and significantly impacted by intangible assets or resources, according to a study that used the hierarchical regression technique. Also, the greatest impact on the profitability and value of SMEs is caused by spending or investing in advertising. The study suggested that, in order to help SMEs achieve their desired profit targets, they should enhance their investments in intangible assets in light of these findings.

The effect of intangible assets on the market value, dividend policy, capital structure, profitability, and efficiency of technology companies was examined by Quresh and Siddiqui (2020). Using the Simultaneous Equation Model, the study discovered that intangible assets significantly reduce both return on equity and return on asset. In light of this, the study suggested that in order to improve the quality of earnings, fair value methodologies should be used when assessing the worth of assets.

Despite the empirical rigors in the reviewed extant studies, the influence of intangible asset innovation especially on value of the quoted manufacturing sector in Nigeria was rarely covered by previous studies. Also, most of the existing studies reviewed are limited to either country or region but intangible asset is not region or

country related but to sector as different sector have their special requirements. The paper decided to settle on manufacturing firms' sector as it has a high degree of intangibles compared to other sectors and have more significant effect on value.

### III. Methodology

#### Research Design

This study used an ex post facto research design that makes use of secondary time series data. This research method was chosen because it is systematic empirical research, meaning that independent variables are not controlled or manipulated in any manner because the study's situation already exists or has already occurred. Since the data on the variables for intangible assets and the listed manufacturing businesses' value are clearly established in yearly reports, the researcher is unable to change the independent variables. That being said, the investigator is able to design or fabricate an environment that will produce the necessary data for examination. Ex post facto research is significant primarily because it represents a practical method to behavioural science research. This is due to the fact that experiments frequently do not occur in real-world settings and may require various forms of artificial research environments.

#### Method of Data Collection

Data on the variables of interest to study were sourced via annual reports of quoted manufacturing firms in Nigeria. The panel data on variables of interest to the study such as return on asset, return on equity as dependent variables and expenditure on research and development, human capital development and advertisement as independent variable were gotten from the quoted manufacturing firms' annual reports for various years.

#### Technique of Data Analysis and model specifications

Pooled Mean Group (PMG), Mean Group (MG), and Dynamic Effect of Panel Autoregressive Distributed Lag (ARDL) model were utilised to accomplish the study's goal. This approach is justified by the fact that each manufacturing firm's separate regression is estimated using the Mean Group (MG) and Poole Mean Group (PMG) in the Panel Autoregressive Distributed Lag (ARDL) model, and the coefficients are estimated as the unweighted mean of the estimated coefficients for each manufacturing firm. While this permits all coefficients to be heterogeneous in both the short and long term, having a sufficiently large data set is a prerequisite for the validity and consistency of this technique. Therefore, in this study, the pooled Mean Group was employed to ascertain the long and short run relationship among the different intangible and possibility of heterogeneous dynamic issue in quoted manufacturing firms' value in Nigeria. Furthermore, correlation coefficients matrix were used to test for multicollnearity among the variables of interest to the study, descriptive statistics was utilized to ascertain the behavior of the variables employed in the estimation and panel unit root was carried out using Pesaran and Shin, Breitung and Levin Linchu (1995).

The panel ARDL (pq) model in error correction is specified thus:

$$C_t = \alpha_1 + \beta_i C_{t-1} + \gamma_i X_{t-1} + U_{it} \dots\dots\dots(1)$$

Where i= individual manufacturing firm and i=1,2,3.....n. Then the long run parameter  $U_{it}$  becomes

$$U_i = Y_i / 1 - \beta_i \dots\dots\dots(2)$$

Given equation (2), the MG estimator for the panel ARDL becomes.

$$U_i = 1/\beta \sum_{i=1}^n U_i \dots\dots\dots(3)$$

Equation (3) shows how the Mean Group (MG) formulated by Pesaran and Smith (1996) and Pooled Mean Group (PMG) model propounded by Pesaran (1999) is further, specified thus.

$$\Delta ROA_t = \alpha^{ROA} + \sum_{i=1}^K \beta_i^{ROA} \Delta ROA_{t-i} + \sum_{i=1}^K \gamma_i^{ROA} \Delta R\&D_{t-i} + \sum_{i=1}^K \delta_i^{ROA} \Delta HCD_{t-i} + \sum_{i=1}^K \theta_i^{ROA} \Delta ADVT_{t-i} + \varepsilon_t^{ROE} \dots\dots\dots(4)$$

Where ROA = Return on Asset, R&D = Expenditure on research and development, HCD = Expenditure on human capital development, ADVT = Expenditure on advertisement and  $\varepsilon_t$  = Error term

#### IV. Presentation And Discussions Of Results

##### Correlation Matrix

To ascertain the degree of relationship between the indicators of intangible assets and quoted manufacturing firms' value, the study conducted correlation coefficient matrix and the result is presented on table 1

**Table 1. Correlation Matrix Result**

Variable	ROA	R& D	ADVT	HCD
ROA	1.00			
R& D	0.723*	1.00		
ADVT	0.630**	.273*	1.00	
HCD	0.481**	.410*	0.623**	1.00

Source: Author's Computation, 2024 Note \* =1% and \*\* = 5% level of significance

The correlation matrix was employed to ascertain if significant relationship exists among the variables of interest to the study at 1% and 5% level of significant respectively. The result revealed that all the variables are significant and are positively related to quoted manufacturing firms' value proxied by return on asset (ROA) with highest degree association observed between research and development (R&D) and quoted manufacturing firms' value. Furthermore, the correlation result matrix showed that none of the inter – relationship among the variables used in estimation is more than 0.7. This implies that there is absence of multicollinearity problem among the variables employed in the estimation.

##### Panel Unit root test.

To determine the order of integration of the variables of interest and the suitability of the chosen estimation technique, the study conducted panel unit root test and the result is presented on table 2.

**Table 2 Panel data unit test Result**

	Level			First difference			Order of Integration
	Pesaran and Shin	Biretung	Levin, Liu and Chu	Pesaran and Shin	Biretung	Levin, Liu and Chu	
ROA	-0.50	-3.63**	-4.05**	-16.64**	-10.50**	-14.87**	1(0)
R&D	-1.07	-1.02	-1.32	-3.60**	-2.01	21.07**	1(1)
HCD	-0.86	-5.02	-0.03	-22.30**	-17.50**	22.10**	1(1)
ADVT	-5.82**	-3.01**	-6.03**	-28.01**	-18.60**	-26.01**	1(0)

Source: Author's Computation, 2024 Note \* =1% and \*\* = 5% level of significance

The results of the panel root test showed that only return on assets (ROA) and expenditure on advertisement (ADVT) were stationary at levels while expenditure on research and development (R&D) and expenditure on human capital development after first difference became stationary at 5% level of significance giving a mix order of integration purely 1(O) and 1(I). The finding has two statistical implications. First, it implies that possible long run relationships exist among the variables of interest in the study. Second, panel data analysis using Ordinary Least Square is grossly inappropriate. Therefore, the most appropriate estimation technique for the study becomes panel Autoregressive Distributed Lag (ARDL) model. Besides, the order of integration of the variables allows for the estimation of both short run and long run relationship along with error correction coefficient.

##### Panel ARDL Results

To ascertain the influence of tangible assets innovation proxied by expenditures on research and development (R&D), human capital development (HCD) and advertisement (ADVT) on quoted manufacturing firms' value proxied by return on asset (ROA). The result is presented on table 3 and 4

**Table 3 Result of Long run Panel ARDL**

ROA (Dependent Variable)	Poole Mean Group	Mean Group	Dynamic fixed effect
Independent Variables	Long run	Long run	Long run
R&D	0.091** (3.24)	0.017*** (1.89)	0.004** (3.83)
HCD	0.032** (4.02)	0.040** (2.95)	0.083** (4.02)
ADVT	0.051** (6.91)	0.063* (4.81)	0.003** (6.20)

Constant	352**	241**	127**
	(2.24)	(2.34)	(2.61)
Observations	122	122	122
Hausmann test <sup>1</sup>			2.69(0.74)
Hausmann test <sup>2</sup>			0.15(0.99)

**Source: Author’s Computation, 2024 Note \* =1%, \*\* = 5% and \*\*\* =10% level of significance**

Table 3 contains the long run panel ARDL coefficients for the model. The result of the long-run estimates of the panel ARDL shows that the coefficients of all variables of interest to the study are correctly signed and are in line with the anticipated expectations. This is because all the variables used in the estimation such as expenditures on research and development (ROA), human capital development (HCD), advertisement (ADVT) are significant and positively related to quoted manufacturing firms’ value proxied by return on asset (ROA). That is a 1% increase in research and development (R&D), human capital development (HCD) and advertisement (ADVT) bring about 0.4%, 8.3%, and 0.03% increase in quoted manufacturing firms’ value proxied by return on asset.

The implication of this finding is that while investment on tangible assets like structures, facilities and equipment continue to be the key factors at manufacturing firms’ production process, its relative relevant has decline over time as importance of intangible asset innovation in enhancing quoted manufacturing firms’ value is at front burner. These findings confirmed the findings of Zaroug and Mawih (2017) as well as Hyeon and Younglum (2020) who found a positive relationship between intangible assets and firms’ value. Furthermore, the Hausmann test confirms the consistency and efficiency of both Pooled Mean Group and Mean Group in the estimation of the panel dynamic effect.

**Table 4. Result of Short run Panel ARDL**

ROA (Dependent Variable)	Poole Mean Group	Mean Group	Dynamic fixed effect
Independent Variables	Long run	Long run	Long run
ECM	-0.83** (0.02)	-0.068** (0.051)	-0.083 (0.011)
R&D	0.035** (8.62)	0.042* (6.86)	0.006** (2.43)
HCD	0.036** (2.16)	0.083** (2.81)	0.041** (3.42)
ADVT	0.083** (3.61)	0.032*** (2.02)	0.041** (6.02)
Constant	352** (2.24)	241** (2.34)	127** (2.61)
Observations	122	122	122
Hausmann test <sup>1</sup>			2.69(0.74)
Hausmann test <sup>2</sup>			0.15(0.99)

**Source: Author’s Computation, 2024 Note \* =1%, \*\* = 5% and \*\*\* =10% level of significance**

Research and development (R&D), human capital development (HCD), and advertisement (ADVT) have short-term significant contributory effects or influences in fostering quoted manufacturing firms' value in Nigeria, according to the results of the Pooled Mean Group (PMG), Mean Group (MG), and dynamic fixed effect. The error correction coefficient for all three short run models is negative and substantial, supporting the validity of these findings.

## V. Conclusion And Policy Recommendations

The study concludes that investment on intangible assets especially on research and development, human capital development and advertisement is highly effective in influencing quoted manufacturing firms’ value in Nigeria. Based on this, the study therefore recommends that Nigerian manufacturing firms should intensify investment on intangible assets to enhance its values especially return on assets.

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