

Towards Capital Commitment in Research and Development, and Future Value of Nigerian Listed Manufacturing Companies: The Economic Value Added Approach

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Abstract:- This study considered how the future value of listed manufacturing companies in Nigeria can be enhanced through optimal capital commitment in research and development (R&D); to achieve economic value added (EVA). It was considered that when adequate research is not done before capital investment, the appraisal techniques are not sufficient to support the capital project. This becomes a major problem to the Nigerian manufacturing companies. The study adopted the quantitative panel methodology of the *expost facto* and correlational research design, where secondary data were extracted from the Nigerian Stock Exchange fact books for the period, 2010 – 2016. Eighty three (83) manufacturing companies listed in the Stock Exchange during this period were taken as the population of the study. The sample size was 69. The study answered three research questions and tested three hypotheses at 0.05 level of significance. Multiple and simple regression analyses were used on the data collected, to find the relationship between the independent and dependent variables for the seven years. The findings revealed that research and development (R&D) had a significant relationship with economic value added (EVA). Based on the findings and conclusion, it was recommended that management of manufacturing companies should ensure that more of research and development is embarked on by manufacturing companies since it will enhance profitability, expansion and technological development.

Keywords:- Capital Commitment, Research and Development, Listed Manufacturing Companies, Economic Value Added.

I. INTRODUCTION

By research and development (R&D), we refer to activities of basic and applied research conducted by the management, aimed at discovering solutions to problems or creating new products. Capital commitment refers to the employment of capital resources after capital expenditure decision was made. Capital decision-making means selecting the best act from the many available alternatives of capital projects under a given situation. Hilton, Maher and Selto (2012) posit that capital assets refer to the

resources, other than human, which a firm procures and utilizes for productive or profit-earning purposes. Manufacturing companies are in business to make profit, the more reason sound investment decisions must be made before funds are committed, to avoid losses.

When a capital asset is acquired by means of purchase or construction, a company is said to be making capital commitment in non-current assets (Hornigren, 2014). Non-current assets are assets that provide service over a period in the long term. Rich, Jones, Heitger, Mowen, and Hansen (2010) opine that firms have at their disposal, the opportunity and the desire to invest in projects and assets that have long-term disposition. The desire to have new production systems or acquire new plants and equipment and engage in production of new products or research and development, are issues of capital investment decisions which transcends to capital commitment. Oyedepo (2016) opined that decision to invest in a manufacturing system should consider a flexible decision mechanism, or a traditionally fixed decision system. Whichever is adopted by management must be seen to enhance the addition of economic value to the concern.

In embarking on research and development as a capital item, the marginal efficiency of capital, which is the rate of discount which equates the price of a fixed capital asset with its present discounted value of expected income, should be considered. According to Wikipedia, Marginal efficiency of capital (MEC) is the net rate of return that is expected from the investment in additional capital. It is also called marginal productivity of capital, which is the annual percentage return on the last additional unit of capital. It is calculated as the expected pay-off, when the cost of inputs and depreciation are considered, and it is influenced by expectations about future input cost and turnover. MEC and capital outlays are necessary in a firm's decision on investment project. MEC must be higher than the cost of capital, r , for investment to be worthwhile. This is so, as the PV of future returns to capital needs to be higher than the cost of capital, C_k . Therefore, $PV > C_k$, that is $MEC > r$. This is where capital budgeting is paramount. (Sheehan, 2009).

Management must realize that all decisions about future investments involve estimates and forecasts. Prudent capital commitment decisions must involve sensitivity analysis to ascertain the impact of all risk and uncertainties on the firm's future investments. For economic value added to occur, it is believed that there must be an optimal capital commitment by the management. This is the more reason strong feasibility studies through research are needful before funds are committed to execute a project, which is the development that will eventually add economic value to the firm (Uwah & Akabom, 2016).

II. STATEMENT OF PROBLEM

Before capital is committed in the manufacturing process, pains should be taken to understand the process, either in continuous or new manufacturing concerns. The nature and operations of the product lines, the market where the goods will be on sale and indeed the competition in the market must be researched on. It is imperative that the R&D department must be enhanced to have the capacity to undertake painstaking and holistic study, knowing that the funds to be committed are normally huge and the capital expenditure decision on manufacturing, irreversible. The benefits of optimal capital commitment will be seen in the firm in the measure of economic value added, not immediately, but in the distant future.

The problem would arise if the activities of Research and Development are played down by management, thinking that operations could continue the old way, or for new manufacturing companies, trying to use the rule of thumb in their operations. The problem of not enhancing the activities of the R&D department would show in not maximizing the long-term return on investment, unable to make ultimate use of the human and physical resources available, inability to maintain a balanced R&D portfolio and risk control, and the inability to foster a favourable climate for creativity and innovation. Some management may feel that R&D has a relative large cost centre which does not relate directly with immediate sales, and as such, might be tempted to cut it and quickly raise the net profit report. This is accounting reality which will likely sell out the company's long-term value, in economic terms. If the company's goals are to be achieved and the economic value added realized, things would need to be done differently, according to the outcome of researches. It is imperative that the company sets up a robust R&D department which would ensure reliable information for decision input through the use of adequate logic. This would give a long term solution as a result of provisions made for environmental and envisaged technological changes, as they would affect the firm.

The implications of these problems would show in low productivity, hence, lower profitability, which can cause the collapse of business empires where billions of shareholders' funds were sunk into. An early end to the business does not align with the going-concern concept of accounting, and the realization of stakeholders' wealth

maximization objective cannot be realized, hence no value addition to the firm.

This research built on the works of earlier researchers, such as McConnell & Muscarella (1985); Agboh (2011); Boasson, Cheng & Boasson (2012); Hertz (2016) and others who worked on "corporate capital expenditure decisions and the market value of the firm"; "utilization of capital budgeting as an optimal tool for investment analysis in manufacturing companies"; "applying modern portfolio theory to financial and capital budgeting decisions"; and "risk analysis in capital investments" respectively. Gap was created in the studies earlier made on the subject-matter of capital commitment and the relationship they have with the long term value of manufacturing companies. This research is done in order to fill this gap and to know if economic value added (EVA) can be achieved through optimal capital commitment from the outcome of research and development.

III. OBJECTIVES OF THE STUDY

The broad objective of the study was to assess the extent of the relationship between Research and Development (R&D) and economic value added (EVA) of listed manufacturing firms in Nigeria. The specific objective was to find out if there is any relationship between capital commitment and economic value added. The study was to also find out if economic value added can be determined through the capital efficiency of listed manufacturing companies in Nigeria. Another objective was to find out if R&D can provide a measure of value creation/ diminution in the manufacturing firms.

IV. THEORETICAL FRAMEWORK

The Information economics/statistical decision theories by Friedrich Hayek (1930) is the framework used in this study. This is an economics-based theory of the contemporary microeconomic policy. Matthews and Perera (1996) opined that information economics which is a study of how information and information systems affect economic decisions is an extension of statistical decision theory. In this theory, individuals are assumed to make choice according to the rank ordering of expected values. In the extension of this model, each expected value is formulated as new information is received. These theories allow management to get complete information about costs, inventory, usage, specifications, development history, material, manufacturing methods and processes. As analyzed in Wikipedia, "the starting point for economic analysis is the observation that information has economic value because it allows individuals to make decisions that yield higher expected payoffs than they would obtain from choices made in the absence of information." This theory is relevant for management's capital expenditure decision-making because the quantitative and qualitative information at their disposal would aid the decisions they make, which would have an impact on the firm's value in the long term.

V. LITERATURE REVIEW

Albrecht, Stice, Stice and Swain (2008) say that Economic Value Added (EVA) is a major result of optimum capital commitment in a manufacturing company. EVA was proposed by a United States measurement system, and it emphasizes the incremental income which an organization can make over and above the required income meant to cover costs of capital which is invested by both debt and equity holders in the organization. Hill (2008) also opined that firms can make profits exceeding their total cost of investment by creating economic value to its shareholders. This concept which is quite similar to the residual income concept is given as: (Return on Capital Invested \times Cost of Capital). That is,

$$\begin{aligned} \text{Capital Invested} &= \text{after tax operating income} - (\text{cost of capital} \times \text{capital invested}). \\ &= \text{Net Operating Profit after tax} - (\text{cost of capital} \times \text{invested capital}). \end{aligned}$$

This means that EVA can be used as a measure of a company's true economic profit as it reflects economic reality beyond what traditional measures, such as net operating profit, earnings per share, and return on equity which shows accounting reality could offer.

As opined by Boasson, Cheng & Boasson (2012), the three core corporate decision areas are; investment, financing and dividend decisions. Of the three, capital commitment involves decisions on investment and financing, while dividend decision is made after the investment has paid off. More so, investment and financing decisions are seen as being paramount in capital expenditure decisions. According to Albrecht, et al (2008), the screening and preference decisions must be made to fully ascertain which investment to embark on, before financial commitment is made.

Beatty, Riffe and Welch (1997) opined that financing decision is not made immediately, until after the approval and authorization of the proposed budgets, and on this background, once financing decision, which is capital commitment is effected, it is irreversible, but the project will be monitored and tracked, up to the post completed audit process. In his argument, contrary to this postulation, Bragg (2007) maintained that the financing of investment should be an integral part of capital budgeting and should be considered simultaneously with the acquisition (investment) decision. The justification for this reasoning is that both the source of funds and the cost of capital have material impact on capital commitment decisions of management.

It is believed that to achieve excellence in capital commitment, so as to have economic value for firms in Nigeria, management should adopt what Isom (1995) called "the four qualitative attributes to decision making". These attributes are: (i) Reliable input premises; (ii) Adequate logic; (iii) Relevant solution; and (iv) Adaptability to change. A problem can arise in investment on capital

projects and the nature of the problem will be seen when decisions are made on capital commitment without adequate incorporation of the foregoing attributes.

Capital is made up of monetary and non-monetary assets contributed by shareholders who are the owners of the company (equity capital). This is done to keep afloat, the operations of the company. The Institute of Chartered Accountants of Nigeria (ICAN) adopts the above definition but adds that capital could also be contributed by creditors (loan capital). It is otherwise known as "wealth" in the form of money or productive assets taken as a sign of the financial strength of the firm and which is available for investment. The two main concepts of capital are financial and physical capital. While financial capital has to do with the company's equity or net assets, the assets' operating capability is shown in the physical capital. Profits exist in the first concept, if the company maintains its capital which was at the beginning as indicated by equity's value or the purchasing power of the Naira, while profit exists in the second concept of capital if the company has set aside adequate capital to maintain the operating of its assets.

The concept of capital has its place in the manufacturing sector since the firm needs capital to acquire other operating assets needed for the production of goods which would bring about increase in sales, hence increasing the firm's value. This study sought to know if a relationship exists between capital commitment in R&D and economic value added (EVA) in Nigerian manufacturing companies.

In a survey study jointly conducted by the United Nations Industrial Development Organization (UNIDO) and the Centre for the study of African economies, Department of Economics, University of Oxford in 2002, it was found out that Nigerian manufacturing companies encounter so many challenges which sometimes could not allow them to make optimal capital commitment to enhance the future value of the firm. The qualitative and subjective variable which stood out here was the problem of exporting manufacturing goods. It was found out that 'manufacturing is a transaction-intensive process and to be involved in export, more transactions would be required. One of the input transactions needed was feasibility study on the market. The paper argued that manufacturing in Nigeria is at a disadvantage comparatively, due to poor policy environment that increases transaction costs. These costs manifest in the form of inefficiency and bureaucracy as evidenced in poor infrastructure which stifled Nigerian exports. More so, the study showed that Nigerian firms are inefficient or poor in manufacturing than their competitors; therefore they prefer to supply a large domestic market and have little incentive to export what is produced. But owing to economic reasons, the domestic market may not support enough sales that would enhance optimum manufacturing capacity and these results in under-capacity utilization which eventually affects the economic value of the company negatively. The gap in the study was that it did not consider making optimum capital commitment to support research and development as a transaction cost in

the area of capital investment concerning inputs that would support international market through exports.

The Economic Value Added (EVA) model, according to Albrecht et al (2008) is similar to the residual income concept except that while the later focuses on operating profit before tax, the EVA insists on net operating profit after tax. This shows that EVA considers the effect of taxation when calculating profit. This assertion is corroborated by Adams, Bourne & Neely (2004) who further pointed another difference, being that residual income considers a minimum required rate of return (hurdle rate) as a variable for measuring the minimum level of income which is earned from using the organization's assets.

In their study, Danayanda, Irons, Harrison, Herbohn, & Rowland (2002) maintained that the hurdle rate is normally set by the management and may be used on the cost of acquiring the assets or capital for the organization. EVA on the other hand, according to Albrecht et al (2008) is focused on using the firm's specific cost of capital to establish the rate of returns required on the capital used by the firm for the project(s). This return must be the average, expected by both shareholders and debenture holders, who are the source of the capital. This is the concept of weighted average cost of capital, which represents the investors' opportunity cost of taking risk by investing funds in a company.

The other difference as opined by Hill (2008) is that residual income has a combination of the hurdle rate and average total assets to determine the minimum income required by the firm, while EVA uses invested capital which is concerned with interest-bearing debt plus all the shares invested in the firm. It is also noted that non-interest bearing operating liabilities, such as accounts payable are excluded by EVA in the residual income equation. This gives a new equation in invested capital assets as 'Interest-bearing debt plus total equity'. It can also be computed as 'Total assets – Non-interest-bearing operational liabilities'. Albrecht et al (2008) however submitted that operating liabilities are not included in this computation because they do not generate any explicit interest expense for the firm. The operating liabilities rather represent a free source of capital for the firm's use to generate further operating profits. It is carried that economic value added is the profit after-tax that is greater than the minimum return on capital.

Many authors see EVA as the best measure of true profitability (added value) or otherwise (value reduction) of a firm, and it varies with the cash flow instead of earnings per share (EPS). Economic value added (EVA) can be measured using the three basic inputs in the definition, i.e. current value of capital in the investments; returns earned on capital invested; and the initial cost of capital. Though there is a difference between market value and book value, when EVA is measured, these variables can be taken only at book value and considered as proxy of the firm's market value (Kenny, 2016). The invested capital in assets at hand and the expected future growth make up the market value

while the book value reflects the accounting information of the current period and the accounting decisions made over time, regarding depreciation of the assets, valuation of inventory and dealing with acquisitions. Therefore, adjustments in the book value are made in order to get a value of the market that is reasonable. This adjustment is made by subtracting from the current value of capital, the book value of capital (Fabozzi & Peterson, 2003).

EVA which is concerned with the economic profit of the firm is comprehensively calculated as net operational profit after tax (NOPAT) less (cost of capital multiplied by the capital invested by the firm). Cost of capital is taken as the weighted average cost of capital (WACC). $WACC = k_e \frac{E}{V} + k_d (1 - t) \frac{D}{V}$, where the cost of debt, k_d is assumed to be irredeemable. Albrecht et al (2008) then opine that NPV is a fundamental traditional investment analysis for capital expenditure, but the use of EVA provides extension of the NPV rule. Thus, the Net Present Value can be taken as the economic value added to the firm on its years of existence.

Therefore the formula below shows extension of the NPV, where:

$$NPV = \sum_{t=1}^{t=n} \frac{EVA_t}{(1 + k_0)^t}$$

And EVA_t is the economic value added to the firm in year t in the life, n years of the firm's existence.

Hill (2008) posits that while investment decision selects opportunities that support optimal investment portfolio to maximize expected net cash inflows (ENPV) at level of risk that is minimal, finance decision explores potential sources of fund (debt and equity) which are long-term or short-term, needed for investment sustenance, and make evaluation of returns which are risk-adjusted, so as to select the capital structure that would maximize the weighted average cost of capital (WACC) of the company. It is worthy of note that WACC represents the cut-off rate which is global for the firm and justifies that investment decision is made after appropriate consideration was given to the financing decision.

In the real sense, when cash inflows exceed the capital costs, NPV will be positive, giving rise to an economic value added (EVA) which is positive. On the other hand, a negative NPV will be realized if capital costs exceed the expected cash inflows. Stewart (1991) posits that capital expenditure should be evaluated using WACC as a cost of capital if a company's average business activities have the same risk as the project it is undertaking, but Yee (2000) postulated that projects which are outside the core business of the company should not use WACC as the risks of the businesses are not the same.

Investment appraisal using WACC as a corporate cost of capital is based on the assumptions that: (i).The company's operational activities can accommodate the

risks from new projects. (ii) Each project undertaken by the company is small in scale when compared to the existing operations. (iii).The existing capital structure of the company will be retained with financial risk being left unchanged. Justifying these assumptions, Hill (2008) went on to say that a company's component capital costs reflect the variability of future expected dividend and interest flows. This is the reason for the first assumption, which indicates that WACC reflects the global risks of the flows combined. That is, when a figure is used as discount rate to appraise a project, the risk return of the new investment should be able to satisfy the expected interest and dividend payments.

Taking a look at the second assumption, Yee (2000) asserts that when a new investment is considered, marginal costs of capital that is applicable to marginal investments appraisals are considered as the relevant costs. These, of course are the returns to the company on relative basis, indicated as incremental cash flows to the existing capital.

The third assumption is made on the premise that new projects will be financed using the existing discount rate, WACC, which implies that the financing decision basis for the new project is similar to the existing projects (Hill, 2008). According to Dittmar, Mahrt-Smith & Servaes (2003), if management should increase the firm's value, using market value added (share price) as a vehicle, a positive EVA must be created first, as the driver. Recalling the earlier review by Albrecht et al (2008), it was said that if firms make profits that exceed their overall cost of funds (positive NPV), they create an economic value added (EVA) for their shareholders. But taking the shareholder theory into consideration, the EVA does not cover every stakeholder. Therefore, considering an efficient capital market, without trade barriers, the EVA will drive the demand for the company's shares to rise, and as such, market value added (MVA) will be created which will sustain the firm, owners and other stakeholders. The MVA can also be sustained by the active dividend policy of the company. All these, combined with the corporate objective of the company will result to corporate wealth maximization which is the same as firm's value as indicated in its high share price. This in our view can only be achieved through optimum capital commitment.

➤ *The concept of capital in manufacturing companies*

Harold (2004) in Agboh (2011) asserted that the main objective for setting up manufacturing companies is to create wealth. Hirst and Baxter (1996), as economists, defined wealth creation as utility, which they otherwise defined as the added value which makes a product or service to be more esteemed than it was initially expected. This is same as production. However, Hill (2008) describes the value of a company's shares as a representative of their market price, which turns out to be a reflection of shareholders' and indeed, other stakeholders' perception about the quality of the firm's financial position.

Every company has its capital assets. The capital of a company, literally in accounting refers to the financial capital which, as opined by Wikipedia, "is any economic resource measured in terms of money used by businesses to buy what they need to make their products". This definition relates to a manufacturing concern. The financial capital could be the internally generated fund (retained earnings) or externally borrowed funds for purchase of capital equipment needed for production of goods (manufacturing).

The real capital or economic capital is made up of physical goods that give rise to the production of finished goods and products/services. Operating assets of manufacturing companies are the capital assets. Horngren (2014) says they are the assets which the manufacturing companies use for a long period of time. They include buildings, manufacturing equipment and office furniture. Capital assets are considered as operational because of their use for the generation of revenues owing to their day-to-day operations in the company for a long time period, and also they are capitalized in the books of the company. This means they are recorded as long-term assets when acquired and depreciated over their useful lives. Before these capital assets could be acquired however, financial capital, which is saved-up financial "wealth", must be available. As captured by Wikipedia, the financial concept of capital revolves around funds readily available for investment. This is the same as the net assets or the entity's equity. The measurement of financial capital could be in either nominal monetary units or units of constant purchasing power. The physical concept on the other hand, shows capital as the productive capacity of the entity, such as units of output per day.

The International Financial Reporting Standards (IFRS) measures financial capital maintenance by using constant purchasing power or nominal monetary units. The three concepts of capital maintenance known by IFRS are showcased through physical capital maintenance, or financial capital maintenance in nominal monetary units and/or maintenance of financial capital in constant purchasing power's units. In manufacturing, the real capital, which is different from financial capital are the already produced durable goods that is used in production of further goods or services.

➤ *Investment decisions and capital commitment*

In the firm's statement of financial position, assets are shown as non-current and current. The non-current assets are further classified into physical (tangible) and intangible, which are shown in the net assets of the firm. Investment in assets by firms ensure that the cash flows are income, which can further be re-invested in more assets to increase the cash flow, for more capital, or dividends pay-out to the shareholders (Tirole, 2006).

Writing on investment decisions, as it affects capital budgeting, Hampton (1989) opined that investment is at its optimum when the capital stock of a company is available to maintain maximally, the output volume that is demanded of the company to meet its market share.

The implication of this, according to Hampton (1989), is that optimum investment reflects the “point of production at which a company meets its desired capital stock level to achieve the best rate of returns, more so when compared with that of its competitors”. Investment by companies must be seen to meet three main criteria of: Maximizing the firm’s value, after adequate risk assessment; being properly financed; ensuring that if there is no sound investment opportunity that satisfies the above points, the cash must be returned to shareholders, so as to maximize their value. However, Graham and Harvey (2001) posit that investment in capital by a firm can better be done through optimum “asset financing strategies”, which would have the potential to bring about its long term value.

Peterson and Fabozzi (2002) wrote that capital is synonymous with funds used in financing the assets of the firm. They maintain that capital investment decisions are those decisions that involve current outlays in return for a stream of benefits in future years. A project which is capital in nature is made up of a particular capital investment decision, and the project can be independently or mutually exclusively appraised. Further still, the project may be contingent on another project, which would warrant joint appraisal.

Madhani Pankaj (2008) reasons that whatever constraints a firm to ration its finances for capital commitment, management should be able to allocate available funds among competing investment proposals. Preference should be given to the project that is appraised to yield higher returns that can maximize its long term value. Projects ranking is the technique used here because the company would have many acceptable investments which require the limited finance.

As put by Ojo (2004), budgeting refers to the planning earlier made before the actual expenditure is incurred. Budget prepares the blue-print, both in quantity and monetary terms and reflects the objectives of the firm. Capital budgeting, therefore involves in specific terms, the planned allocation of funds that are available, to the long term assets of the company so that maximum profitability can be achieved in the long term. Similarly, Philippalys (2003) opined that capital budget has to do with how the firm can harness its resources which are usually scarce, by allotting them to productive opportunities. To consider the future cash flow to the company, comparison must be made between the streams of earnings from the project with the expenditure made on the project. This assertion is made on the premise that capital budgeting is made up of planning and development of available capital, for the optimum objective, which is to maximize the long term profitability of the company.

Summarizing the above, Agboh (2011:89) asserted that the system of capital budgeting is employed to evaluate expenditure decisions which involve current outlays, but likely to produce benefits over a period of time longer than one year. Manufacturing companies ought to develop and be seen to implement strategic plans on investment

analysis, so that they could be relevant in the Nigerian economic scenario. As opined by Brounen and Kosdijk (2004), investment analysis is the evaluation of investment through the establishment of cash flow, estimation of the required rate of return (opportunity cost of capital) and the application of a decision rule for making choice. Using the company’s strategy, all realistic options should be identified and the advantages and disadvantages of each option analyzed, which should lead to the identification of the preferred course of action.

Uwah and Asuquo (2016) also maintained that there is expediency in using corporate strategy to plan future investment, if the firm must be sustained in the long term. The implication is that after the establishment of the firm’s objective, there should be continuous evaluation of investment on projects using capital budgeting and risk analysis techniques. The firm can be said to achieve its corporate strategy, if it continues to invest in non-current assets that would ensure its long term existence.

Drury (2006) maintained that the implications of capital commitment on long term value of firms are indicated in having a positive net present value which shows the difference in investment cost and gross present value from that investment. Also, Pandey (2009) cited in Agboh (2011) further states that “capital budgeting refers to the processes of generating, evaluating, selecting and following up on capital commitment alternatives” (p.37). The features in capital commitment are: the expected benefits, irrespective of risks involved and the long lead time between initial outlay and cash inflows. Keeping these features in mind would guide management in making investment decisions.

This re-emphasizes the position held by other scholars on this subject-matter such that great care should be taken in making such decisions owing to the reasons that: (1) How profitable a firm is would depend on its competition with others. Sound investment decisions give rise to a firm’s profitability of the firm and impacts positively on its competitive position. (2) The destiny of the company lies on capital budgeting decisions. (3) The cost structure of the firm in the future depends on its long term plan. (4) Investment decisions which are capital in nature are irreversible, and any attempt to reverse it would bring huge financial loss to the firm. (5) Even with the scarce resources of firms, capital investment is cost intensive. (6) Firms should neither operate below or above the optimum capacity as both result to waste. (7) Economic growth from activities such as employment and other activities are determined by appropriate capital investment decisions.

➤ *Financing activities and capital commitment*

Horngren (2014) describes financing activities as involving cash inflows and outflows involved in long-term liabilities and equity of a company. The issuance of shares, payment of dividends, and buying and selling treasury stock are all aspects of financing activities. To borrow money and pay off long-term liabilities in the likes of notes payable, bonds payable, and mortgages payable, are all

activities of financing by the organization. While the cash inflows are indicated by proceeds from both short-term and long-term borrowing and cash received from shareholders from the issue of shares, cash outflow on the other hand is indicated by repayments of amounts borrowed (excluding payment of interest) and payment of dividends to shareholders.

Meigs and Meigs (1995) assert that the main transactions from the financing activities of companies can be grouped into three; stock, debt and dividends transactions. When cash is received from the sales of shares, capital is raised and ownership is diluted. This may not be a bad sign after all, as far as the firm's expansion is at a rate that is acceptable. But the firm can repurchase its shares to increase the ownership and cash is decreased. When debt is issued, there is cash inflow but the debt is an obligation for future settlement, which carries with it, interest payment. This interest payment is not regarded as financing activity, but an operating activity, since the payments are made in course of normal business operations. However, the repayment of the debt is cash outflow in the financing activity.

➤ *Dividend policy and capital commitment*

Policy on dividend is one of the fundamental decisions that management has to make to favour or retard the economic value added to firms vis-a-vis capital commitment. According to Moeljadi (2014) when earnings per share increase, this signals growth in dividend to the ordinary shareholders. Growth in earnings would come to the firm because of factors such as inflation, amount of earnings retained and re-invested by the company, as well as the company's rate of returns on equity.

Albrecht et al (2008) have said that if there is stability in output for units produced, there is a rise in both the sales price and input costs owing to inflation. The earnings per share (EPS) of the company will grow at the inflation rate, and aside from this, it will also grow because of the re-

investment or plough-back of earnings. Similarly, Brigham and Houston (2013) put it that if a firm's earnings are retained, the portion of investment in money terms will rise in future, which will eventually lead to growth in earnings and dividends.

It is generally agreed in this review that the firm's value would not increase because there is increase in current and future dividends; rather it would increase where the firm pays less current dividends, and retain funds for a highly profitable investment opportunity. In the same vein, the firm's value would be added where the shareholders are paid high current dividend where it is found out that there is poor investment opportunities in the present and near future. However, in either case, the impact of taxation must be considered, since according to Rich et al (2010) taxation on dividends and capital gains vary. This is why dividend policy decision has effect on taxation of investors. Akinsurile (2010) posits that three theories which impacts on investors' preference have to be considered in determining capital commitment for the long-term value of firms in the view of dividend and earnings. These are dividend irrelevance, bird-in-hand and tax effect theories.

VI. HYPOTHESES AND MODEL DEVELOPMENT

The hypotheses for this study were developed and model shown as follows:

Hypothesis 1: There is no significant relationship between capital commitment by listed manufacturing companies in Nigeria and current value of capital in the investments.

Hypothesis 2: There is no significant relationship between marginal efficiency of capital (MEC) of listed manufacturing companies in Nigeria and returns earned on capital invested.

Hypothesis 3: There is no significant relationship between research and development (R&D) and economic value added (EVA).

➤ *Development of model*

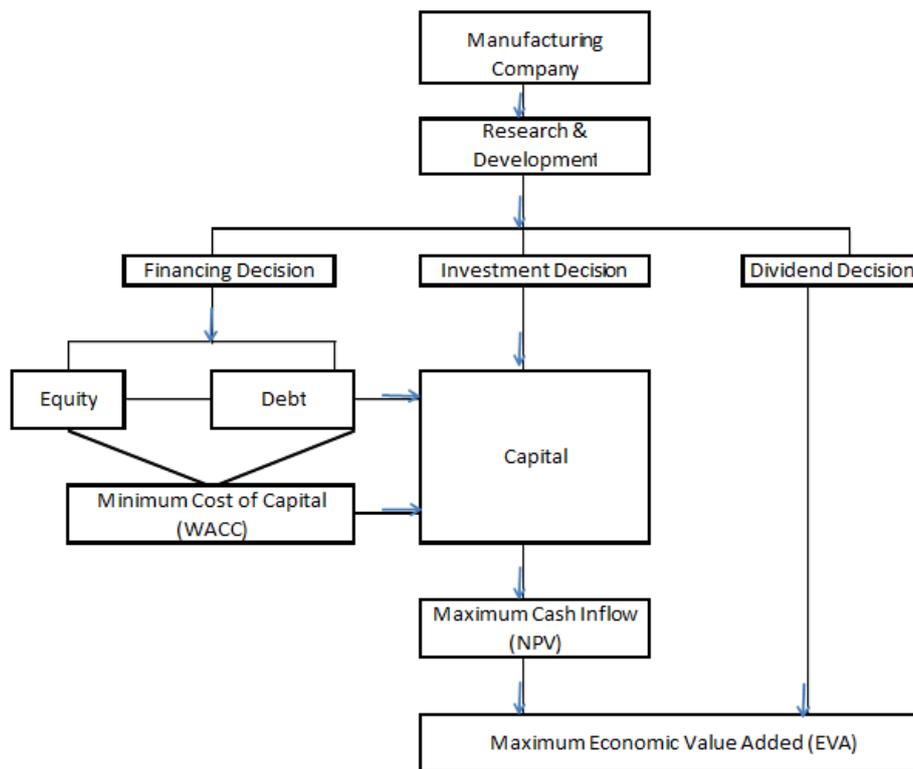


Fig 1:- Conceptual Framework

VII. RESEARCH METHODOLOGY

➤ *Research Design*

The study adopted quantitative panel methodology using the ex post facto and correlational research design. The goal of this design was to measure the relationship of two variables. The topic for this study is co-relational, measuring the relationship between capital commitment in research and development, and economic value added in listed manufacturing companies. This methodology was used in analyzing secondary (panel) data collected and collated from the Nigerian Stock Exchange (NSE) Fact Books and the published financial statements of these companies for a seven-year period, (2010-2016).

For the purpose of this study, therefore, “Research and Development” was the independent variable while “Economic value added” was taken as the dependent variable. The future value of the firm as manifested in the economic value added depends on the capital commitment made on research and development.

➤ *Population of the study*

The population of this study was the 83 manufacturing companies that are listed on the Nigerian Stock Exchange, as at December, 2016. These companies are in the various sectors in the manufacturing industry.

➤ *Sampling procedure and sampling technique*

The Taro Yamane formula was used to arrive at the sample size of 69 manufacturing companies. The researcher

adopted the non-census sampling (probability sampling). The stratified random sampling technique was used so that the sample could be truly representative of all units or strata of the population. The strata includes manufacture of consumer goods, construction, food and agricultural processing, manufacturing of healthcare and pharmaceutical products, industrial goods manufacturing, mining, oil and gas production and processing of beverages.

The sampling procedure used was the proportional stratified sampling. The percentage composition of the manufacturing companies listed in the NSE were: 12 percent of agricultural and food processing sector, 20 percent of consumer goods sector, 33 percent of industrial goods sector, 10 percent of healthcare and pharmaceutical, 5 percent of mining and construction sector, 10 percent of oil and gas production and 10 percent of food and beverages sector. This means that the researcher studied 69 manufacturing companies quoted in the Nigerian Stock Exchange, as sample size made up of 8 in agric and food processing, 14 in consumer goods, 23 in industrial goods, 7 in healthcare and pharmaceutical products, 3 in mining and construction, 7 in the oil and gas production, and 7 in the manufacture of beverages. The percentages were calculated thus: Number per sector divided by sample size × 100.

Carrying out ex post facto research as outlined in the research design of this study, the researcher collected the necessary data painstakingly from the Nigerian Stock Exchange and also used secondary data sources, which

were mainly the published financial statements prepared by the selected companies under study.

➤ *Model Specification*

The researcher used simple linear as well as multiple linear regression analyses to find the relationship between capital commitment on research and development, and future value of the firm as indicated in the economic value added. The general equation for regression is given as $Y = f(X)$, which means Y , depends on X . Here, the dependent variable, economic value added is denoted by Y , and the independent variable, capital commitment on R&D is denoted by X . The equation can be written as: $Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \mu$

Where, α is the intercept, and $\beta_1, \beta_2, \beta_3$ are the coefficients of variables X_1, X_2, X_3 respectively, which show the kind of relationship existing between dependent and independent variables and μ is known as the error term.

Therefore, $Y =$ Dependent variable {Economic value added (EVA)}, indicated by current value of capital in the investments (CV) and returns earned on capital invested (RE).

$X =$ Independent variable {Research and Development (R&D)}, indicated by Capital Commitment (CC) and Marginal Efficiency of Capital (MEC).

Following the model put up by Sudiyatno, Puspitsari and Kartika (2012), the model for this study was adapted as follows:

Model: *Research and Development = f (Economic Value Added)*
i.e. Economic Value Added, EVA = f(R&D).

Therefore,

$$CV = a_0 + \beta_1 \text{Log}CC_{it} + \beta_2 \text{Log}MEC_{it} + \beta_3 \text{Log}R\&D_{it} + \mu_{it}$$

$$RE = a_0 + \beta_1 \text{Log}CC_{it} + \beta_2 \text{Log}MEC_{it} + \beta_3 \text{Log}R\&D_{it} + \mu_{it}$$

$$R\&D = a_0 + \beta_1 \text{Log}CC_{it} + \beta_2 \text{Log}MEC_{it} + \beta_3 \text{Log}R\&D_{it} + \mu_{it}$$

Where: $i = 1, 2, 3, \dots, 69$, and $t = 1, 2, 3, 4, 5, 6, 7$.

In this model, i represents the i^{th} cross-sectional unit and t represents the t^{th} time period. The dependent variable is the Economic Value Added (EVA), here hypothesized to depend on research and development (R&D) – a decisive variable for capital commitment (CC) and Marginal Efficiency of Capital (MEC). The hypotheses are for each manufacturing firm, i on the sample over the t , 2010 – 2016 analysis period. Vector variables for measuring Research and Development as represented by CC and MEC, were regressed against current value of capital in the investments (CV) and returns earned on capital invested (RE), the proxies of EVA as the dependent variable. In this model, EVA is calculated as net operational profit after tax (NOPAT) less (cost of capital multiplied by the capital invested by the firm). Cost of capital is taken as the weighted average cost of capital (WACC). $WACC = k_e \frac{E}{V} + k_d (1 - t) \frac{D}{V}$, where the cost of debt, k_d is assumed to be irredeemable.

VIII. TESTING OF HYPOTHESES AND ANALYSIS

Hypotheses one to three were tested using SPSS V.20. with a confidence interval of 95% taken, and the decision rule was to reject the null hypothesis if the calculated value, p , is less than the alpha value of 0.05 ($p < 0.05$) and to accept, if otherwise.

Model	R	R ²	Adjusted R ²	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Result
				B	Standard Error	Beta			
Capital commitment (CC)	0.925	0.856	0.854	0.502	0.025	0.925	19.945	0.000	Significant

(Reject H0)

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Capital commitment (CC) Regression	3910.149	1	3910.149	397.783	0.000
Residual	658.600	67	9.830		
Total	4568.749	68			

Dependent variable: Current value of capital (CV)

Table 1:- A table showing simple linear regression and its associated ANOVA of the relationship between Capital Commitment (CC) and Current Value of Capital (CV) in hypothesis one

From Table 1 above, the relationship between capital commitments and current value of capital is shown. The Table's analysis shows a Beta value of 0.925 which is about 93% of the total contribution of capital commitment to the firm's economic value added. A multiple correlation coefficient (R) of 0.925 which indicates a high correlation was observed to correspond with this beta value. The R² value of 0.856 which shows a relationship of about 86% between the independent and dependent variables was also observed. However, the value of the adjusted R² which is the modification for the limitation of R² was 0.854. This indicates that the independent variable in the model explains about 85% variation on the dependent variable. The unstandardized B value of 0.502 shows that as

financial assets increases or decreases by one unit in value, there are a corresponding 0.502 unit in the value of current capital which increases or decreases in the sampled manufacturing firms. More so, the associated analysis of variance (ANOVA) reveals the sum of squares for regression and residual to be 3910.149 and 658.600 respectively, while the mean squares values are also shown as 3910.149 and 9.830 respectively, which indicate a significant relationship between the variables. Finally, the Sig.value reveals 0.000, which is less than the alpha value of 0.05 level and as such, the null Hypothesis one was rejected, meaning that a significant relationship exists between 'capital commitment' and 'current value of capital' a proxy of the economic value added.

Model	R	R ²	Adjusted R ²	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Result
				B	Standard Error	Beta			
Marginal efficiency of capital (MEC)	0.712	0.507	0.499	0.677	0.082	0.712	8.295	0.000	Significant (Reject H ₀)

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
Marginal efficiency of capital (MEC)	Regression	11443.681	1	11443.681	68.804	0.000
	Residual	11143.642	67	166.323		
	Total	22587.323	68			

Dependent variable: Returns earned on capital invested (RE)

Table 2:- A table showing simple linear regression and its associated ANOVA of the relationship between Marginal Efficiency of Capital (MEC) and Returns earned on capital invested (RE) in hypothesis two

The data in table 2 dealt with the data showing the extent to which marginal efficiency of capital (MEC) relate with the returns earned on capital invested (RE) of 69 sampled companies for the period 2010 to 2016, used in the study. The SPSS result shows the multiple regression analysis of Beta value 0.677 for marginal efficiency of capital by Nigerian firms and its corresponding dependent variable, returns earned on capital invested in the firms. These data inform us that about 67% of research and development contribute to the economic value added, of firms in Nigeria. The variables show significant values at 0.000 Sig.level. A multiple correlation between the dependent variable, returns earned on capital invested (RE) with the independent variable, marginal efficiency of capital (MEC) was also made. A multiple regression

correlation coefficient (R) of 0.712 was seen. This indicates a high correlation. R square (R²) value of 0.507 was also realized. This implies that while about 71% of multiple correlations (R) were established between the independent and dependent variables, about 50% was realized as the contribution of the independent variable to the economic value added of firms in Nigeria. The table revealed that a value of 0.000 is the p-value. As this value is lower than the alpha value of 0.05, our hypothesis two was rejected, following our decision rule. This decision therefore means that there is a significant relationship between marginal efficiency of capital (MEC) of manufacturing firms in Nigeria with the returns earned on capital invested in these firms. This is reflected in the 0.000 Sig.value realized in the multiple regression analysis.

Model	R	R ²	Adjusted R ²	Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Result
				B	Standard Error	Beta			
R&D	0.281	0.079	0.065	0.894	0.373	0.281	2.395	0.019	Significant (Reject H ₀)

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
R&D	Regression	1401.685	1	1401.685	5.734	0.019
	Residual	16377.376	67	244.438		
	Total	17779.061	68			

Dependent variable: Economic Value Added (EVA)

Table 3:- A table showing simple linear regression and its associated ANOVA of the relationship between Research & Development (R&D) and Economic Value Added (EVA) as hypothesized in hypothesis three

Data presented on Table III above reveals the relationship between Research & Development (R&D) and Economic Value Added (EVA). From the Table, R&D has a Beta value of 0.281, indicating an approximate contribution of 28% to EVA in the manufacturing firms under study. This result shows a positive correlation coefficient and also a relatively average relationship. A p-value of 0.019 realized also shows that the value is less than the 0.05 alpha level, which makes us to reject the null hypothesis three. This indicates that there is a significant relationship between R&D and EVA in the companies under study. The unstandardized B value of 0.894 also explains that for any additional increase in the unit of R&D, there is an increase of about 89% in the value of EVA. The associated analysis of variance (ANOVA) reveals that the sum of squares for regression which is same as mean of square was 1401.685 and 16377.376 was the residual value for R&D. The mean squares value for R&D, in relation with EVA shows 244.438. All these show a strong relationship, which supports the rejection of the hypothesis.

IX. CONCLUSION

The analysis from the data collected show that most manufacturing firms in Nigeria do not invest in research and development. However, this study has shown a significant relationship between this variable and economic value added for manufacturing firms in Nigeria. The sub-variables also indicate that capital commitment in R&D has a significant relationship with the current value of capital used in these companies. More so, the marginal efficiency of capital as applicable in these companies has a significant relationship with returns earned on capital invested.

X. RECOMMENDATION

More of Research and development should be embarked on by manufacturing companies as this variable shows a significant relationship with the economic value added. An increase in capital committed to this investment would ensure the growth of the manufacturing companies, since it will enhance profitability, expansion and technological development.

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