

Capital Budgeting Processes and Wealth Maximization Objective: Implications for Firms in Nigeria.

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Abstract

This paper examined how capital budgeting processes result in the wealth maximization objective of firms in Nigeria. Data were obtained from both primary and secondary sources using the explorative research design. The findings revealed that proper identification and selection of projects becomes necessary, using capital budgeting techniques and processes and adopting those projects that would maximize the wealth of the owners through value addition to the capital of the firms. It concluded that adopting the necessary techniques and implementing them implies using capital budget processes to actualize the objectives of the firms. The paper contributes to the literature on capital budgeting as a multi-faceted process aimed at making screening and preference decisions by management, on which long-term project should be embarked on. It recommended that firms in Nigeria should entrench the capital budget processes in the firm and be seen to follow it as approved and authorized by the board. This would result in better performances by the firms in Nigeria.

Keywords: Capital Budgeting Processes, Net Present Value, Wealth Maximization, Investment Appraisal.

1. Introduction

The accounting principle of "going –concern" implies that a firm will continue in existence for a long time to carry out its objectives and will not be liquidated in the foreseeable future. For promoters of companies therefore, it will not be in their interest to set up firms with short-term objectives. The objectives of any corporate organization with a going –concern status revolve around profit maximization, wealth maximization and non-financial objectives. Contemporary Management Accountants have been advancing arguments on the supremacy of wealth maximization over profit maximization. Wealth maximization is known to maximize the net present value of a firm, as opined by Akinsulire (2010). The wealth maximization objectives of the firm involve increasing the earnings per share of the owners and timing of returns to obtain the net present value of an investment. This principle keys into the concept of the long-term value of the firm, which every shareholder desires, alongside profitability.

It is expedient to note that before a firm could survive in the long-term, there must be a determination of the corporate strategy, which is its broad set of objectives, for future investment. Therefore when a firm's objective is established, the firm continually evaluates possible investment projects, using capital budgeting as an ongoing process. The firm achieves its corporate strategy by making investment in long lived assets that will maximize shareholders' wealth.

Capital budgeting, which is the process of selecting alternative long-term investment opportunities, has the process of committing funds into long-term projects, according to Peterson & Fabozzi (2002). The processes involved in capital budgeting decision as enunciated in this paper are:

- i. Investment identification and selection
- ii. Project evaluation /capital budget proposal
- iii. Budgeting approval and authorization
- iv. Project tracking /development
- v. Monitoring and control of projects
- vi. Post completion audit.

All these processes have sensitivity analysis as the pivot. The implications of capital budgeting processes and wealth maximization objectives of firms are indicated in the net present value of an action. This can be seen as the difference between the amount of investment needed for the project and the gross present value derived from the investment. The terminology used in this measurement is known as investment appraisal. This is done by discounting or capitalizing its benefits at a rate which reflects their timing and uncertainty (Drury 2006).The implications are also indicated when a financial action which has a positive action resulting in negative NPV should be rejected because if accepted it will diminish the existing wealth. Another implication stands on the fact that mutually exclusive projects with the highest NPV should be adopted and those with lower NPV dropped. By using these criteria the wealth or NPV of the firm will be maximized.

2. Making Investment Decisions

Peterson and Fabozzi (2002) say that investment decision involves the identification of viable projects. This is done by appraising projects using various techniques to determine the viability. Management is always

concerned with making investment decisions. The decision on which asset to invest in, always poses a problem since the value of any asset is not always easy to determine. The financial manager pursues the firm's objective of maximizing its wealth and for this to be, there must be evaluation of investment opportunities so as to determine the asset which can add value to the firm. If a number of firms are taken into consideration, for instance firms X, Y and Z and each of them has identical investment opportunities and similar assets, but given the following differences:

- ❖ The management of firm X happens to ignore investment opportunities and decides on active dividend policy by paying all its profit to the shareholders.
- ❖ Y's management makes replacement decisions as at when due, to replace old plants and machinery and pays left-over profit to its shareholders.
- ❖ The management of another company, Z decides to invest in every opportunity that would provide a good return on investment than what the shareholders would have got in alternative investment.

The three scenarios above show that the shareholders' investment in company X will not have good returns on investment as it would have been if the company took advantages of the foregone investment opportunities. By taking this unpopular decision, the firm's wealth will diminish and may lead to loss of all assets. Firm Y's management on the other hand, being satisfied in replacing old assets but not taking further risks to invest in other profitable investments indicates that other opportunities are foregone and shareholders' wealth will not be maximized. However, the other firm, Z, is better-off because its management has made all profitable investment, and is able to maximize the shareholders' wealth. This company will continue to grow as long as there are profitable investment opportunities which the management is taking advantage of.

3. Investment Decisions and Capital Budgeting

Tangible and intangible assets make up the firm's total assets which is equal to the firm's capital. It is known that firms invest funds in assets which produce income and cash flows which the firm can re-invest in more assets to increase its capital or pay to the owners. The tangible assets of a firm include land, buildings, equipment and machinery while the intangible assets include accounts receivable, securities, patents and copyright. Therefore, capital investment by a firm through better asset financing strategies could result in wealth maximization.

The word "capital", according to Peterson & Fabozzi (2002) is the same as funds used to finance the assets of the firm. According to doctoc.com, "capital investment decisions are those decisions that involve current outlays in return for a stream of benefits in future years." Each capital investment decision is referred to as a capital project. This capital project therefore can be mutually exclusive or independently appraised. Capital projects may also be contingent on one another and are considered together. As stressed by Peterson & Fabozzi (2002), if a firm is considering the production of a new product, this capital project will require land acquisition, facilities, building and purchase of production machines, one project depending on another. There may also be need for the collection of assets needed for the day-to-day operations of the long-term investment. This is also known as investment in working capital. These decisions are made by management to enhance effective capital utilization.

4. Shareholders Wealth Maximization and the Net Present Value

Dayananda, Irons, Harrison, Herbohn & Rowland (2002) maintained that management should also maximize the shareholders' wealth by maximizing the net present value of the expected future cash flows in the firm. To maximize the shareholders' wealth, the magnitude of flow of cash, time value of money and risks associated with the cash flows expected to be received in the future by shareholders must be measured. The present firm's value is said to be the present value of all the future cash flows discounted at the cost of capital or hurdle rate fixed by the company. The cash flows to be discounted are derived from the assets at present which is brought down from all past investment decisions in addition to future investment opportunities open to the firm. This could be expressed in the firm's value equation;

$$V = PVI = PVO + PV1 \dots \dots n,$$

Where V = value of the firm

PVI = present value of all future cash flows

PVO = present value of all cash flows from all assets in the present.

PV1.....n = present value of cash flows from future investment opportunities in the life of the project.

(Drury, 2006) opines that future cash flows are discounted to take care of the risk and uncertainty inherent in the investment. The firm is known to have business risk, which comprises of sales risk and operating risk. The sales risk is concerned with the market and the general economy which the goods and services from the firm are sold. Operating risk on the other hand is determined by the product or service which the firm provides to the customer. The changes in sales volume bring high sensitivity to the operating cash flows.

However Tirole (2006) says the rate of discount which is the minimum rate of return required to

compensate the shareholders and the debenture holders reflects in the business risk of that project. From the firm's perspective the discount rate for the firm must be equal to the cost of capital, while the discount rate is the required rate of returns on the investment from the investor's perspective to fully appreciate the firm's value, these three scenarios must be fully understood:

- (a) If the cash flows are just enough to pay the suppliers of capital, the firm is in break-even point.
- (b) The value of the firm will decrease if the cash flows generated are less than required by it. Here, the earnings to the firm is less than the cost of capital.
- (c) There will be increase in the firm's value if the project has cash flows which are greater than what is required to pay the shareholders for their risk.

5. Classification of Investment Projects

There are different ways managers classify capital investment projects. Projects are classified on the basis of how they influence the investment decision process. Dayanada et al (2002) submit that the classifications are: Independent projects, mutually exclusive projects and contingent projects. But Peterson & Fabozzi (2002) assert that projects could be classified according to their economic life risk and dependence on other projects. This last point supports the classification by contingent projects as opined by Dayanada et al (2002).

(a) *Classification according to their economic life.*

An economic life of a project is the length of time which it will provide cash inflows to the firm. After the useful life, the assets show declining revenues. According to Peterson & Fabozzi (2002), this is indicated in the following conditions:

- ❖ Physical deterioration
- ❖ Obsolescence or
- ❖ The degree of competition in the market for a product.

If an investment requires immediate expenditure and provides benefits in the form of cash flows within the current period (one year), such investment is regarded as short-term, but if the benefits are received beyond the current period, such investments are referred to as long-term. Short-term investment decisions, which are primarily investment in current assets still, have the same objective of investment in long-term assets, to maximize owners' wealth. Peterson & Fabozzi (2002) however say each of them could be considered for two reasons:

1. Time value of money is considered when decisions are made as regards long-term assets which are based on projections of extreme future cash flows.
2. Long-term assets are not involved in the day-to-day operating needs of the firm. Therefore, decision regarding short-term investment (working capital needs) which are concerned with the daily operations have to be made necessarily, but it must be noted that this working capital should be included as cash outflow in the year of investment, but added back as cash inflow at the end of the project's life. This adjustment is necessary so as to account for the time value of money on the short-term fund used in appraising the viability of the project. Accounting for working capital in the firm is important since the firm operates with current assets which could help out during poor operating period, when operating cash flows are lower than expectation. This assertion supports the classification according to dependence on other projects as put forward by Dayananda et al (2002).

(b) *Classification according to their risk*

Assets that are to be replaced, projects that are to be expanded, new products/new markets as well as projects that are mandatory all have investment risk of return. As classified by Dayanada et al (2002) and Peterson & Fabozzi (2002) in separate situations, mutually exclusive projects are included in their classification according to risk.

If a firm should have two investment decisions to make, say for projects A and B, and both projects have cash flow estimate of N100,000 each for five years from year 0. If B is riskier than A and the management of the firm is risk averse, they would consider project A less valuable than B because the chance of getting the N100,000 in five years is less for A than for B. Therefore valuing projects that are mutually exclusive requires considering the risks associated with their future cash flows. However, Pandey (2009) defines risk as "the chance that the actual outcome will differ from the expected outcome" while uncertainty "relates to the situation where a range of differing outcome is possible, but it is not possible to assign probabilities to this range of outcomes". Pandey (2009) further asserts that in the context of risk assessment, the decision maker does not know exactly what the outcome would be, therefore, to assign probability weight to the various potential outcomes is desirable.

Replacement projects look at opportunity cost while expansion projects take the advantage of learning curve. Both of them have minimal risk. But projects involving new products or new markets have high risk, because the company has little or no experience in managing the new product or new market. Tirole (2006) while supporting Peterson & Fabozzi (2002) maintained that if the risk element of a project is high, the pay-off may be high also but the firm would select mutually exclusive projects depending on management's disposition

to risk. However, mandated projects are selected, irrespective of the risk, from the possible projects that satisfies government policy or the project is left off, and the production halted.

(c) Classification according to their dependence on other projects.

Projects can be independent or mutually exclusive. That is, a project can “stand alone” and bear its risk of future cash flows to be independent or a project can be selected to avoid the high risk of an alternate project, (mutually exclusive). However, when projects are selected as a dependant of another project, they are contingent projects. This occurs when the investment in one project can only be made upon the functionality of a sister project. For example, table water manufacturing is contingent on the spring-well project. Dependence of one form of project on the other hand can also be found in complimentary projects. This situation is seen when investment in one promotes enhanced cash flows of related projects. There are also projects which are substitutes to each other. That is, the degree of success (or failure) of one project is increased by the decision to accept or reject the other project. Complimentary projects therefore have to do with the manufacture of associated product(s), while substitute projects have to do with the production of two substitute products by the same firm. Here, increase in the cash flow of one product can be realized only if the substitute product is not on sale.

6. The Capital Budgeting Process

Capital budgeting processes have multi-faceted activities. There are several sequential stages in the process. There must be in place a corporate strategy, otherwise known as strategic planning. A strategic plan shows the financial implications on decisions relating to the sources of funds, investment decision on the funds and the dividend policy of the firm. The capital budget processes are:

(i) Identification of investment opportunities

To identify investment opportunities and generate investment project proposals is an important step in capital budgeting process. Project proposals must fit into a firm’s corporate goals, vision, mission and long term strategic plan. However, Bragg (2007) suggests that if an excellent investment opportunity shows up, the corporate vision and strategy can be changed to accommodate it. This opined the idea that there is a two-way traffic between strategic planning and investment opportunities. Some investments are mandatory, e.g. those required to satisfy government regulatory laws, which are necessary to keep the firm in business, while others are discretionary which are brought up by growth opportunities, competing businesses, cost reduction strategies etc. The later type of investment opportunity is what fits into the strategic plan of the business firm. These business ideas could be as a result of the work done by the R&D division or casually from opportunities suggested to the firm’s management by the staff.

(ii) Preliminary screening of projects and selection

Projects which are consistent with the corporate strategy are usually identified by the production, marketing and R&D departments of the firm. After identification, projects are evaluated and screened by estimating the future cash inflow to the firm and how this will affect the value of the firm. This is the project analysis stage, which deals with the quantitative analysis, economic and financial appraisal and project evaluation techniques. Sensitivity analysis plays a major role here.

Danayanda, et al (2002) asserts that financial appraisal provides the estimated addition to the firm’s value in terms of the projects NPV. If the projects so identified repeatedly produce negative NPVs in the analysis stage, management has to review its strategic plan. Drury (2006) therefore summarized that the feedback derived from project analysis to strategic planning is very important in the capital budgeting process.

(iii) Capital Budget Proposal

Capital budget is usually proposed for a project that has passed through the preliminary screening and selecting process. A budget is a planned action of future events which is forecasted in monetary terms. The capital budget proposal will therefore list the feasible projects and the monetary investment needed for each project.

(iv) Budgeting approval and Authorization

Since capital projects are capital intensive, usually irreversible, there must be need for adequate analysis before it is approved. Before the approval, management must have authorized the project to be analyzed.

(v) Project Tracking

This is one of the processes of capital budgeting which involves periodic reports on expenditures and possible revenues associated with the project. It enhances the communication between the strategic, tactical and operational management of the firm.

(vi) Post completion audit

This stage allows the firm’s management to know how well the cash flows realized correspond with the cash flows forecasted some years back. The major essence is to see whether the projects should be continued in the direction it started. This audit provides feedback to project appraisal or strategy formulation. It assesses the strength (or accuracies) and weakness (or inaccuracies) of cash flow forecast in the projects.

7. Estimating and Evaluating the Cash Flow of a Firm's Project

As put by Brealey, Myers, Stewart and Allen (2011), firms invest in order to increase the value of their ownership interest. The investment decision made by the management of a firm in the past gives it the cash flows in the future. If a new investment is added to the present, the firm is expected to have incremental cash flows. Therefore, a change in a firm's value is shown when the benefits and costs of a new investment is analyzed. This could be illustrated thus:

$$PV = PB - PC$$

Where: PV = project's new status as regards the firm's value.

PB = Benefits derived from the new project

PC = Costs of the new project.

Here PB deals with the present value of the cash flows from the project's operating activities (revenues less operating expenses), known as operating cash flows. PC is the present value of investment cash flows, which are the expenditure needed to acquire the project's assets in addition to cash flows from project's assets disposed. Predominantly for a growing firm, PB is typically positive (showing cash inflows) while PC is typically negative (showing Cash outflows).

8. Estimating and Evaluating Cash Flows of a Firm

As seen in the above equation, one can estimate the free cash flows (FCF) for a project in much the same way as for a firm. When the project's free cash flows are discounted at the appropriate risk-adjusted rate, Brigham and Ehrhardt (2008) affirm that the result is the project's value. The only difference in the valuation of a firm and a project is while the former uses the risk adjusted rate, the later uses the overall weighted cost of capital. Thus:

$$NPV = \left[\frac{FCF}{(1+r)^1} + \frac{FCF}{(1+r)^2} + \dots + \frac{FCF_n}{(1+r)^n} \right] - \text{Initial cost}$$

Subtracting the initial cost of the project gives the net present value (NPV). If a project has a positive NPV, then it adds value to the firm. It is adduced that the firm's market value added (MVA) is the sum of all its projects' NPVs. Therefore capital budgeting, which is the process for evaluating projects, is critical for a firm's success.

Capital budgeting processes as outlined above are not costless operations. Brealey et al (2011), assert that larger investments and riskier projects require increasingly detailed analysis and approval at a higher level within the firm.

The most important, but also most difficult and critical step in capital budgeting is the estimation of project cash flows. Many variables, individuals and departments within the firm are involved in the process. For instance, the estimate of unit sales and sales prices are normally made by the marketing group, based on their knowledge of price elasticity, advertising, state of the country's economy, action of competitors, and trends in customers' tastes and preferences. In the same vein, the capital outlays associated with a new product are generally obtained from the engineering and R&D departments, while operating costs are estimated by cost accountants, production and personnel departments, etc. According to Bragg (2007), proper analyses of the above issues include:

- (a) Obtaining information from various departments,
- (b) Ensuring that everyone involved in the estimation uses a consistent set of realistic economic assumptions and
- (c) Ensure that biases are not inherent in the forecasts.

Brigham and Ehrhardt (2008) therefore identify four cardinal rules that can help minimize mistakes associated with forecast of relevant cash flows.

- (i) Capital budgeting decisions must be based on cash flows, not accounting income.
- (ii) Only incremental cash flows are relevant.
- (iii) Depreciation is ignored because it does not involve movement of cash.
- (iv) Sunk costs which are historical costs already incurred prior to the investment under consideration should be ignored.

It should be noted that free cash flows (FCF) is the cash flow available for distribution to investors. So, the relevant cash flow for a project is the additional free cash flow that the company can expect if it implements the project. This is also known as incremental cash flow. It is the cash flow above and beyond what the company could expect if it does not implement the project. Investopedia (2015) defines free cash flow as a measure of financial performance calculated as operating cash flow minus capital expenditures. Free cash flow is important because it allows a firm to pursue opportunities that enhance shareholders' value. Free cash flow (FCF) is therefore calculated as: EBIT (1-Tax Rate) + Depreciation & Amortization – Change in Net Working Capital – Capital Expenditure.

In the evaluation of cash flows, it must be noted first of all that capital budgeting is the decision process that firms use to identify those projects that add to the firm's value. As a result of this, one may say it is one of

the most important task faced by financial managers. Three reasons support the forgone assertion, according to Bragg (2007):

- (i) "A firm's capital budgeting decisions define its strategic direction because going into new products, services or markets must be preceded by capital expenditures."
- (ii) "The results of capital budgeting decisions continue for many years, reducing flexibility."
- (iii) "Poor capital budgeting can have serious financial consequences on the firm."

Brealey et al (2007), also maintain that if the firm invests too much, it will waste investor's capital on excess capacity. If on the other hand, it does not invest enough its equipment may not be sufficient to produce competitively. Also, if it has inadequate capacity, it may lose market share to rival firms and to regain customers who had left, the firm would need high selling expense, price reduction or improvement of products, which are all costly. In this light therefore, for a firm to be well managed for the benefit of the stakeholders, good budgeting proposals are mandatory. Six major methods are used in evaluating projects to decide whether or not they should be accepted. They are called capital budgeting techniques.

9. Capital Budgeting Techniques

To evaluate investment projects and select the one that maximizes wealth, we must determine the cash flows from each investment and assess the uncertainty of all the cash flows. The six techniques are:

1. Payback period
2. Discounted payback period
3. Net present value
4. Profitability index
5. Internal rate of return
6. Modified internal rate of return.

An evaluation technique should consider the following elements of a capital project.

- All the future incremental cash flows from the project.
- The time value of money.
- The uncertainty and risks associated with future cash flows. Drury (2006) opines that projects selected using a technique that satisfies all three criteria will maximize owners' wealth.

1. Payback Period Technique

The payback period for a project is the length of time it takes to recoup the money invested in the project. It is the period from initial cash outflow to the time when the project's cash inflows add up to the initial cash outflow. The economic life of a project after the payback period, according to (Myers, 1974) "is referred to as the post payback duration". "If post payback duration is zero, the investment is worthless, no matter how short the payback." This is so, because the initial outlay is greater than the future cash flows. This assertion was corroborated by Pandey (2009) who opines that when the future cash flows are worthless today than in the future, zero post payback duration exists. This means that the present value of the future cash flows is less than the project's initial investment.

The payback technique has much usefulness to the firm, in areas of risk indication and giving the firm a rough liquidity situation of the investment. However, because the payback method does not tell the firm the particular payback period that maximizes wealth, it is not advisable to use it as the primary screening device for investment in long-lived assets. It should be noted that payback does not consider all cash flows and the timing of cash flows.

Payback Period and firm's wealth maximization.

Investment's payback period does not show the profitability of the project. Payback period ignores the time value of money, the cash flows after the payback period and may lead to excessive investment in short-term projects. It shows no contribution of a project to the value of the firm. Therefore, this method does not indicate projects that maximize owners' wealth.

2. Discounted Payback Period.

The discounted payback period is an improvement on the simple payback period, since it recognizes the time value of money. This is done by discounting the cash inflows of the project at a rate that reflects both the time value of money and the uncertainty of the future cash flows. The rate used is the cost of capital. Like the PBP, the discounted payback period technique does not take into account the cash inflows from projects after the payback period and as such, it is not consistent with owners' wealth maximization.

Discounted Payback Period and firm's wealth maximization.

Just like the payback period, the discounted payback period does not provide the analyst with the information about how profitable the investment is. This is so because it ignores every transaction after the payback point. This method can only be used as an initial screening device to eliminate projects that cannot payback over the expected term of investment. Because it ignores the some of the cash flows that contribute to the present value of investment, this technique is not consistent with the wealth maximization objectives of owners of investment.

3. Net Present Value Technique

The net present value (NPV) method is based upon the discounted cash flow (DCF) technique. To implement this approach, find the present value of each cash flow, including the initial cash flow, discounted at the project's cost of capital, r . After this, sum these discounted cash flows and subtract from the initial cash outlay to arrive at the project's NPV.

The rationale for the NPV technique is that at the NPV of zero, the project's cash flows are exactly sufficient to repay the invested capital and to provide the required rate of return on that capital. If the NPV is positive, it means the investment has increased the value of the firm. On the other hand, a negative NPV indicates a diminution of the firm's value from the investment embarked on. Net Present Value can be presented using the summation notation, thus:

$$NPV = \sum_{t=0}^N \frac{CF_t}{(1+r)^t}$$

Where,

t indicates any time period.

CF_t indicates the cash flow at the end of period, t .

r is the cost of capital.

T is the number of periods making up the economic life of the investment.

Net Present Value and the firm's Wealth Maximization.

The decision rule for NPV therefore follows that if NPV is greater than zero, the investment is expected to increase shareholders' wealth and the project should be accepted. If the NPV is less than zero, the investment is expected to decrease shareholders' wealth and the project should be rejected. And if NPV is equal to zero, the investment is expected not to change shareholders' wealth and the firm is indifferent between accepting or rejecting the project. Therefore, since NPV is a measure of how much owners' wealth can be expected to increase or decrease owing to the expected profitability, it is consistent with owners' wealth maximization objective.

4. Profitability Index Technique

The profitability Index (PI) is the ratio of the present value of investment cash outflows. It is the present value of future cash flows divided by the initial cost of the project. Or the ratio of the present value of change in operating cash inflows to the present value of investment cash outflows. PI is the ratio of two present values. It is therefore a variation of NPV. If NPV is zero, PI is one, because the former is the difference of the values while the later is the ratio of the values.

$$PI =$$

Present value of the change in operating future Cash inflows

Present value of the investment cash outflows

According to Peterson et al (2002), the PI also measures the benefit-cost ratio, because it is the ratio of the benefit which an investment provides (the present value of cash inflows) to its cost (the present value of cash outflows).

The PI indicates the relative profitability of a project. It shows the present value per Naira of initial cost: if the PI is greater than one, the firm has more than N1 for each N1 invested. Conversely, if the PI is less than one, the firm has less than N1 for each N1 invested. It implies that for a project to increase the firms' wealth it must have a PI greater than one.

Profitability Index and the Firm's Wealth Maximization

The decision rule is, if $PI > 1$ the investment returns more than N1 in present value for every N1 invested, and the project should be accepted. If the $PI < 1$, the investment returns less than N1 in present value for every N1 invested, and the project should be rejected. But if $PI = 1$, the investment returns N1 in present value for every N1 invested and the firm is indifferent between accepting and rejecting the project. PI as an evaluation technique considers the three criteria of considering all cash flows, timing of cash flows and considers the riskiness of cash flows. Meeting these criteria, we could say that it is consistent with the firm's wealth maximization objectives. However, in comparison with NPV, there will be inconsistent results when project ranking involving different capital outlay is considered.

5. Internal Rate of Return Technique

The IRR is defined as the discount rate that forces the NPV to equal zero. Internal rate of return has other names. It is called the cut off rate, the hurdle rate, the DCF yield, the target rate, the marginal efficiency cost of capital, DCF rate of return and the break even cost of capital. It is the rate that equates the PV of all cash inflows with the PV of all cash outflows.

The IRR of a particular project is peculiar, and indicates that borrowing at a rate higher than the IRR calculated will make the project unviable. But if a lower rate is applied to finance the project, it will become

viable and add to the value of the firm (Akinsulire, 2010). Though IRR is calculated using the following equation,

$$CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \dots + \frac{CF_N}{(1+IRR)^N} = 0$$

$$= NPV = \sum_{t=0}^n \frac{CF_t}{(1+IRR)^t} = 0$$

The simpler way to calculate this rate is using a two step- approach- trial and error and interpolation.

Step 1- Trial and error

Akinsulire (2010) opines that by good reasoning, the firm would be required to apply two different rates that would produce two opposing NPVs - one positive and the other, negative.

Step 2- Interpolation.

From the calculations done in step1, the following formula would be used to generate the IRR

$$IRR = \frac{LR + NPV_{LR}}{NPV_{LR} - (NPV_{HR})} * (HR - LR)$$

Where: LR is lower rate

HR is higher rate

NPV_{LR} is the NPV of lower rate (positive NPV)

NPV_{HR} is the NPV of the higher rate (negative NPV).

The IRR and Mutually Exclusive Projects

As explained by Akinsulire (2010), when evaluating mutually exclusive projects, the one with the highest IRR may not be the one with the best NPV. The IRR may give a different decision than NPV when evaluating mutually exclusive projects because of these re-investment assumptions:

- (a) NPV assumes cash flows are re-invested at the cost of capital
- (b) IRR assumes cash flows are re-invested at the internal rate of return.

These re-investment assumptions, Mcdonald (2006) posits that it could cause management to have different choice among mutually exclusive projects considering the following:

- (i) The timing of the cash flows is difficult among the projects
- (ii) There are scale differences(i.e. very different cash flows amounts)
- (iii) The projects have different useful life.

IRR and capital Rationing

Capital rationing is the term used to describe the situation in which finance available for new investment is limited to an amount that prevents acceptance of all projects with positive NPVs. That means there is financial constraint.

If two investments B and C are independent projects, and assuming the capital budget is limited to N1,000,000, the firm is forced to choose between B and C. Let's assume also that B is the project with the higher IRR while C is the project with a higher NPV. In this scenario, C increases the wealth than A. Therefore, ranking investments on the basis of their IRRs alone does not add value to wealth.

IRR and Wealth Maximization

Chandra (2009) therefore posits that evaluating projects with IRR indicates the ones that maximize wealth as long as the projects are independent and are not limited by capital rationing. For mutually exclusive projects or capital rationing, the IRR may (though not always) lead to projects that do not maximize wealth.

6. Modified Internal Rate of Return Technique

The modified internal rate of return technique is similar to the IRR but uses a more realistic reinvestment assumption. According to Akinsulire (2010), MIRR addresses the re-investment rate issue and reduces over optimism, and produces a result which, when ranking projects, is consistent with the NPV rule.

Brigham and Ehrhardt (2008) opine that academics prefer NPV but surveys show that most company executives prefer IRR to NPV. Managers, according to him find it more desirable to evaluate investments in terms of percentages, rates of return than Naira of NPV. This brings us to the MIRR formula:

$$PV \text{ of costs} = \frac{\sum_{t=0}^n \frac{COF_t}{(1+r)^t}}{(1+MIRR)^N} = \frac{\sum_{t=0}^n CIF_t (1+r)^{N-t}}{(1+MIRR)^N}$$

= PV of terminal value.

Where,

COF= cash outflows (negative numbers) or cost of project

CIF= cash inflows (positive numbers)

r= Cost of capital.

The left term in the equation is the present value of the investment outlays when discounted at the cost of capital, and the numerator of the right term is the compounded future value of the inflows, assuming that the

cash flows are re-invested at the cost of capital. The compounded future value of the cash inflows is also called the terminal value. Here, MIRR is the discount rate that forces the present value of the terminal value to equal the present value of the costs.

MIRR and Wealth Maximization

MIRR can be used to evaluate investment in independent projects and also identify the ones that maximize owners' wealth. (Danayanda et al, 2002). However, Peterson Fabozzi (2002) stress that "decisions made using MIRR are not consistent with maximizing wealth when selecting among mutually exclusive projects or when there is capital rationing."

9. Hypotheses Development

The hypotheses for this study were developed using wealth maximization, as the objective of the firms and the extent of the contribution of capital budgeting processes to increase firms' performances in achieving the objective of the firm. In this study, capital budgeting processes is the independent variable (X), wealth maximization objective becomes the dependent variable (Y).

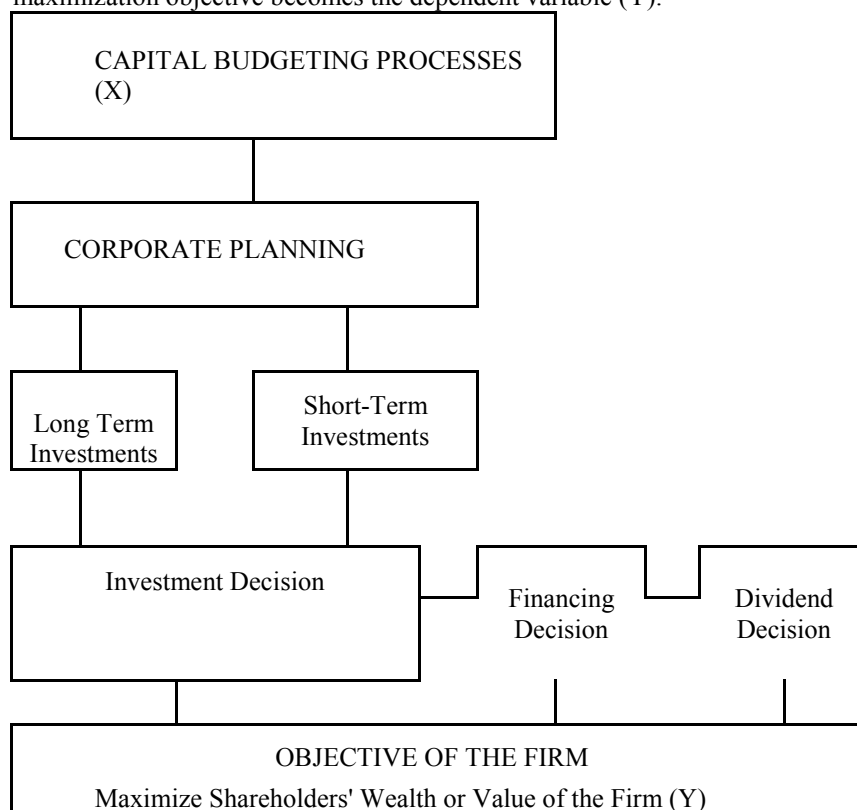


Figure 1. The conceptual model

Hypothesis 1:

Investment identification and selection does not relate significantly with wealth maximization objective of firms.

Hypothesis 2:

There is no significant relationship between project evaluation/capital budgeting proposal and wealth maximization objective of firms.

Hypothesis 3:

Budgeting approval and authorization has no significant relationship with wealth maximization objective of firms.

Hypothesis 4:

There is no significant relationship between project tracking/development and wealth maximization objective of firms.

Hypothesis 5:

Monitoring and controlling firm's project is insignificantly related to maximizing shareholders' wealth.

Hypothesis 6:

Carrying out post completion audit does not have any significant relationship with shareholders wealth maximization.

Hypothesis 7:

There is no significant joint relationship between Investment identification and selection, project evaluation and

capital budgeting proposal, budgeting approval and authorization, project tracking and development, monitoring and control of project, post completion audit and wealth maximization objectives.

10. Research Methodology and Model Specification

10.1 Research Design

In this study the exploratory research method was used, to investigate the magnitude and direction or nature of the relationship that exists between the dependent variable and one or more independent variables. Facts were gathered from existing literature on the subject matter. The physical and virtual libraries were visited to consult authors of accounting and finance books and journals. These served as external sources. For the internal sources, data were collected through e-mail questionnaire survey from 25 companies listed in the Nigerian Stock Exchange. The list of manufacturing companies listed in the Stock Exchange was collected from the NSE Fact Book, 2014. The names and addresses of the companies were obtained through browsing the companies' websites. Questionnaires were sent to 25 companies and 15 senior managers in the Accounts and Finance departments of these companies were expected to fill and return the questionnaires. Altogether, 375 questionnaires were sent out. However, only 75, representing 20% of the population under survey were received.

10.2 Model Specification

Correlation analysis using Pearson Moment Correlation Coefficient was used to find the relationship between capital budgeting processes (Investment identification and selection, Project evaluation and capital budget proposal, Budgeting approval and authorization, Project tracking and development, Monitoring and control of projects, Post completion audit) and wealth maximization objectives (Positive NPV, Magnitude of future cash flow, Timing of future cash flow, Reduction of business risk). It was noted earlier that shareholders wealth is the same as the firm's value, V, and $V = PVI = PVO + PVI1 \dots n$,

Where V = value of the firm

PVI = present value of all future cash flows

PVO = present value of all cash flows from all assets at hand

$PVI1 \dots n$ = present value of cash flows from future investment opportunities in the life of the project.

The general equation for regression is given as $Y = f(X)$, which means Y depends on X and the equation can be written as: $Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \mu$

Where, α is the intercept, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 are the coefficients of variables X_1, X_2, X_3, X_4, X_5 and X_6 respectively, which show the kind of relationship between dependent and independent variables and μ is known as the error term.

Y = Dependent variable

= wealth maximization objectives which are indicated by; Positive NPV, Magnitude of future cash flow, Timing of future cash flow and Reduction of business risk.

X = Independent variable

= Capital budgeting processes indicated by; Investment identification and selection, Project evaluation and capital budget proposal, Budgeting approval and authorization, Project tracking and development, Monitoring and control of projects, Post completion audit.

For this study however, the above formula is adapted as follows:

Model: *Wealth Maximization Objectives of Firms* = $f(\text{Capital budgeting processes})$

Therefore, WMOF = $\alpha + \beta_1Inv + \beta_2Proj + \beta_3Budg + \beta_4Dev + \beta_5Mon + \beta_6Post + \mu$

Hence, Positive NPV = $\alpha + \beta_1Inv + \beta_2Proj + \beta_3Budg + \beta_4Dev + \beta_5Mon + \beta_6Post + \mu$

Magnitude of FCF = $\alpha + \beta_1Inv + \beta_2Proj + \beta_3Budg + \beta_4Dev + \beta_5Mon + \beta_6Post + \mu$

Timing of FCF = $\alpha + \beta_1Inv + \beta_2Proj + \beta_3Budg + \beta_4Dev + \beta_5Mon + \beta_6Post + \mu$

Reduction of Business Risk = $\alpha + \beta_1Inv + \beta_2Proj + \beta_3Budg + \beta_4Dev + \beta_5Mon + \beta_6Post + \mu$

11. Data presentation and analysis

The data presentation involved tables which were used for the correlation analysis and regression analysis for the hypotheses testing.

Table 1: Multiple Regression of The Relationship Between Capital Budgeting Sub-Variables And Wealth Maximization.

Model	Unstandardized coefficient		Standardized coefficient B	t	Sig	Result
	B	Std error				
Constant	70.037	2.327	-----	30.092	0.000	Significant
IAS	0.447	0.126	0.234	3.536	0.000	Significant
PEACBP	-0.325	0.195	-0.113	-1.666	0.097	Insignificant
BAAA	-1.085	0.357	-0.640	-3.040	0.003	Significant
PTAD	0.001	0.107	0.000	0.011	0.991	Insignificant
MACOP	-0.770	0.134	-0.286	5.746	0.000	Significant
PCA	0.047	0.351	0.027	0.133	0.894	insignificant

Dependent Variable: Wealth maximization objectives

Source: SPSS V.20 Field Data Analysis.

Hypothesis 1:

Investment identification and selection does not relate significantly with wealth maximization objectives of shareholders.

The multiple regression in table 1 above reveals a beta value of 0.234 for both investment identification and wealth maximization. This value however was significant at 0.000 alpha level. Hence, since the p-value of 0.000 was less than the chosen alpha level of 0.05, the null hypothesis was rejected and the alternate accepted implying that investment identification relates significantly with wealth maximization objectives of shareholders.

Hypothesis 2:

There is no significant relationship between project evaluation/capital budgeting proposal and wealth maximization objectives of shareholders.

The analysis in the table also reveals a beta value of -0.113 which represents approximately 11% of the total contribution to wealth maximization. Furthermore, a p-value of 0.09 was also realized. However, since the p-value was greater than the chosen alpha, hypothesis 2 was accepted and its corresponding alternative rejected. This in actual sense implies that project evaluation and capital budgeting proposal has no significant relationship with wealth maximization of shareholders.

Hypothesis 3:

Budgeting approval and authorization has no significant relationship with wealth maximization objectives of shareholders.

From the analysis, budgeting approval and authorization had a beta value of -0.640 which represents about 64% of its contribution to wealth maximization. A p-value of 0.003 was also realized. However, this value was less than the chosen alpha value of 0.05. hence, since $p < 0.05$, hypothesis 3 was rejected and its corresponding alternate accepted meaning that budget approval and authorization has a significant relationship with wealth maximization of shareholders.

Hypothesis 4:

There is no significant relationship between Project tracking/development and wealth maximization of firms.

Project tracking and development had a beta value of 0.000 indicating almost 0% relationship or contribution towards wealth maximization. A p-value of 0.991 was also realized. Since this value is greater than the alpha level, hypothesis 4 was however accepted indicating that project tracking and development does not have any relationship with wealth maximization of shareholders.

Hypothesis 5:

Monitoring and controlling firm's project is insignificantly related to maximizing shareholders' wealth.

Monitoring and control of project had a beta value of -0.286 indicating about 28% contribution towards wealth maximization. P-value of 0.000 was also realized. Hence, since the p-value was less than the alpha level of 0.05, the null hypothesis however is rejected and the alternate accepted implying that monitoring and control of project actually relates significantly with wealth maximization of shareholders.

Hypothesis 6:

Carrying out post completion audit does not have any significant relationship with wealth maximization objectives of firms.

Analysis from the post completion audit also revealed a beta value of 0.027. This value indicates that about 2.7% of wealth maximization could be attributed to post completion audit. A p-value of 0.894 was also realized. However, 0.894 as realized was greater than the alpha level of 0.05. Hence, hypothesis 6 was accepted meaning that carrying out post completion audit does not have any significant relationship with wealth maximization of shareholders.

Hypothesis 7:

There is no significant joint relationship between Investment identification and selection, project evaluation and capital budgeting proposal, budgeting approval and authorization, project tracking and development, monitoring and control of project, post completion audit and wealth maximization objectives.

Furthermore, in order to test hypothesis 7, data were subjected to analysis of variance (ANOVA) associated with multiple regression statistics. The table below depicts the analysis and the results thereof.

Table 2: Analysis of Variance associated with Multiple Regressions on the Joint Relationship between Variables of Capital Budgeting and Wealth Maximization of Shareholders.

Model	Sum of Squares	D.F	Mean of square	F	R	R2	Sig	Result
Regression	54496.814	6	9082.802	56.029	0.720	0.519	0.000	Significant
Residual	50578.277	312	162.110					
Total	105075.091	318						

Source: SPSS V.20 Field Data Analysis.

Table 2 reveals that there is a multiple correlation between all the dependent variables with the independent variable. A multiple correlation coefficient (R) of 0.720 was realized indicating a high correlation. A R squared value of 0.519 was also realized. This value indicates that all the independent variables combined contributes about 51.9% to the wealth maximization objectives of shareholders. The table also reveals a p-value of 0.000. since the p-value is less than the chosen alpha level of 0.05, hypothesis 7 was rejected meaning that investment identification and selection (IIAS), project evaluation and capital budget proposal, budget approval and authorization, project tracking and development, monitoring and control of project as well as post completion audit jointly put, have significant relationship with wealth maximization of shareholders.

12. Conclusions

This study was conducted to examine the relationship which exists between capital budgeting processes and wealth maximization objectives of firms in Nigeria. The results show that capital budgeting processes, indicated by (Investment identification and selection, Project evaluation and capital budget proposal, Budgeting approval and authorization, Project tracking and development, Monitoring and control of projects, Post completion audit) has significant relationship with wealth maximization objectives of firms in Nigeria. Arriving at this result of multiple correlations between the dependent variables and the independent variable, we had earlier rejected null hypotheses 1,3 and 5. This confirmed that (1), Investment identification relates significantly with wealth maximization objectives of shareholders. (2) Budget approval and authorization has a significant relationship with wealth maximization of shareholders. (3) Monitoring and control of project actually relates significantly with wealth maximization of shareholders.

Earlier in the study, we found out that hypotheses 2,4 and 6 were accepted, which means: (1) there is no significant relationship between project evaluation/capital budgeting proposal and wealth maximization objectives of firms in Nigeria. (2) there is no significant relationship between project tracking/development and wealth maximization objectives of firms and, (3) carrying out post completion audit by management of firms does not have a significant relationship with wealth maximization objectives of firms in Nigeria.

The acceptance of hypothesis 2 can be explained in the light of the fact that project evaluation/proposal analysis involves many techniques which are discounted and non-discounted. Any technique that would increase the cash inflow to the firm would add to its value, while the one that does not have positive net present value would rather diminish the existing value of the firm. It depends on the peculiarity of that firm and the projects involved. The same reason goes to the acceptance of hypotheses 4 and 6. Project tracking/development and carrying out post completion audit may not add value to a project that has already started. Their contribution is to correct the anomaly, if any, against future projects and does not contribute to a project whose financial outlay has already been made.

13. Recommendations

- (i) This study recommends that management of firms in Nigeria should ensure that any investment they want to commit the shareholders' fund to, must be properly identified and screened before giving preference to it. The study showed a positive correlation between identification of the project and the value the project would add to the firm. The value addition results in maximization of wealth to the shareholders.
- (ii) Management should consider capital budgeting approval and authorisation as being essential to value addition to shareholders' investment. This is seen in the positive correlation which exists between this variable and wealth maximization objectives. Timely approval and authorisation of the budget is a panacea to this.

(iii) Project monitoring and control is essential for management to know the direction the project is going. This will ensure that the approval and authorisation it gave to the budget is followed strictly and the tactical management responsible for the implementation is assigned adequate responsibility. This is responsibility accounting which also ensures steering the project to the realization of the firm's objective, which is wealth maximization.

(iv) The capital budget processes as discussed must be entrenched in the firm and seen to be followed as approved and authorized by the board. This involves making capacity decision in addition to taking responsibility by the management concerned. It must be noted that post completion audit may not add value to the existing project as indicated in the negative correlation, but it would help in the evaluation of similar project(s) likely to be undertaken by the firm in future.

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