
USAGE OF CAPITAL BUDGETING TECHNIQUES AND DETERMINANTS; EVIDENCE FROM VARIOUS LITERATURE REVIEW OF MANUFACTURING COMPANIES SURVEYS

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ABSTRACT

In this article, it is highlighted that there are specific determinants and factors that explain why manufacturing companies use and do not use specific capital budgeting techniques; namely, Financial variables(size, revenue growth, leverage and liquidity), non-financial variables(such as the pressure of competitive environment, company's strategy, production technologies and company's age). Several studies on the impact of such variables on management systems can be found in the literature. Nevertheless, there is little empirical evidence on the factors that explain the use of capital budgeting evaluation techniques by companies. A literature studies about the survey evidence on capital budgeting evaluation techniques was collected. These studies were done by different scholars.It is expected that, in practice, capital budgeting evaluation techniques could be regarded not only as an ad hoc usage of more or less sophisticated techniques, but characterized by different levels of sophistication and completeness. In this article, we present literature review of various surveys done by research scholar

Keywords: Capital budgeting, Techniques, Determinants of this techniques

INTRODUCTION

A number of researchers in finance have examined capital budgeting practices. The best known field studies about the practices of corporate finance are Gitman and Forrester's (1977) study of Capital Budgeting Techniques Used by Major U.S. Firms, Porwal's (1976) study on Capital Budgeting Techniques and Profitability and Graham and Harvey's (2001) study on capital budgeting, cost of capital, and capital structure. It is believed that the findings of this study in the context of Ethiopia are useful to academia and practitioners in learning how manufacturing Ethiopia operates. What are the capital budgeting tools and techniques being practiced by the industry and how popular are they? Do firms use methods that help to maximize the firm value? The review of empirical surveys and studies help to find answers to these questions. The changes in capital budgeting procedures over the decades have been well documented in prior studies. The research of Canada and Miller, Fremgen, Gitman and Forrester, Kim and Farragher, Stanley Block all indicate that increasingly sophisticated capital budgeting procedures have been put in practice. However, a generalization that more sophisticated practices take place across all industries is subject to investigation and challenge. This consideration is important because an analyst within a given industry may be intending on following industry norms but misled by general observation that relate to the studies cited above. Just as there are different valuation procedures or financing norms between industries, there may also be different capital budgeting procedures. Rosenblatt and Jucker (1979) and Scott and Petty (1984) summarize several of these surveys. They show that from 1955 to 1978 the use of techniques which recognize the time value of money (i.e., IRR, NPV, PI and discounted payback) by sample firms rose from .09 to around .80. However, many survey authors

express that a greater percentage of the respondents did not use techniques which discounted future cash flows. A number of textbooks have similar concerns.

CAPITAL BUDGETING TECHNIQUES AND CLASSIFICATION:

Capital budgeting techniques are classified into two broad groups-traditional and modern and sophisticated or discounted cash.

Traditional capital budgeting techniques;

The traditional capital budgeting techniques consists of payback period and accounting rate of return. These two are the most common that many company uses

The Payback Period Method:

The payback can be defines as the time required for the cash inflows from capital investment project to equal the cash out flow. When deciding between two or more projects, the usual decision is to accept the one with the shortest payback. Payback is commonly used as a first screening method. That is, when a capital investment project is being considered, the first question to ask is, "How long will it take to pay back its cost? The firm may have a target payback period, and so it would reject a capital project unless it's payback period is less than a certain number of years, perhaps five years, depending on the company policy. The specific approach to be adopted in the process of identifying the actual payback period will depend on the nature of the cash flow; i.e., whether the cash flow is constant or unequal throughout the duration of the project. Where the cash flow is evenly, the formula approach for payback period is appropriated, and it is defined as;

$$\text{Pay back period} = \frac{\text{Cash Outflow}}{\text{Average Annual Earning}}$$

Adeniyi (2004)ⁱ asserted that in spite of the theoretical limitations of the payback period method, it is the one that is most widely used in practice. He offered the following reasons for its usage: it is easily understood by all levels of management; it provides an insight on how quickly the initial can be recouped; most managers see risk as time-related i.e. the longer the period, the greater the chance of failure; where a firm faces liquidity constraints and requires a fast repayment of investments, the payback period is more useful; it is appropriate in situations where risky investments are made in uncertain markets that are subject to fast design and product changes or where future cash flows are particularly difficult to predict.

Accounting Rate of Returns:

The accounting rate of returns technique for capital project is to estimate the return on investment that the project should yield. If the computed value of return on investment exceeds a target rate of return for a single project, it is advisable to undertake the project otherwise the project should be rejected. But where multiple project proposals are being considered, the project proposal with the highest return on investment is the most viable.

The accounting rate of returns (ARR) is defined as:

$$ARR = \frac{\text{Estimated average annual earning}}{\text{Estimated average capital}} \times 100\% \dots$$

Discounted cash flow:

The discounted cash flow consist net present value, internal rate of return and profitability index. The modified internal rate of return also which is some companies use depending on certain circumstances.

Net present Value (NPV) techniques:

Henshaw and Smith (2000) highlighted the following conditions for the viability of a project under the net present value; if the net present value is positive, it means that the cash inflows from a capital

investment will yield a return in excess of the cost of capital, and so the project should be undertaken if the cost of capital is the firm's target rate of returns; if the net present value is negative, it means that the cash inflows from a capital investment will yield a return less than the cost of capital, and so the project should not be undertaken if the cost of capital is the firm's target rate of returns; if the net present value is exactly zero, the cash inflows from the capital investment will yield a return which is exactly the same as the cost of capital, and so if the cost of capital is the firm's target rate of returns, the project be only just worth undertaking. The net present value function is defined as;

$$NPV = \sum \left[\frac{cf}{(1+r)^n} \right] - I$$

Where:

CF = Cash inflows

n = Duration of the capital budgeting project

r = Rate of discount or cost of capital

I = Initial Investment or Cash Outflows.

This technique ignores the impact of risk on project evaluation; divisional manager may not be comfortable by relying on the method for performance evaluation, because it is not a rate of return method; it may mislead the investor or firm because it does not represent the actual returns associated with the project; it over-relies on the accurate estimation of the market determined cost of capital.

The Internal Rate of Returns (IRR) technique:

This is the discount rate or the cost of capital that will equate the sum of present values of a project to zero. It is the rate of discount in which discounted cash inflows and outflows of a project are balanced. In other words, internal rate of returns is the maximum rate of interest a firm can afford to pay if a project is financed with borrowed funds and the project cash inflows are to be used to liquidate the loan. It is equally the minimum rate of interest a lender is willing to accept for releasing fund to the borrower. Conventionally, if the internal rate of returns exceeds the prevailing rate (i.e. external rate of return or cost of capital), the project is considered viable. The internal rate of return is defined as:

$$NPV = \sum \left[\frac{cf}{(1+r)^n} \right] - I = 0$$

Where

Cf = Cash Inflows

n = Duration of the project

I = Initial Investment or cash outflow

r = Internal rate of returns

Lucey (1984)ⁱⁱ advanced two basic techniques for computing the internal rate of returns. These are the formula method and the present value profile method. These are the formula method and the present value profile method.

The Profitability Index:

This is also a discounted cash flow method, which is determined by the ratio of the sum of present values of cash inflows to the capital outlay.

Profitability index is defined as:

$$PI = \sum \frac{[Cf(1+r) - n]}{I}$$

Where

Cf = cash inflows

r = Discount rate

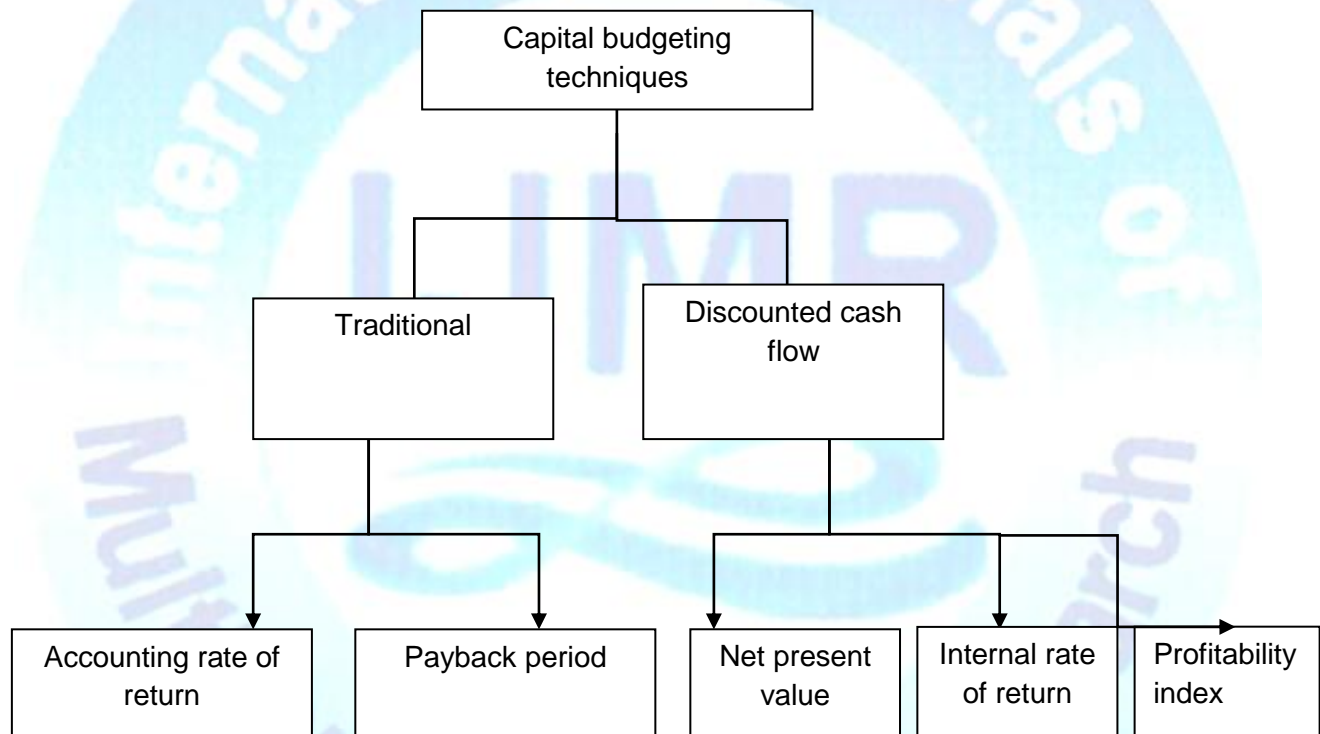
n = Duration of the project

I = Initial Investment or cash outflow

Conventionally, a project is said to be viable if the profitability index is greater than one.

As we can see from figure 1 the capital budgeting techniques broadly classified into traditional and modern or sophisticated technique which many company are using whether their objective is expansion of existing plan machinery, maintenance, adding line of production or research and development in manufacturing companies.

Figure 1: Capital budgeting techniques



Source: Adeniyi A. Adeniji (2004)

The Determinants of the capital budgeting technique's selection

It is imperative that the selection of the techniques of capital budgeting decision involves a multitude of factors that may directly or indirectly affect the selection of the technique and then the outcome of the analysis and the final decision whether to adopt the successful opportunity or not. We can classify the determinants of the technique selection into financial and non-financial factors.

The financial factors include the size of the organization measured by the value of assets), rate of growth in revenues, profitability, leverage level, capital expenditure of the investment opportunity, and availability of cash. On the other side, the nonfinancial factors include: the age of the company, life of the project, management experience and educational background, quality of the project, familiarity with investment, and other external factors.

Size of Company:

Regarding the first variable, which is the size of the company measured by the value of total assets, it is found that generally the size is positively correlated with the use of the capital budgeting techniques (Daunfeldt, and Hartwig,ⁱⁱⁱ and Bennouna et al.^{iv}, . They find that large companies use PB, NPV, IRR, IRR, more than small companies;

Revenue growth:

The financial variable (Revenues Growth) determines the type of techniques used by the company. Many literatures show that companies with higher growth rates use PB and NPV more often and use other techniques such as adjusted present value (APV) less often when compared to companies with lower growth rates.

Profitability

The profitability of the company is measured by the amount of net profits as well as some profitability ratios (ROE, ROA, and Profit Margin Ratio). It is found that profitable companies use more NPV and the relationship with other methods is either not significant or negatively related to this variable.

Leveraged;

Companies with high debt-equity ratio are classified as high leveraged companies. Research findings provide evidence that high leverage companies tend to use more the PB and NPV but they have insignificant or negative relationships with other techniques. High leveraged companies pay more attention to the period of time to recover their initial costs as they are subject to a high degree of financial risk.

Liquidity;

The availability of enough cash is a good indicator of liquidity. Companies with large cash balances are classified as liquid companies and with less liquidity risks. Therefore, they have an opportunity to make new investments. Studies show companies with more cash balance tended to use more excessively NPV and APV but they are negatively correlated with PB, ARR and IRR Verbeeten^v and Holmen.^{vi}

The second class of variables is about the non-financial factors that include the age of the company, useful life of the project, levels of education of the CFOs, quality of the project, familiarity with the project, and other external variables.

Age of the company:

However, new companies (5 years or less) found to have a strong relation with PB. Capital budgeting Projects expected to continue for a long period tended to have excessive use of, NPV and IRR. On the other side, they have negative relation with PB, PI, and ARR.

Educational qualification of the Managers/CFOs:

The managers/CFOs with a high level of education (Ph. D., MBA, or Professional Certificates), tend to use more, NPV, and IRR, whereas they have insignificant or negative relation with PB, ARR, and other techniques.

Quality of the capital budgeting project:

When the target of the company is the quality of the project, decision makers concentrate more on qualitative factors, which are not financial. Literature and research study findings show that there is a negative correlation between the high quality projects and most of the capital budgeting techniques.

Familiarity/Experience

If the company is familiar with the capital project, the company did not use any of the common capital budgeting techniques. Managers/CFOs usually use their experience or that familiar projects do not need

sophisticated techniques and they can select the project only by considering experience of other investors.

However, there is a negative association between a majority of the nonfinancial factors (age, life of the project, level of education, and quality of the project) with other techniques of capital budgeting.

EVIDENCE FROM LITERATURE

The review of capital budgeting literature can be seen as follows;

Wong, Farragher and Leung (1987)^{vii} surveyed a sample of large corporations in Hong Kong, Malaysia and Singapore in 1985. They found that payback period (PBP) was the most popular primary technique for evaluating and ranking projects in Malaysia. In Hong Kong, they found PBP and ARR to be equally the most popular. They concluded that, in contrast to US companies where DCF techniques are significantly more popular than non-DCF techniques as primary evaluation measures, companies in Hong Kong, Malaysia and Singapore prefer to use several methods as primary measures in evaluating and ranking proposed investment projects. It is also observed that companies in Hong Kong, Malaysia and Singapore do not undertake much risk analysis, neither attempting to assess risk nor adjust evaluation criteria to reflect risk. The most popular risk assessment techniques were sensitivity analysis and scenario analysis (high-medium-low forecasts).

Pandey I M (1989)^{viii} studied the capital budgeting practices of fourteen medium to large size companies in India. He found that all companies, except one, used payback. With payback and/or other techniques about two-thirds of companies used IRR and about two-fifths NPV. IRR was found to be the second most popular method. The reasons for the popularity of payback in order of significance were stated to be its simplicity to use and understand its emphasis on the early recovery of investment and focus on risk. It was found that one-third of companies always insisted on the computation of payback for all projects, one-third for majority of projects and remaining for some of the projects. For about two-thirds of companies' standard payback ranged between 3 and 5 years. According to his survey, reasons for the secondary role of DCF techniques in India included difficulty in understanding and using these techniques, lack of qualified professionals and unwillingness of top management to use DCF techniques. For capital rationing it is found that most companies do not reject projects on account of capital shortage. They face the problem of shortage of funds due to the management's desire to limit capital expenditure to internally generated funds or the reluctance to raise capital from outside. But generally companies do not reject profitable projects under capital rationing; they postpone them till funds become available. The most commonly used methods of risk analysis in practice are sensitivity analysis and conservative forecasts. Except a few companies most companies do not use the statistical and other sophisticated techniques for analyzing risk in investment decisions.

Stanley (1990)^{ix} has studied capital budgeting techniques used by small business firms in 1990s. According to Eugene Brigham, in his book 'Fundamentals of Financial Management' his research of "Capital Budgeting in the Small Business Firms", capital budgeting may be more important to the smaller firm than its larger counterparts because of the lack of diversification in a smaller firm. He says that a mistake in one project may not be offset by successes in others. His intention of the study is to ascertain where small firms stand today in regard to capital budgeting techniques as opposed to prior decades. He selected 850 small firms out of which he received 232 usable responses to the study. As per his findings, a number of patterns relating to capital budgeting by smaller firms are worthy to note. The firms continue to be dependent on the payback method as the primary method of analysis. This is not necessarily evidence of a lack of sophistication, as much as it is a reflection of the financial pressures put on the small business owner by financial institutions. The question to be answered is not always how profitable the project is, but how quickly a loan can be paid back. Small business owners have increased

sophistication as over 27% use discounted cash flow as the primary method of analysis. Stanley opines that their conclusions may, at times, be somewhat misleading due to an inappropriate discount rate. Small firms take risk very seriously which is reflected by a higher required rate of return for risky projects.

Drury, Braund and Tayles' (1993)^x in their survey of 300 manufacturing companies with annual sales exceeding 20 million indicates that payback (86%) and IRR (80%) are the most widely used project appraisal methodologies. The most widely used project risk analysis technique is sensitivity analysis. Forty-nine per cent of the respondents do not use statistical analysis for risk analysis and 95 per cent of the respondents never use either capital asset pricing model (CAPM) or Monte Carlo simulation due to lack of understanding. Petry and Sprow's (1993) study of 151 firms listed in the 1990 Business Week 1000 firms indicates that about 60 per cent of the firms use the traditional payback period either as a primary or as a secondary method for capital budgeting decisions. Ninety per cent of the firms use NPV and IRR either as a primary or as a secondary capital budgeting decision methodology. Most of the financial managers indicated that either they had not heard of the problems of IRR (multiple rates of return, NPV and IRR conflict) or such problems rarely occurred.

Kester, George W & Chong Tsui Kai (1996)^{xi} has studied Capital Budgeting Practices of Listed Firms in Singapore. They took a sample size of 211 companies and the survey resulted in 54 responses. They found that the responding executives in Singapore considered IRR and payback to be equally important for evaluating and ranking capital budgeting projects.

Summary and Conclusion

The article reviews the capital budgeting practices, techniques and determinants of the manufacturing companies studied by different researchers and analyze their view. The study fills a gap in the literature regarding capital budgeting practices in Ethiopia manufacturing and the other region in the world.

The review of literature study concludes that most of the companies apply capital budgeting techniques in evaluating their investment opportunities. The percentage of frequent and always use is very high for most of the techniques, and only few techniques are not used or sometimes used. The payback technique (PB), NPV, IRR, and PI are widely used techniques by a majority of the companies. Therefore, discounted cash flows are frequently or always used by many companies.

Finally, the study also revealed a number of factors that affect the selection of the capital budgeting technique. The major factors that influence the selection may be financial or nonfinancial variables such as the size of the company, revenues, profitability, leverage level, familiarity with the project, availability of cash, and the level of education of decision makers. Significant differences were found between the methods selected and the factors influencing the selection of the technique. It has been found that there is a positive association between the size, revenues, profitability, and leverage with the mainly used techniques (PB, NPV, IRR, and PI). However, there is a negative association between majority of the nonfinancial factors (age, life of the project, level of education, and quality of the project) with the techniques of capital budgeting.

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