

An Overview of the Capital Budgeting Techniques Practiced by the Companies of Dhaka Stock Exchange Limited

Mohammad Rezaul Islam^{*}

Asma Akter Shelly^{}**

Abstract: *This study explores the capital budgeting techniques used by Bangladeshi companies in evaluating capital investment projects. For this study data were collected from the listed companies of Dhaka Stock Exchange Limited (DSE). The findings of the study reveal that the Net Present Value (NPV) is most preferred technique for evaluating investment projects in terms of profitability while sensitivity analysis is used as a technique for assessing risk of the project. It is also documented that managers generally use more than one technique for evaluating investment projects. However, they emphasize more on the result of Net Present Value (NPV) to select the right one from the conflicting results. In this study the return on investment (ROI) and net profit margin are also observed as the other determinants of evaluating capital investment projects.*

Keywords: *Capital Budgeting, Net Present Value (NPV), Internal Rate of Return (IRR), Pay Back Period (PBP), Discounting Payback Period (DPBP), Profitability Index (PI), Accounting Rate of Return (ARR).*

Introduction

Investment decisions of a company are analyzed in the corporate capital budgeting. Whether there exist any acceptable capital investment evaluation techniques of the individual company is still an unresolved issue. Corporate capital budgeting shed-light on the long term investment decision of a company.

Company can collect fund from various sources along with financial market and uses their fund to invest in different projects to expand the business or to keep intact its status quo in the competitive market. Combined success of different projects, whether new or existing, can ensure the wealth maximization of a company. Companies must meticulously examine the project before using the scarce resources. In this case, capital budgeting process helps to identify and select investments in assets which are expected to produce benefits over more than one year. Over the years different capital budgeting evaluation techniques have been evolved by finance theorist to analyze the optimal investment decisions to be taken by the corporation. Few empirical studies have been done on the application of capital budgeting decisions for different types of companies. Moreover, few empirical studies have extended the analysis of capital budgeting techniques in the international sector. The role of capital budgeting techniques in determining an optimal investment decisions is the focus of this paper. In particular, we attempt to extend capital budgeting research for different types of companies taken in Bangladesh.

^{*}Lecturer in Accounting, School of Education, Bangladesh Open University, Gazipur.

^{**}Lecturer in Finance, School of Business, Bangladesh Open University, Gazipur.

This paper is organized in the following manner so as to show how capital budgeting techniques is used by Bangladeshi companies. The first section specifies the scope and objectives of the study. In section two, previous studies have been outlined. Section three deals with the methodology and findings of results have been given in section four. Concluding comments are contained in section five.

1.0 Scope and Objectives of the Study

The scope of the study is very big. It covers many aspects of the capital investment decisions such as balancing, modernization, replacement and expansion. The evaluation of these investment decisions is the key to survival of a corporation. So the study covers a broad spectrum. The present study will try to concentrate on the issues identified and will try to cover all these issues. In doing so, the capital budgeting techniques of Bangladeshi Companies will be the focal point of consideration. So the main objectives of the study will be as follows -

1. To identify different capital budgeting techniques used by Companies listed in Dhaka Stock Exchange Limited in evaluating investment project.
2. To identify the nature of capital budgeting project and the evaluation process involved in different projects.
3. To identify the application of techniques for appraising investment projects.
4. To identify what discount rate and others factors Companies usually use in Capital Budgeting while making investment decision.
5. To identify the problem of capital budgeting techniques used by Companies and to provide suggestive measures.

2.0 Conceptual Framework and Literature Review

In corporate finance many techniques are used to evaluate investment projects. There are six techniques that are commonly used to evaluate investment projects or investment in long-term assets: i) Payback Period, ii) Discounted Payback Period, iii) Net Present Value, iv) Profitability Index, v) Internal Rate of Return, vi) Average Rate of Return. The choice of techniques may vary among company size, category, and industry. Project size may also play a role in choosing techniques. Similar types of studies were done in different countries and those studies have been used as a reference in conducting this research. Many other factors related with investment evaluation process like constrain of techniques, preference among techniques, discount rate etc. have also been incorporated in this study. This research is conducted with the aim of exploring the use of various capital budgeting techniques to appraise investment projects by Bangladeshi Companies.

Gitman and Forrester (1977) have conducted a survey on the popularity of techniques of capital budgeting and the result of the survey indicated that IRR was the most popular (54.6 percent) technique among the US finance managers. Their result indicates NPV is not used as the primary

tool of analysis; rather it is used as secondary tool of analysis. Danielson and Scott (2006) have shown that “Gut feelings” and payback period method are the top tools for evaluating investment decision in small company. Apap and Masson (2004) have carried out a survey on utility Companies in US and found manager’s preference for payback period for evaluating their project. Graham and Harvey (2001) have found in their study that 75 percent manager prefer NPV or IRR. Bierman (1993) has got out 98 percent of his survey Companies’ preferred discounted cash flow (DCF) techniques and among these techniques IRR was used more frequent than NPV. Petry and Sprow's (1993) indicated about 90 percent of the Companies use NPV and IRR either as a primary or as a secondary decision making tools. Anand (2002) has shown 85 percent of the respondents from India prefer IRR as a very important and 65 percent respondents almost always use NPV. Arnold and Hatzopoulos (2000) have conducted a survey on theory and practice gap in capital budgeting in UK where they found that Companies in UK gradually shifted from Payback Period method to NPV and IRR for investment project evaluation. They have indicated 97 percent large Companies prefer to use NPV and 84 percent prefer IRR as investment appraisal tools. Chadwell-Hatfield et al. (1997) have inquired about the techniques used by the US manufacturing company and found that 72 percent managers used to prefer IRR as investment appraisal method whereas 65 percent preferred Payback period. They have found that US manufacturing managers do not depend on only one technique; rather they use multiple techniques in project appraising.

According to Kester and Chang (1999), sensitivity analysis and scenario analysis have found to be the most important tools for project risk assessment in Australia, Hong Kong, Indonesia, Malaysia, Philippines and Singapore. According to Anand (2002) 90.1 percent managers in India use sensitivity analysis and 61.6 percent managers use scenario analysis for accessing project risk. Arnold and Hatzopoulos (2000) showed sensitivity/scenario analysis as the most widely (85 percent of Companies) used techniques to evaluate the risk and uncertainty. Graham and Harvey (2001) have indicated in their research that highly levered Companies prefer sensitivity and simulation analysis. However, Chadwell-Hatfield et al. (1997) found an inconsistent result regarding risk analysis of US manufacturing company. Their survey results have indicated that managers are not concern about the risk in capital budgeting expenditure as only 26 percent managers consider downside risk is important and 49 percent manager consider the upside risk associated with the project.

3.0 Methodology

3.1 Sample and Sampling Techniques

The population of the present study consisted of all companies listed in Dhaka Stock Exchange Limited (DSE) on October, 2014 except banks and non-banking financial institutions, insurances and mutual funds as they are beyond the scope of the present study. Thus target population comes down to 175 companies divided into A-category (125), B-category (10), N- category (14) and Z-categories (26) Companies. A random sample of 64 out of 175 Companies is used as sample units.

The formula of Yamane (1967) was used to determine the sample size for this survey with a 95 percent confidence level.

$$n = \frac{N}{1 + N(e)^2} \quad \text{Where, } N = \text{Population; } n = \text{sample}$$

3.2 Data Collection Techniques and Instruments

To materialize the objectives of the study, data have been collected from both primary and secondary sources. A structured and open-ended questionnaire has been developed after thorough consultation with the experts in this area to collect the primary data. Comprehensive reviews of existing literature facilitate to develop the option in multiple-choice and ranking type questions. A pilot study was conducted after developing the draft questionnaire where a group of finance managers gave their feedbacks and suggestions and those are also incorporated in finalizing the questionnaire. The questionnaire contains total 18 questions of which one question is classificatory one. Survey Monkey website was used to collect data provides analysis along with results in percentage. However, data collected in print format were also inputted in the website. Excel program was also used for further analysis.

3.3 Data Collection Procedures and Responses

Existing literatures show that this type of survey is conducted through postal delivery or mailing through internet as it is assumed that the reader of this questionnaire is a highly educated person (Anand 2002; Graham and Harvey 2001). The traditional and modern methods were followed for collecting data. Initially, the questionnaire was developed in paper format and electronic webpage format by using the website *Survey Monkey*. The paper formatted questionnaire was used for collecting data in person and electronic format questionnaire was sent to finance managers of sample companies through email with detail instructions. As stated earlier main target respondents were finance manager or their designated officers. At the beginning, very insignificant respondent (14 percent of sample) participated without personal intervention. Eventually the researchers decided to contact the respondents personally to enhance the response rate. Finally the response rate reached to 78 percent of sample and 29 percent of target population.

Table 1: Industry Representation			
No.	Industry	Sample Size	Percentage
1	Cement	4	8%
2	Food and Allied	8	16%
3	Tannery Industries	5	10%
4	Textile	13	26%
5	Pharmaceuticals and Chemicals	8	16%
6	Engineering	3	6%
7	Fuel and Power	6	12%
8	Services and Real Estate	3	6%
	Total	50	100

Table - 1 presents the industry-wise composition of companies in the sample. Total 50 companies were responded to the questionnaire which covers 8 industry categories. Among the sample 26% companies were from textile industry, 16% from Pharmaceuticals and Chemicals industry and 12% from fuel and power.

4.0 Analysis and Findings

4.1 Identification of the nature of capital budgeting project and evaluation of the project

The survey attempted to visualize the scenario of capital budgeting projects and its nature among the Bangladeshi companies. Respondents were requested to reply about the size and number of projects implemented in last year and try to find out any relation or influence with existing projects over the potential project or not. Table-2 and 3 shows that 77 percent respondent stated less than 3 projects were adopted in last year and there was significant (91 percent) influence of existing projects over the new project. In this survey, projects of the companies were categorized into 3 groups: small, medium and large. Small projects are ranged from Tk. 4 lac to below Tk. 1 crore, medium projects are ranged from Tk. 1 crore to below Tk. 30 crore and large project are ranged from Tk. 30 crore to Tk. 500 crore.

Table 2. Projects implement during last year	
Less than 3	77.27%
3 – 5	9.09%
6 – 8	4.55%
More than 8	9.09%
<i>Source: Researcher's own survey</i>	

Table 3. Impact of other projects on new proposed investment project	
Yes	90.91%
No	9.09%
<i>Source: Researcher's own survey</i>	

This attempt aimed to comprehend about the procedures adopted in appraising capital investment decision. There are several quantitative and qualitative analyses required in the capital budgeting decision. Qualitative analysis other than capital budgeting techniques are those that affect capital investment decision like Group requirement and decision, availability of resources, etc. while quantitative analysis means capital budgeting techniques like NPV, IRR etc.

Table 4. Evaluation of an investment project	
With Quantitative Approach	0.00%
With Qualitative Approach (Judgmental)	0.00%
Both Quantitative and Qualitative Approach	100%
<i>Source: Researcher's own survey</i>	

Table 5. Use of Qualitative / Quantitative approach			
	Qualitative	Quantitative	Both
Small project	55.54%	13.64%	31.82%
Medium project	27.27%	9.09%	63.64%
Large Project	0.00%	4.55%	95.45%
<i>Source: Researcher's own survey</i>			

Several quantitative capital budgeting techniques were listed in the literature namely Payback Period Method (PBP), Discounting Payback Period Method (DPBP), Accounting Rate of Return (ARR), Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI). In the literature, it is often argued that NPV is theoretically superior to other techniques (e.g. Zimmerman, 1997 and Kaplan and Atkinson, 1998). Finance managers were asked to rank each of these techniques accordingly and the result shown in Table - 7 is consistent with the theoretical preference. NPV is also consistent with the objectives of wealth maximization. As many as 73 percent respondents prefer NPV as the most important tools for evaluating an investment project whereas IRR and PBP method got the second and third preference tool respectively for evaluating the capital investment projects.

It is usual that when a company invests in a project, especially in medium and large project, prefer to use more than one technique. Respondents were requested to reply three (3) questions about the use of more than one technique.

Table 8. Use of more than one Capital Budgeting Technique			
Yes	90.91%	No	9.09%
If Yes, than how many			
2 - 3 techniques			47.62%
4 – 5 techniques			47.62%
More than 5 techniques			4.76%
<i>Source:</i> Researcher's own survey			

Table 9. Reason for using more than one Capital Budgeting Technique	
Different methods are needed for different situations	59.09%
Some methods give information others don't.	50.00%
Different management executives want different methods	18.18%
Don't have full confidence in any one method	9.09%
<i>Source:</i> Researcher's own survey	

According to Table - 8 most of the managers (91 percent) use 2 to 3 techniques and use 4 to 5 techniques (48 percent) in evaluating the project because different methods are needed for different situations and some methods give information others don't (See Table - 9). This result is also consistent with the result of Apap and Masson (2004). They have found 59 percent of their subjects use more than one technique because different methods are needed for different situations.

Table 10. Capital Budgeting Techniques accept or emphasis when different techniques used give conflicting result.	
Payback Period Method (PBP)	4.55%
Discounting Payback Period Method (DPBP)	13.64%
Accounting Rate of Return (ARR)	4.55%
Net Present Value (NPV)	68.18%
Internal Rate of Return (IRR)	36.36%
Profitability Index (PI)	9.09%
Qualitative (Judgment)	22.73%
<i>Source:</i> Researcher's own survey	

As companies using more than one technique in evaluating a project, there is probability of conflict of results among different techniques. This survey tried to find out the techniques on which managers give more emphasis if there is any conflicting result in same situation due to different techniques. It is observed from the Table - 10 that managers prefer (68 percent) to rely more on NPV. IRR is in the second position in reliability when there is conflict among those techniques. It's interesting that company also put emphasis (23 percent) on qualitative tools as well when conflict arises among techniques. The result of the study is also consistent with the Apap and Masson (2004) result as they also have found that 74 percent company place more importance in NPV.

The findings of the study show the dominance of NPV technique among all the capital budgeting techniques. This lead to further analysis of preference of NPV according to industries, DSE share categories and paid-up-capital of Companies listed in Dhaka Stock Exchange Limited. In this study for analysis industries and share categories are taken as it done by the DSE. While only classification by paid-up-capital is improvised for the analytical purpose. Companies having less than Tk. 10 crore as paid-up-capital are classified as small company; Companies having Tk. 10 crore to Tk. 100 crore as paid-up-capital are classified as medium and Companies having Tk. 100 crore and above as paid-up-capital are classified as large company. Table - 11, 12 and 13 presents the data.

Table 11. Industry wise NPV and Sensitivity Preferences		
Industries (No. of company survey)	NPV Preference	Sensitivity Preference
Cement	100%	100%
Food and Allied	100%	100%
Tannery Industries	100%	00%
Textile	80%	100%
Pharmaceuticals and Chemicals	80%	60%
Engineering	68%	68%
Fuel and Power	33%	68%
Services and Real Estate	0%	00%
<i>Source:</i> Researcher's own survey		

It is revealed from Table - 11 that NPV was given 100 percent preference by Cement, Food and Allied and Tannery industries, while 80 percent of Textile and Pharmaceuticals and Chemicals industries prefer NPV. Around 80 percent of large companies in term of paid-up-capital prefer NPV while it is 100 percent in case of small companies (See Table - 12). Almost 67 percent of A-category companies prefer NPV while all Z-category Companies prefer NPV (See Table - 13).

Every project has some risk and uncertainty associated with it. In corporate decision making process, whether to accept a project or not, one of the important task is to evaluate the risk and uncertainty associated with that project. In theory, we find many techniques to evaluate the risk

associated with a project namely, Sensitivity Analysis, Simulation, Probability Analysis, Scenario Analysis, Risk Adjusted Discount Rate, etc.

Table 12. NPV Preferences by Paid-up Capital

Category according to Paid-up capital (No. of Surveyed)	NPV Preference	Sensitivity Preference
Large	80%	80%
Medium	50%	56%
Small	100%	100%
<i>Source:</i> Researcher's own survey		

In case of risk analysis, it's clear that sensitivity analysis technique plays a great role among other techniques. Further analyses are shown in Table - 11, 12 and 13 in this regard. 100 percent of Cement, Food and Allied and Textile industries prefer sensitivity analysis as technique of risk analysis while it is 68 percent of Engineering and Fuel and Power industries. About 80 percent of large companies prefer sensitivity analysis and 100 percent of small Companies. But sensitivity analysis is less preferred (56 percent) in medium company (Table - 12).

Table 13. NPV Preferences by DSE Share Category

Category according to Share Category (No. of Surveyed)	NPV Preference	Sensitivity Preference
A	67%	67%
Z	100%	100%

Source: Researcher's own survey

Table - 13 contains the summary of results shows 67 percent of A-category companies prefer sensitivity analysis for risk assessment of an investment project while it is 100 percent for Z-category companies.

It is important to determine the particular area where managers think capital budgeting techniques are helpful for evaluating a project. Respondents were requested to identify the area where capital budgeting techniques are most useful.

Table 14. Preferred risk analysis techniques while evaluating/analyzing investment projects

[illegible]

Respondents were requested to rank the techniques used in estimating risk and uncertainty according to their practice. Table - 14 contains a summary of the results. The result shows that sensitivity analysis is at the top preference (73 percent) of their choice. Scenario Analysis technique has reached the second in term of preference (45 percent) among the managers. The finding of this study also resembles the existing literature.

Table 15. Area where Capital Budgeting Techniques are most useful for evaluating	
Acquisition of new equipment	36.36%
Merger	18.18%
Acquisition of buildings/land	27.27%
Investments in new product/Service	86.36%
Renovation of fixed assets	27.27%
<i>Source:</i> Researcher's own survey	

Investment in new product/Service is the most useful area where 86 percent managers prefer to use capital budgeting techniques for decision making (See Table - 15). Investment in acquisition of new equipment is the second area (36 percent) where manager indicate using these techniques. It's surprising to see that merger get the least mark (13 percent) where manager prefer to use capital budgeting tools. The reason behind this is perhaps Bangladeshi companies have less experience with the practice of merger.

4.3 Identification of Discount rate and other factors

Capital budgeting tools also have some drawbacks and managers facing some problems while using these tools.

Table 16. Common bottlenecks in applying Capital Budgeting Techniques	
Finding appropriate cost of capital	59.09%
Projection of expected Cash Flows	50.00%
Unwillingness of using Capital Budgeting Technique by upper management/BOG	9.09%
<i>Source:</i> Researcher's own survey	

Table 17. Discount rate usually use in Capital Budgeting	
Weighted Average Cost of Capital (WACC)	40.09%
Risk Adjusted WACC	22.73%
Weighted Average Cost of Debt/Borrowing Rate	36.36%
FDR Rate	9.09%
<i>Source:</i> Researcher's own survey	

Table - 16 shows that finding out appropriate cost of capital is most challenging task in applying these tools for decision making as stated by 59 percent of the respondents. Companies have to use

discount rate for evaluating investment projects and Weighted Average Cost of Capital (WACC) is preferred (40 percent) discount rate in investment evaluation process (See Table - 17). Weighted Average Cost of Debt/Borrowing Rate is also play an important role in this regard. Arnold and Hatzopoulos (2000) study has shown 54 percent UK managers prefer Weighted Average Cost of Capital (WACC) as minimum required rate of return and they compared it with the findings of Westwick and Shohet (1976) result where they indicated only 10 percent use of WACC. Two decades ago UK companies mainly used the bank overdraft rate as minimum rate of return for appraisal an investment project.

Table 18. Other factors or ratio usually consider in making Capital investment decision	
Return on Equity (ROE)	31.82%
Return on Investment (ROI)	81.82%
Net Profit Margin (NPM)	54.55%
Average Debt Service Coverage Ratio (DSCR)	27.27%
<i>Source: Researcher's own survey</i>	

Table 19. Use of any special software for evaluating an Investment Project			
Yes	13.64%	No	86.36%
<i>Source: Researcher's own survey</i>			

Though this study mainly focused on the capital budgeting techniques in evaluating a project, other factors that are taken into consideration in evaluating a project have also been explored. It is observed from Table - 18 that return on investment (ROI) and net profit margin (NPM) are very important factors in evaluating a project. In previous research, Anand (2002) has indicated 85.10 percent of the respondents consider maximizing EBIT and EPS, and 75.90 percent of the respondents consider the objective to maximize the spread between ROA and WACC. Chadwell-Hatfield et al., (1997) has indicated that 49 percent of US managers consider operating income of a project as very important financial criterion in accepting a project. It is believable that managers do some calculations for the sophisticated procedures. The study shows that the managers don't use any special software; rather they use traditional methods for calculation like Excel sheet (See Table - 19).

5.0 Conclusion

This study is an attempt to identify and evaluate the different capital investment techniques used by Bangladeshi companies. In order to materialize the objectives of the study, an empirical study was undertaken to find out the evaluation techniques used by the Bangladeshi companies. The findings of the study reveal that the companies applied both quantitative and qualitative analyses in evaluating capital investment projects. It also suggests that the companies listed in DSE tend to employ multiple evaluation techniques when analyzing medium and large investment project. However, the results of this survey clearly indicate the dominance of NPV technique among all the capital budgeting techniques. This research also reported a number of alternative measures considered to be important in project selection. These measures include top management commitment, availability of resources or budget, alignment with strategy, statutory requirements

as well as return on investment and net profit margin. However, solely emphasis on these factors may lead to a project selection that is not consistent with the objectives of wealth maximization. The sensitivity analysis and scenario analysis are the most widely used techniques for project risk analysis. The respondents use multiple criteria for assessing the project risk indicated companies listed in DSE are more concerned about the project risk. In the application of capital budgeting techniques, the discount rate is found an important factor to determine in this regard. In this survey, companies preferred weighted average cost of capital (WACC) as a discount rate in investment evaluation process. Further research regarding the discount rate could reveal new windows for future researches. Also the qualitative factors those intensely influencing capital investment decision making can be examined.

References

- Anand, M. (2002). Corporate finance practices in India: A survey. *Vikalpa*, Vol. 27, No. 4.
- Arnold, G. C. and Hatzopoulos, P. D. (2000). The theory-practice gap in capital budgeting: Evidence from the United Kingdom. *Journal of Business Finance and Accounting*, Vol. 27(5) No. (6), June/July, 0306-686X.
- Apap, A. and Masson, D. J. (2004). A survey of capital budgeting in publicly traded utility Companies. *Southwest Business and Economics Journal*, Vol. 13, p. 1.
- Bierman, H. (1993). Capital budgeting in 1992: A survey. *Financial Management*, Vol. 22, No. 3.
- Chadwell-Hatfield, P; Goitein, B; Horvath, P; Webster, A. (1997). Financial criteria, capital budgeting techniques, and risk analysis of manufacturing Companies. *Journal of Applied Business Research (JABR)*, Vol. 13, No 1.
- Danielson, M. G. and Scott, J. A. (2006). The capital budgeting decisions of small business *Journal of Applied Finance*. Vol. 16 Issue 2, p. 45.
- Dhaka Stock Exchange Limited. Retrieved from http://www.dsebd.org/ipo_archive.php
- Graham, J. and Harvey, C. (2002). How do CFOs make capital budgeting and capital structure decisions? *Journal of Applied Corporate Finance*, Vol. 15, No 1, pp. 8-23.
- Gitman, L. J. and Forrester Jr, J. R. (1977). A survey of capital budgeting techniques used by major US Companies. *Financial Management*, Vol. 6, pp. 66-71.
- Kaplan, R. S. and Atkinson, A. A. (1998). Advanced management accounting (International Edition), Prentice Hall.
- Kester, G. W.; Chang, R. P.; Echanis, E. S.; Haikal, S; Isa, M. Md.; Skully, M. T.; ... Wang, C. J. (1999). Capital budgeting practices in the Asia-Pacific Region: Australia, Hong Kong, Indonesia, Malaysia, Philippines, and Singapore. *Financial Practice and Education*, Vol. 9, No 1, pp. 25-33.
- Petry, G. H. and Sprow, J. (1993). The theory and practice of finance in 1990s. *The Quarterly Review of Economics and Finance*, Volume 33, Issue 4, pp. 359-381.
- Survey monkey. Retrieved from <https://www.surveymonkey.com>
- Trahan, E. A. and Gitman, L. J. (1995). Bridging the theory practice gap in corporate finance: A survey of chief financial officers. *Quarterly Review of Economics and Finance*, Vol. 35, Issue 1, pp 73-87.
- Westwick, C. A. and P. S. D. Shohet (1976). Investment appraisal and inflation', ICAEW Research Committee. Occasional Paper, No. 7.
- Yamane, Taro. (1967). *Statistics: An introductory analysis* (Second Edition), New York: Harper and Row.
- Zimmerman, J. L. (1997). *Accounting for decision making and control* (2nd edition), Irwin/McGraw-Hill, Boston.