

---

# Impact of Firm Characteristics on Capital Budgeting Techniques in Sri Lankan Listed Manufacturing Companies

Swarnapali RMNC<sup>1</sup>

Department of Accountancy & Finance, Faculty of Management Studies, Rajarata University of Sri Lanka, Mihintale.

---

## ABSTRACT

*In finance, the capital budgeting is one of the most debatable topic and continues to keep researchers pondering. The importance has been given to capital investment for creation of shareholders' wealth of firms. Techniques are used to evaluate and select a capital investment known as capital budgeting techniques. It is paramount important to investigate the capital investment practices in Sri Lanka, with the underlying inspiration of filling the gap in empirical evidence on this field. The main objective of this study is to examine the impact of firm characteristics on capital budgeting techniques applied by listed manufacturing companies in Sri Lanka. Both primary and secondary data are used for the study. Primary data is collected through a structured questionnaire while secondary data is extracted from the annual reports published in the respective companies' websites. Firm size, leverage, share ownership, growth and listing age have used as the firm characteristics whereas Net Present Value, Internal Rate of Return, Profitability Index, Payback Period and Accounting Rate of Return have been used as the capital budgeting techniques. Independent samples t-test and multiple regression analysis are used to analyze the gathered data. Findings reported that firm characteristics have no statistically significant impact on capital budgeting techniques and contradict the literature. Hence, it is important to note that majority of the studies that have reviewed in the literature focus on developed capital markets. Colombo Stock Exchange belongs to an emerging capital market and hence characteristics that are distinct in developed capital markets may not clearly be discernible in Colombo Stock Exchange.*

**KEYWORDS:** *Capital Budgeting Techniques, Firm Characteristics, Listed Manufacturing Companies*

## **1 Introduction**

Financial management has three main concerns; financing decisions, investment decisions and dividend decisions. These decisions have developed in pursuing the overall goal of maximizing shareholders' wealth (Dayananda et al. 2002). Out of these three, a few of researchers have questioned the crucial importance of decision making in investment within most companies in determining their long-term success or failure (Pike 1988). Every firm has strategies to implement which are reflected through investments within the firm and these investments have to be assessed to see if an investment will add value to the firm and increase the shareholders' wealth (Penman 2010). Arnold (2008) stated that adding value takes two aspects; maximization of accounting profit and maximization of long-term shareholders' wealth. Competent managers are concerned about the second aspect since it is the one that has future prospects, reflects steady growth and provide a risk shield while accounting profit is a short-term measure of the difference between the firm's expenses and revenues. Hence, capital budgeting is considered today as one of the most important aspects which should be carefully applied in order to achieve the corporate strategies and success of the firm. These decisions result in enormous amount of cash outflow or funds from the organization for a long period of time while stressing funds to an investment. Thus, a wrong decision relates to capital budgeting will have an effect on both profitability of the organization and on the survival of the organization (Pike 1988; Verbeeten 2006). This is true since capital budgeting decisions entail a long-term commitment to the projects with strategic implication to the firm. As this decision involves binding scarce resources for a long period of time, it needs to be evaluated carefully to ensure the maximum profitability.

Many studies have been conducted to find out what are the most widely used capital budgeting evaluation techniques and also the relationship between firm's performance and methods of capital budgeting. But, it needs to understand more beyond just knowing that a certain technique is more widely used than another or the relation of capital budgeting techniques with firm's performance. What will cause for certain technique to be accepted over the other is an interesting question yet to be fully explored. What are the factors influencing the adoption of a certain technique? Are certain techniques more suitable to evaluate different types of investment? Understanding the logic behind the adoption of a particular financial measure for the appropriate type of investment can aid in selecting the right method for evaluating a particular investment. For both practitioners and researchers, more in-depth knowledge on capital budgeting contributes to better evaluation of capital budgeting decisions. As Drury and Tayles (1997) argued that not only using the correct method matters, but also correctly using the correct method is utmost importance. Incorrect usage of the method results in wrong decision make on investment and rejecting worthwhile investments. This shows the importance of capital budgeting technique in making better investment decision.

On the other hand, determining which firm characteristics and environmental factors affect a company's capital budgeting practices is not an easy task. Thus, a clear understanding of a company's internal and external environments is essential. For a firm operating under a different set of organizational context, is there a more appropriate method that can help in making better decisions or would a standard method be applicable for evaluating different types of projects regardless of firm characteristics are the important aspects to be discussed under the application of capital budgeting. Therefore, this study attempts to explore whether the identified use of capital budgeting techniques vary with firm characteristics.

## **2 Statement of the Problem**

Capital budgeting plays a crucial role in the competitive model of a business. In today's highly competitive business environment, long-term capital investments have become a critical issue. Lazaridis (2004) affirmed that a business whose ability to effectively develop a feasible mechanism for capital budgeting, may gain a better competitive advantage to its rivalries in an environment characterized through change and volatility. Thus, the technique to be used in the evaluation process is one of the most important decisions in the capital budgeting process, knowing that each technique has its merits and demerits. Generally, investment decision makers know the capital budgeting techniques which are available for evaluating their investment projects. However, there is no specific guide on

whether there is a suitable capital budgeting evaluation technique for a specific type of project for firm operating with certain firm characteristics.

The capital budgeting practices in organizations is frequently discussed at many forums. Out of them, only a few similar studies pertaining to the current topic have been conducted even in developed nations. Lack of evidence on capital budgeting practices hides the extent to which practitioners use their presumed knowledge in the subject or it may hide misapplications of these practices (Drury & Tayles 1997). On the other hand, studies conducted in this topic have come up with different findings. Several studies report that firm characteristics have significant impact on capital budgeting techniques whereas some other studies declare that firm characteristics have no significant impact on capital budgeting techniques. Thus, it is still a problem to study further. Verbeeten (2006) noted that “the relation between industry characteristics and capital budgeting practices may reveal some additional insights to the field of capital budgeting”. Hence, still it is questionable whether firms with different sizes have a tendency to use a particular capital budgeting technique to evaluate their capital expenditure projects (Graham & Harvey 2001). If they do, then can it be a rule of thumb for financial decision makers? Should firms facing different degree of leverage use different capital budgeting techniques? (Daunfeldt & Hartwig 2011). Similarly should firms with different share ownership, growth level and age of listing select different capital budgeting technique? (Leon, Isa & Kester 2008). The several studies bear evidence for recognizing that different firms operating in different countries having different environments impact the capital budgeting practice focusing on limited firm specific characteristics for example, firm size (Pike 1988; Brounen, De Jong & Koedijk 2004; Hermes, Smid & Yao 2007).

Moreover, studies done to date clearly showed the wide gap that existed within Sri Lankan context. Specially, the author could not find any researches related to the firm-specific determinants on the capital budgeting techniques in Sri Lanka. Hence, author took interest somewhat to cover this research gap. Highlighting this compelling need, the present study examines the impact of firm characteristics on the choice of capital budgeting techniques, with special reference to the listed manufacturing companies in Sri Lanka. Therefore, this study is an effort of filling that gap with giving a new insight into the applicability of capital budgeting subject in present organizational context. In light of the above understanding, it is appropriate to question as to be there any impact of firm characteristics on capital budgeting techniques in a firm. Hence, more specifically, the research problem focused in this study can be stated as follows:

*“Is there an impact of firm characteristics on Capital Budgeting Techniques in Sri Lankan Listed Manufacturing Companies?”*

### **3 Objective of the Study**

In light of the above setting, present study intends to examine the impact of firm characteristics on the use of capital budgeting techniques.

### **4 Review of Literature**

Capital budgeting decisions are among the most important decisions the firm has to take. The importance of capital budgeting is derived from concept of maximizing the firm’s value because capital investment projects are supposed to maximize the value added to the stockholders (Hermes et al. 2007). Capital budgeting theory typically assumes that the primary goal of a firm’s shareholders is to maximize firm value. In addition, the firm is assumed to have access to perfect financial markets, allowing it to finance all value enhancing projects. When these assumptions are met, firms can separate investment and financing decisions, and should invest in all positive net present value projects (Cooper et al. 2001). Gitman (2003) define capital budgeting as the process of evaluating and selecting long-term investments that are consistent with the firm’s goal of maximizing shareholders’ wealth. In general, capital budgeting process is broken into four stages; project definition and cash flow estimation, project analysis and project selection, project implementation and project review (Gitman 2003; Cooper et al. 2001). A study carried out by Cooper et al. (2001), confirmed the findings of previous studies that more firms view project definition and cash flow estimation, analysis and

selection as the two most important and most difficult stages of capital budgeting process.

In order to maximize the return to the shareholders of a firm, it is important that the optimum or most profitable investment projects are selected. Since the results for making a bad long-term investment decision can be both financially and strategically devastating, particular care needs to be taken with investment process. There are numbers of financial techniques available for appraisal of investment proposals and can be classified as non-discounted cash flow techniques and discounted cash flow techniques. In practice, there are five main financial capital budgeting techniques used when assessing investment projects. These techniques are the net present value (NPV), internal rate of return (IRR), profitability index (PI), payback period (PB) and the accounting rate of return (ARR) (Cooper et al. 2001; Graham & Harvey 2001; Khamees, Al-Fayoumi & Al-Thuneibat 2010). The arguments for the best techniques to be used are interesting to so many researchers. Every study is concluding a different results and generalizations. Theory suggests that NPV is the only value maximizing technique to be used in the selection process (Graham & Harvey 2001; Hermes et al. 2007). Though the Non-DCF techniques are the least accurate ones, they are still nowadays used widely as supplementary tools (Hermes et al. 2007, Verma, Guptha & Batra 2009).

While in the literature, several firm factors have been mentioned as determinants of the choice of capital budgeting techniques. Those determinants are known as firm characteristics or firm specifics. Many researchers have recognized different firm characteristics in the purpose of identifying their impact on capital budgeting practices throughout the world (Pike 1988; Drury & Tayles 1996; Brounen et al. 2004; Verbeeten 2006; Danielson & Scott 2006; Hermes et al. 2007; Leon et al. 2008; Daunfeldt & Hartwig 2011). Firm size has identified as the most dominant firm attributes. Many of the researchers (Graham & Harvey 2001; Verma et al. 2009; Daunfeldt & Hartwig 2011) highlighted that size of the firm influence on the choice of capital budgeting technique in a firm. Contrary to the above view, a few researchers (Fernando 2005; Leon et al. 2008; Truong, Partington & Peat 2008) noted that firm size does not have any influence on selection of capital budgeting methods. Leverage also one of the firm attributes which use to identify the impact on capital budgeting techniques. Daunfeldt and Hartwig (2011) concluded that companies with a high-level of financial risk are more likely to use the non-DCF based payback method. Further, they found that high levered companies also had a tendency to use NPV and IRR which both are discounting based methods, more extensively than low levered companies. Contrary to the above findings, Graham and Harvey (2001) found that highly levered firms are significantly more likely to use NPV and IRR than firms with small debt ratios. Thus, their findings concluded that leverage is positively correlated with the DCF techniques whereas negatively correlated with the Non-DCF techniques. According to the findings of Anand (2002) and Leon et al. (2008), there is no significant difference in the technique used by highly levered and low levered firms.

Third important firm characteristic which influences on the determinant of capital budgeting techniques is the type of ownership. When both Graham and Harvey (2001) and Daunfeldt and Hartwig (2011) have reported that ownership as a influencing factor of selecting capital budgeting method, result of the study conducted by Leon et al. (2008) concluded that the share ownership appears to be unrelated to whether firms use DCF techniques or not. The next characteristic is the growth of the company. According to the findings of Graham and Harvey (2001), there is no difference in techniques used by growth and non growth firms. Thus, they concluded that the company growth has no impact on the choice of capital budgeting technique. Oppose to the above view, some researchers declared that company growth has impact on the choice of capital budgeting technique (Anand 2002; Danielson and Scott 2006; Daunfeldt and Hartwig 2011). The final aspect which considers in this study on the firm characteristics is period of listing. Exchange listing tends to increase the likelihood of cost of capital calculations significantly (Brounen et al. 2004). The relationship between period of listing and the use of capital budgeting techniques has been empirically tested by an Indonesian study carried out by Leon et al. (2008). In the study, Leon et al. (2008) assumed that those that have been listed over a long period of time would have been subject to much greater scrutiny than those recently listed. Therefore, they assumed that period of listing would be positively related to usage of DCF techniques. Consist with their conjecture, they affirmed that period of listing is positively related to the use of DCF techniques and it significantly influenced on DCF techniques.

## 5 Methodology

As discussed above, this is an explanatory type study which was planned to identify the impact of firm characteristics on capital budgeting techniques of listed manufacturing companies in Sri Lanka. Five selected firm characteristics were taken into consideration in this regard. The dimensions of firm size, degree of leverage, share ownership, growth level and age of listing were studied under firm characteristics. Main financial techniques used for the capital budgeting appraisal was focused to identify the application of capital budgeting techniques exists within the listed companies in Sri Lanka. Based on this conceptualization, following conceptual model was derived to address the research problem.

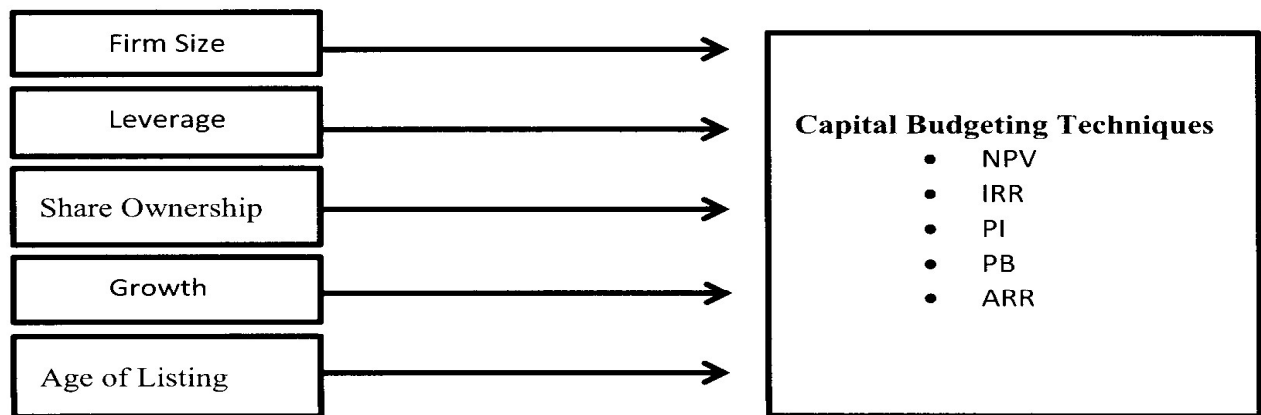


Figure 1: Conceptual Framework of the Study (Researcher's Conceptualization)

Operationalization of the variables are being done in following manner by converting the variable to dimensions and then to indicators. All are operationalized by using the standard scales. Hence, key variables and dimensions used in the conceptual framework are operationalized as in Table 1.

Table 1: Key Variables and Selected Dimensions

Variable	Dimensions	Indicators/Measurement
Firm Characteristics	Firm size	<i>Natural Log of Total Assets</i> (Brounen et.al. 2004; Leon et al. 2008)
	Leverage	<i>Debt-to-asset Ratio</i> (Graham & Harvey 2001; Leon et al. 2008; Daunfeldt&Hartwig 2011)
	Share Ownership	<i>Percentage of shares owned by foreign investors</i> (Leon et al. 2008)
	Growth	<i>Price-earnings Ratio (P/E ratio)</i> (Graham & Harvey 2001; Anand 2002; Daunfeldt&Hartwig 2011)
	Company Age	<i>Period of listing</i> (Leon et al. 2008)
Capital Budgeting Techniques	DCF Techniques Non-DCF Techniques	<i>Likert Scale</i> (Graham & Harvey 2001; Brounen et al. 2004; Alzoubi&Alazawi 2010)

The population of the study comprises all the listed manufacturing companies in Sri Lanka; 36 companies were listed at Colombo Stock Exchange (CSE) as at 10<sup>th</sup> April 2013. The entire population has been selected as sample of the study. The choice of this selection is based on a rationale made by previous studies (Ramadan 1991; Kester et al. 1999; Alzoubi&Alazawi 2010). Researcher believes that this kind of study cannot achieve its objectives if it does not separate the firms according to the industry in which firms operate. Previous researchers have recognized this matter and conducted their studies on a base that considers the sector or the industry of the firms. Ramadan (1991) and Khamees et al. (2010), conducted capital budgeting studies on industrial firms, while Kester et al. (1999) considered the industry differences a limitation on their study. The justifications for choosing the listed companies only is briefly made because of some factors like a belief that the listed companies are more

willing to give information, on the assumption that it is an accurate representation of the companies in Sri Lanka, the convenience of access with the fact that their corresponding details are available on the web site of the CSE.

Both primary and secondary data were used for the study. Primary data for the analysis was obtained by using the results of a survey. A questionnaire consisted by both opened ended and closed ended questions addressing the topic of capital budgeting practices was the main data gathering tool for the primary data. The questionnaire was self-administered by the respondents. Members of the committee of capital budgeting are the respondents of the survey and the usable response rate is very high compared to other similar studies in the field. The survey instrument was pretested for clarity and accuracy. Thus, a pilot study was carried out with the responses of 10 companies for the purpose of seeking the feasibility and identifying an appropriate approach to carry out the study. To elicit information regarding the firm characteristics, secondary data were used and it examined the published annual reports of the three financial years from 2010 to 2012. All annual reports for this study were downloaded directly from the respective companies' web sites in the form of soft copies. The gathered data were treated and analyzed through the Statistical Package for Social Sciences (SPSS). Independent samples t-test and multiple regression analysis were used to analyze the gathered data. To understand the effect of the independent variables against the dependent variable, it was decided to use the multiple regression models as depicted below:

$$CBT_j = a_0 + \beta_1 \ln(\text{SIZE})_i + \beta_2 \text{LEVERAGE}_i + \beta_3 \text{OWNERSHIP}_i + \beta_4 \text{GROWTH}_i + \beta_5 \text{AGE}_i + \epsilon_i \dots \dots \dots (1)$$

Where;

$CBT_j$  is the reported use of capital budgeting technique  $j$  ( $j=1, 2, \dots, 5$ ) by company  $i$  ( $i=1, 2, \dots, 36$ );

$a_0$  = intercept;

$\beta_i$  = coefficient of the regression estimates;

$\epsilon$  = error term

## 6 Results and Discussion

The respondents' categories include in the survey; CFOs, Finance Controllers, Finance Managers and other persons of financial authority in the firm. All the respondents except two have postgraduate qualifications and highly skilled in their professions. Seventy three percent (73%) have professional experience of at least ten years. All of the respondents have financial or business related degrees and therefore have a strong theoretical background on capital budgeting decision criteria. Majority of the respondents involve in controlling and monitoring the entire capital budgeting process at senior level in their respective organizations. The depth of knowledge and experience pertaining to capital budgeting as well as the seniority of the respondents in the industry added to the validity and reliability of the primary data sourced. The test-retest was done for estimating external reliability of the instrument, which used to collect primary data by using 12 companies with a two week time interval. This approach to determining reliability involves measuring the same thing repeatedly under the same conditions and calculating the variability of the resulting measure. Table 2 shows the test-retest reliability of the instrument based upon a sample of 12 companies. The result of the test-retest indicated only slight differences. So, it ensured that external reliability of the research instrument was satisfactory.

Table 2: Test-Retest of Major Variables

Variable	Test (T1)	Re-Test (T2)	(T1-T2)
	Mean	Mean	
NPV	3.7	3.5	0.2
IRR	3.1	3.2	(0.1)
PI	2.7	2.9	(0.2)
PB	3.9	3.7	0.2
ARR	2.7	2.6	0.1

Source: Survey Data, 2013

The researcher has set a criterion to measure the use of a specific technique or a practice as a main tool if the firm applies it either “very frequently” or “frequently”. So, a main tool is the one used by the firm either “very frequently” or “frequently”. Mean scores indicate in forthcoming Tables are the weighted average of the scores ranging from 1 (never used) to 5 (very frequently used). The mean of total assets (mean value of last three years average) of the sample companies is 2,285.68 million rupees. The 64.5% of sample firm has total asset of less than 2,285.68 million rupees and 35.5% has total assets of 2,285.68 million rupees or more. As Brounen et al. (2004) categorized, in subsequent analysis; it refers to firms with total assets greater than mean value (2,285.68 million rupees) as large. Table 3 reports the descriptive results along with independent samples t-test where firm size is divided into two categories based on the total assets. Researcher used independent samples t-tests to further enrich the above results. When the p-value of Levene’s test is greater than 0.05, it is assumed that the variance of two groups is the same (if the p-value of Levene’s test is less than 0.05, it is assumed that the “unequal variance” result). The results of independent samples t-test indicated that there is no significant difference between mean scores of capital budgeting usage in terms of firm size.

Table 3: Degree of using Capital Budgeting Techniques and Firm Sizes

Capital Budgeting Technique	Usage rate as a main tool (%)		Mean		Std. Deviation		t-test for Equality of Means	
	Small Firms	Large Firms	Small Firms	Large Firms	Small Firms	Large Firms	t- value	p- value
NPV	80	72.7	3.95	3.73	0.89	0.79	-.695	.493
IRR	60	36.4	3.50	3.18	1.19	1.08	-.734	.469
PI	40	27.3	2.75	2.73	1.52	1.56	-.040	.969
PB	65	81.8	3.80	3.91	1.24	0.54	.339	.737
ARR	25	0	2.70	2.45	1.21	0.82	-.596	.556

Source: Survey Data, 2013

The distribution of debt levels is fairly uniform. Approximately half of the sample firms have debt-to-asset ratios below 40%, another one-third have debt ratios between 40% and 50%, and the remaining firms have debt ratios greater than 50%. The researcher refers to firms with debt ratios greater than 40% as highly levered as Graham and Harvey (2001), grouped in their study. Referring to the Table 4, it is noted that the high levered companies are more likely to use PB method with 76.4 percent usage rate and highest (3.82) mean score. The low levered companies also have a tendency to use IRR and PI which both are discounting based methods, more extensively than high levered companies. However, the results of independent samples t-test indicate that there is no significant difference of capital budgeting usage in terms of firm leverage.

Table 4: Degree of using Capital Budgeting Techniques and Leverage

Capital Budgeting Technique	Usage rate as a main tool (%)		Mean		Std. Deviation		t-test for Equality of Means	
	Low	High	Low	High	Low	High	t- value	p- value
NPV	58.6	76.5	4.00	3.76	0.88	0.83	-.765	.450
IRR	57.1	47.1	3.57	3.24	1.09	1.20	-.808	.425
PI	50.0	23.5	3.14	2.41	1.66	1.33	-1.365	.183
PB	64.3	76.4	3.86	3.82	1.17	0.95	-.088	.930
ARR	14.2	17.7	2.57	2.65	1.16	1.06	.190	.851

Source: Survey Data, 2013

The researcher defined a foreign company as one that is at least 40% company shares owned by the foreign investors. Based on this definition, it was found that the sample consists of 81% domestically owned (local) and 19% foreign owned companies. Researcher further assumed that foreign owned firms would be more inclined to use the more sophisticated DCF techniques than local firms because presumably foreign firms employ better qualified managers and therefore, better managed as declared by previous researchers. The results showed (Table 5) that use of NPV and PB techniques for these firms carry an equal mean score (3.84). However, the lowest standard deviation (0.94) represented by NPV technique. However, the results of independent samples t-test do not report any significant difference of capital budgeting usage in terms of share ownership.

Table 5: Degree of using Capital Budgeting Techniques and Share Ownership

Capital Budgeting Technique	Usage rate as a main tool (%)		Mean		Std. Deviation		t-test for Equality of Means	
	Local	Foreign	Local	Foreign	Local	Foreign	t- value	p- value
NPV	72	100	3.84	4.00	0.94	0.00	.848	.405
IRR	48	66.7	3.32	3.67	1.25	0.52	1.06	.301
PI	32	50	2.64	3.17	1.52	1.47	.765	.451
PB	68	83.3	3.84	3.83	1.14	0.41	-.014	.989
ARR	8	50	2.44	3.33	1.08	0.82	1.886	.069

Source: Survey Data, 2013

The median price-earnings ratio is 14.06. Fifty two percent of the respondents have price-earnings ratio of 14.06 or lower. As Graham and Harvey (2001) referred in their study, in subsequent analysis, researcher refers to these non-growth firms while remaining 48% of the firms as growth firms. As presented in Table 6, sample companies with higher growth opportunities use NPV more often, but less often for other techniques. The usage rate of NPV as a main tool is 73.4% while it is for PB and IRR are 60% and 46.7% respectively. The most commonly used project evaluation technique in non-growth firms is PB having highest mean score (4.00) and lowest standard deviation value (0.63). However, there is specific finding to highlight regarding the usage rates; percentage of usage rate for each technique (except the ARR) as a main tool is higher in non-growth firms than growth firms. Moreover, the results of independent samples t-test depict that there is no significant difference of capital budgeting usage in terms of growth level.

Table 6: Degree of using Capital Budgeting Techniques and Growth Levels

Capital Budgeting Technique	Usage rate as a main tool (%)		Mean		Std. Deviation		t-test for Equality of Means	
	Non Growth	Growth	Non Growth	Growth	Non Growth	Growth	t-value	P-value
NPV	81.3	73.4	3.87	3.88	0.72	0.99	-.027	.979
IRR	56.3	46.7	3.50	3.27	1.03	1.28	-.560	.580
PI	43.8	26.6	3.12	2.33	1.45	1.50	-1.494	.146
PB	81.3	60	4.00	3.67	0.63	1.34	-.873	.393
ARR	12.4	20	2.75	2.47	1.00	1.19	-.720	.477

Source: Survey Data, 2013

Most of the companies have been listed in CSE for at least fifteen years and mean of listing age is 24 years. Approximately 42% companies have been enjoyed in CSE more than 24 years as a member of the listed companies in Sri Lanka. As Leon et al. (2008) have referred, companies which listed more than 24 years are referred as high listing age companies while remainder as low listing age companies.

Table 7: Degree of using Capital Budgeting Techniques and Listing Age

Capital Budgeting Technique	Usage rate as a main tool (%)		Mean		Std. Deviation		t-test for Equality of Means	
	Low Age	High Age	Low Age	High Age	Low Age	High Age	t- value	p- value
NPV	83.4	69.2	4.06	3.62	0.80	0.87	-1.455	.156
IRR	55.6	46.2	3.67	3.00	1.08	1.15	-1.644	.111
PI	38.9	30.8	3.00	2.38	1.61	1.32	-1.129	.268
PB	72.2	69.2	3.89	3.77	1.28	0.60	-.313	.751
ARR	11.1	23.1	2.67	2.54	1.14	1.05	-.320	.752

Source: Survey Data, 2013

Usage rates and mean scores presented in the Table 7, highlighted that usage of all the capital budgeting techniques except of ARR are higher in low period listing firms than high period of listing firms. The NPV is the most preferred methods of capital budgeting where it is being preferred by 83.4% of the low listing age companies. Among the rest, PB method is more preferred by the relevant companies. High age listings companies are more tend to use NPV and PB each with 69.2 percent



usage rate. Although the usage rate as a main tool represents the same percentage, mean scores show a marginal difference. According to the mean scores, the most frequently used technique of the long period of listing companies is the PB which indicates the highest mean score (3.77) and lowest standard deviation (0.60). However, the results of independent samples t-test do not reveal any significant difference of capital budgeting usage in terms of listing age.

## 6.1 Bi-variate Analysis

When individually analyzed the firm attributes with the help of correlation analysis; it showed that (Table 8) foreign owned, non growth and high listing age companies have a significant influence on the use of some capital budgeting techniques whereas others found no significant at all. The coefficient of foreign owned firms with NPV technique is positive and significant. Non growth firms are positively and significantly associated with NPV and IRR techniques while high listing age companies significantly and positively associated with PI and IRR techniques.

Table 8: Results of Correlation Analysis for Firm Characteristics and Capital Budgeting Techniques

			NPV	IRR	PI	PB	ARR
Size	Small	Pearson Correlation	.166	.082	.272	.342	.391
		Sig. (2-tailed)	.483	.732	.245	.140	.088
	Large	Pearson Correlation	-.218	-.236	.039	.272	.180
		Sig. (2-tailed)	.520	.484	.910	.419	.596
Leverage	Low Levered	Pearson Correlation	.341	.153	-.002	.515	.201
		Sig. (2-tailed)	.232	.601	.996	.059	.491
	High Levered	Pearson Correlation	.303	.390	-.131	-.049	-.336
		Sig. (2-tailed)	.238	.122	.616	.851	.187
Ownership	Local	Pearson Correlation	-.239	-.181	.046	-.288	-.133
		Sig. (2-tailed)	.249	.387	.828	.162	.526
	Foreign	Pearson Correlation	.890*	.106	-.114	.192	.402
		Sig. (2-tailed)	.018	.841	.830	.716	.429
Growth	Non Growth	Pearson Correlation	.611*	.506*	.350	.204	.121
		Sig. (2-tailed)	.012	.045	.183	.450	.655
	Growth	Pearson Correlation	.006	.001	.226	-.382	-.161
		Sig. (2-tailed)	.984	.996	.418	.160	.568
Listing Age	Low Age	Pearson Correlation	.048	-.120	-.405	-.162	-.311
		Sig. (2-tailed)	.849	.635	.096	.520	.210
	High Age	Pearson Correlation	.147	.345	.629*	.310	.610*
		Sig. (2-tailed)	.631	.248	.021	.302	.027

\*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data, 2013

## 6.2 Multi-variate Analysis

Above findings were deviated when researcher looked at the impact of all the firm attributes together by using a multiple regression model. A closer look at the individual coefficients in Table 9 reveals that all the variables are statistically insignificant at 0.05 and 0.01 level. The results offer evidence of a negative relationship between the firm size and NPV method is contrast with often argument that firm size positively associated with the NPV. The negative relationship between the firm size and NPV method is not significant for  $\beta_1$  (p-value = 0.606). The p-value for remaining firm characteristics also is more than 0.05. Thus, all the firm characteristics are not significant predictors of NPV. At the 95% confidence interval (CI), the value of 0 falls within the interval further supported that firm characteristics are not significant predictors of NPV.

Table 9: Multiple Regression Results in NPV Technique

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.207	2.489		2.092	.047
Size	-.201	.384	-.106	-.523	.606
Leverage	.309	.485	.128	.638	.529

Growth	.006	.008	.162	.760	.454
Ownership	.002	.003	.158	.798	.432
Age	-.017	.015	-.229	-1.082	.290
R= 0. 296		R square = 0. 087		Adj. R square = -0. 095	
SE = 0. 886		F value =0. 479		Sig F = 0. 788	

Source: Survey Data, 2013

According to the Table 10, the multiple correlation coefficients indicate a positive, but medium strength relationship between the dependent and set of independent variables. R Square value represents that only 12.8% of the variation in IRR method can be explained by the firm characteristics. It depicts that the estimated model has only 12.8% of ability to predict the IRR and remaining proportions are explained by the other factors which have not been considered in this model. Thus R Square shows the evidence for badness of fit of the model. The received F value also indicates that five firm attributes cannot be used to model IRR. The results offer evidence of  $\beta_1$  and  $\beta_5$  are negatively and weekly related to IRR whereas  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  positively related. Positive impact of the leverage is strong whereas positive impact of other two variables is small. However, p-values indicate that the any identified variables do not significant predictors of IRR. At the 95% CI, the values of 0 falls within the interval again indicate that firm characteristics are not significant predictors of IRR.

Table 10: Multiple Regression Results in IRR Technique

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	6.144	3.294		1.865	.074
Size	-.436	.509	-.170	-.858	.399
Leverage	.645	.642	.196	1.005	.325
Growth	.013	.010	.267	1.285	.210
Ownership	.001	.004	.066	.338	.739
Age	-.026	.020	-.261	-1.259	.220
R= 0.357		R square = 0.128		Adj. R square = -0.047	
SE = 1.172		F value =0.731		Sig F = 0.607	

Source: Survey Data, 2013

The linear correlation between the observed and model-predicted value of the dependent variable indicates a positive and medium strength relationship ( $R = 0.316$ ) between the dependent and set of independent variables (Table 11). The explanatory power of PI method by regression model, as a whole is small ( $R^2 = 0.10$ ). F value also confirmed the above conclusion representing the statistically insignificant value. Thus, it seems that model is not reasonably fit for the data. The coefficients of  $\beta_2$  and  $\beta_5$  show that those two variables have a negative impact on the PI method. The negative impact of  $\beta_2$  on PI method is strong. Moreover,  $\beta_1$ ,  $\beta_3$  and  $\beta_4$  are positively and weekly related to PI method. However, any of the five coefficients do not provide an evidence of significant. Hence, it concludes as there is no statically significant association exists between firm attributes and PI method.

Table 11: Multiple Regression Results in PI Technique

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.364	4.397		.765	.451
Size	.015	.679	.004	.022	.982
Leverage	-.777	.857	-.180	-.907	.373
Growth	.014	.014	.209	.991	.331
Ownership	.003	.005	.112	.570	.574
Age	-.025	.027	-.196	-.931	.361
R= 0.316		R square = 0.100		Adj. R square = -0.080	
SE = 1.564		F value =0.554		Sig F = 0.734	

Source: Survey Data, 2013

According to the Table 12, multiple correlation coefficients indicate a positive and medium or small strength relationship between the dependent and set of independent variables.

Table 12: Multiple Regression Results in PB Technique

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.594	2.961		.201	.843
Size	.507	.457	.219	1.109	.278
Leverage	.342	.577	.115	.593	.559
Growth	.000	.009	-.021	-.100	.921
Ownership	-.005	.003	-.311	-1.613	.119
Age	.005	.018	.058	.282	.781
R= 0. 372		R square = 0.138	Adj. R square = -0.034		
SE = 1.053		F value =0.804	Sig F = 0. 558		

Survey Data, 2013

The regression as a whole is insignificant because the analysis shows a greater p-value of 0.558 than the significance level of  $\alpha = 0.05$ . The explanatory power of PB method by regression model as a whole is small ( $R^2 = 0.138$ ). Thus, it reports the evidence for badness of the model fit. Based on the p-value approach, all the variables are insignificant. Since all the regression coefficients were not significant, it is accepted that characteristics of responded companies have no influenced on the use of PB technique. Table 13 shows the linear correlation between the observed and model-predicted value of the dependent variable indicates a positive and medium strength relationship ( $R = 0.345$ ) between the dependent and set of independent variables. This estimated model has only 11.9% of ability to predict the ARR technique and remain proportions is explained by the other factors which have not been considered in present model. Thus, R Square shows the evidence for badness of the model fit.

Table 13: Multiple Regression Results in ARR Technique

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.780	3.137		.886	.384
Size	-.020	.484	-.008	-.041	.967
Leverage	-.266	.611	-.085	-.435	.667
Growth	.014	.010	.302	1.447	.160
Ownership	-.002	.003	-.117	-.602	.553
Age	-.002	.019	-.026	-.127	.900
R= 0.345		R square = 0.119	Adj. R square = -0.057		
SE = 1.116		F value =0.677	Sig F = 0.645		

Source:Survey Data, 2013

From the above results of multiple regressions, the researcher found that the findings of the present study do not support the theoretical assumption that firms' characteristics influence the choice of capital budgeting techniques. The results of independent samples t-test also supported the above findings, which did not reveal any significant difference between the usages of capital budgeting techniques in terms of firm characteristics. According to the overall findings, there is no significant difference in techniques used by small firms and large firms. For all methods in two firm sizes, the Pearson correlation showed an insignificant relationship. This indicates that for all methods, no association was found between the firm sizes and the capital budgeting methods. Thus, it is concluded that the firm size has no relationship with the capital budgeting techniques. The result of regression analysis is aligned with the correlation results. The results of independent samples t-test also confirmed these findings which did not show any significant difference of capital budgeting usage in terms of firm size. Hence, it concludes that there is no relationship between firm size and capital budgeting techniques. It is true that the finding of the present study is inconsistent with the findings of many studies (Pike 1984; Drury & Tayles 1996; Graham & Harvey 2001; Verbeeten 2006; Verma et al. 2009). But this relation has confirmed by Fernando (2005), Leon et al. (2008) and Truong et al. (2008) which they conclude that there was no significant difference in capital budgeting techniques used in terms of the firm size. Companies which were categorized as large companies in this study could be

considered small companies when comparing to developed countries. That may be a casing factor which affected an insignificant result.

The result of correlation and regression analysis showed an insignificant relationship between the levels of firm leverage and all the capital budgeting methods. The results of independent samples t-test also consistent with the above findings and did not report any significant difference of capital budgeting usage in terms of firm leverage. This finding is also inconsistent with the findings of Graham and Harvey (2001) and Daunfeldt and Hartwig (2011) who assert that the firm leverage is significantly related with capital budgeting techniques. However, this finding is in line with the finding presented by Leon et al. (2008), which concluded that the use of capital budgeting techniques is unrelated to the financial leverage. This relation has also confirmed by the study of Anand (2002) who found an insignificant relationship with firm leverage and capital budgeting techniques. Thus, it is concluded that the company leverage has no influence on the use of capital budgeting techniques. The results of correlation analysis reveal that NPV method in foreign owned companies was significant at 5% level. It means higher foreign ownership results in higher NPV usage and vice versa. The result is consistent with the findings of Leon et al. (2008) who assert that foreign ownership is positively related with DCF techniques. But the regression analysis results do not support the above findings which show the insignificant relationships. The results of independent samples t-test also confirmed the correlation result by showing insignificant difference of capital budgeting usage in terms of share ownership. The correlation results showed a significant relationship between non growth firms with NPV and IRR methods, while showed an insignificant relationship with other methods. According to the correlation results, relationship between growth firms and all the capital budgeting techniques do not show any significant relationship. Regression result does also not show and significance. The results of independent samples t-test also confirmed these findings by not showing any significant difference of capital budgeting usage in terms of growth level. It is true that the finding of the present study is inconsistent with the findings of Daunfeldt and Hartwig (2011) and Anand (2002) who reported that there is a relationship between growth level and capital budgeting techniques. But, this relation confirmed by the study of Graham and Harvey (2001) and Ahmed (2013) by reaching the same conclusion. Thus, it is concluded that the company growth has no significant impact on the use of capital budgeting techniques.

The results of correlation analysis reveal that PI and ARR methods in high age companies were significant at 5% level though other methods in high age companies were insignificant. Correlation analysis further reveals that all the methods were insignificant in low age companies. However, the regression analysis results do not show any significant relationships. The results of independent samples t-test also did not report any significant difference of capital budgeting usage in terms of listing age. The present finding is not consistent with the finding of Leon et al. (2008) who assert that the age of listing positively influence for DCF techniques. As identified by the researcher, it is important to report that the incorporation date and the listing date of sample companies is different. Although some of the sample companies have listed in CSE with a less period of time, those companies have incorporated in many years ago. Hence, these companies had practiced the capital budgeting for making their long-term investment decisions at the beginning of the business itself. So, the listing age would not be an influencing factor of deciding the technique of capital budgeting of the sample companies.

## **7 Conclusions and Recommendations**

As a whole, given results highlighted that the most used capital budgeting technique in the sample firms was either NPV or PB under each firm attributes, while the least used capital budgeting technique was the ARR; scoring the least means and percentages of usage rate as a main tool. When taking firm characteristics into account, it is noted that the use of PB criterion is more popular among large, highly levered, non-growth and high listing age companies. The NPV is used significantly more often among small, low levered, foreign owned, growth and low listing age companies whereas domestically owned companies used both NPV and PB as main tools at the equal mean score. The results emphasized that the preferred capital budgeting technique was either NPV or PB in each firm attributes, while the least used capital budgeting technique was the ARR; scoring the least means and percentages of usage rate as a main tool. The present findings in many instances were contrary to theory, for example the payback method still remains a popular method among sample companies, despite its disadvantages and on the aspect of the firm size and method used. An important caveat here, and throughout the survey, is that the responses represent beliefs. But, it has no way of verifying that the beliefs coincide with actions. In many aspects the results differ from previous surveys, perhaps because the more

diverse sample. At the end, it is important to note that majority of the studies that have been reviewed in the literature review focus on developed capital markets. Colombo Stock Exchange belongs to an emerging capital market and hence characteristics that are distinct in developed capital markets are not clearly discernible in CSE. Given the results of present study and the results from prior studies, researcher suggests that more empirical studies are required in this area. The research area touched by the present study could be identified as a fruitful avenue to carryout future studies. At the country level, the researcher recommends a further study can be widened within listed companies in Sri Lanka, through which a comparison can be made based on industry sectors; where more firms are included in the sample to give more generalization and to benefit more sectors.

## References

- Ahmed, I.E. (2013) 'Factors determining the selection of capital budgeting techniques', *Journal of Finance and Investment Analysis*, 2(2), pp. 77-88.
- Alzoubi, A. and Alazawi, Y. (2010) '*Capital budgeting techniques and firm's performance, case study: Jordanian listed services firms*'. A Thesis Submitted in partial fulfillment of the Requirements of Umea School of Business for the Degree of Master: Umea School of Business, Jordanian.
- Anand, M. (2002) 'Corporate finance practices in India: a survey', *Vikalpa*, 27(4), pp. 29-56.
- Arnold, G.C. (2008) *Corporate financial management*, 4th edn., London: Prentice Hall.
- Brounen, D., De Jong, A., and Koedijk, K. (2004) 'Corporate finance in Europe: confronting theory with practise', *Financial Management*, 33(4), pp. 71-101.
- Cooper, W.D., Morgan, R.G., Redman, A., and Smith, M. (2001) 'Capital budgeting models: theory vs. practice', *Business Forum*, 26(1 & 2), pp. 15-19.
- Danielson, M.G. and Scott, J.A. (2006) 'The capital budgeting decisions of small businesses', *Journal of Applied Finance*, 16(2), pp. 45-56.
- Daunfeldt, S.O. and Hartwig, F. (2011) 'What determines the use of capital budgeting methods? Evidence from Swedish listed companies', *Social Science Research Network*, pp. 1-37.
- Dayananda, D., Irons, R., Harrison, S., Herbohn, J., and Rowland, P. (2002) *Capital budgeting: financial appraisal of investment projects*. [Online]. Available at: [http://books.google.lk/books?hl=en&lr=&id=IUZRST\\_KMvUC&oi=fnd&pg=PR13&dq](http://books.google.lk/books?hl=en&lr=&id=IUZRST_KMvUC&oi=fnd&pg=PR13&dq) (Accessed: 22th February 2013).
- Drury, C. and Tayles, M. (1997) 'The misapplication of capital investment appraisal techniques', *Management Decision*, 35(2), pp. 86-93.
- Fernando, M.S.J.S.K.D. (2005) 'Capital investment practices in Sri Lanka: an empirical study'. In: *International Conference on Business Management*, University of Sri Jayewardenepura Nugegoda, Sri Lanka.
- Gitman, L.J. (2003) *Principles of managerial finance*, 10 edn., Boston: Addison Wesley.
- Graham, J.R. and Harvey, C.R. (2001) 'The theory and practice of corporate finance: evidence from the field', *Journal of Financial Economics*, 60(2-3), pp. 187-243.
- Hermes, N., Smid, P. and Yao, L. (2007) 'Capital budgeting practices: a comparative study of the Netherlands and China', *International Business Review*, 16(5), pp. 630-654.
- Kester, G.W., Chang, R.P., Echanis, E.S., Haikal, S., Isa, M.M., Skully, M.T., Tsui, K.C. and Wang, C.J. (1999) 'Capital budgeting practices in the Asia-Pacific Region: Australia, Hong Kong, Indonesia, Malaysia, Philippines and Singapor', *Financial Practice and Education*, 9(1), pp. 25-33.
- Khamees, B.A., Al-Fayoumi, N. and Al-Thuneibat, A. (2010) 'Capital budgeting practices in the Jordanian industrial corporations', *International Journal of Commerce and Management*, 20(1), pp. 49-63.
- Lazaridis, I.T. (2004) 'Capital budgeting practices: a survey in the firms in Cyprus', *Journal of Small Business Management*, 42(4), pp. 427-433.
- Leon, F.M., Isa, M., and Kester, G.W. (2008) 'Capital budgeting practices of listed Indonesian companies', *Asian Journal of Business and Accounting*, 1(2), pp. 175-192.

Penman, S. (2010) *Financial statement analysis and security valuation*, 4th edn., New York: McGraw Hill.

Pike, R.H. (1988) 'An empirical study of the adoption of sophisticated capital budgeting practices and decision-making effectiveness', *Accounting and Business Research*, 18(72), pp. 341-351.

Ramadan, S. (1991) 'Capital budgeting techniques and firm performance: Jordanian industrial corporations', *Journal of University of King Saud: Business Sciences*, 3(1), pp. 187-212.

Truong, G., Partington, G. and Peat, M. (2008) 'Cost-of-capital estimation and capital-budgeting practice in Australia', *Australian Journal of Management*, 33(1), pp. 95-122.

Verbeeten, F.H.M. (2006) 'Do organizations adopt sophisticated capital budgeting practices to deal with uncertainty in the investment decision? A research note', *Management Accounting Research*, 17(1), pp. 106-120.

Verma, S., Gupta, S. and Batra, R. (2009) 'A survey of capital budgeting practices in corporate India', *The Journal of Business Perspective*, 13, July/September (3), pp. 1-17.