

Using Capital Budgets Techniques in Evaluating Investments Projects: Applied Study on Jordanian Industrial Corporations

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Abstract

This study aimed to investigate capital budgets techniques used by Jordanian industrial corporations, exploring the extant use of capital budgets techniques used by industrial corporations. Ways of handling risks, discount rate and cash flows, and examined the relationship between using capital budget techniques with size and the financial performance of the industrial corporations. Questionnaires were distributed to 44 listed industrial corporations. The results of the study showed that: the most common used technique was the residual income by 75%, and then the payback period, the study showed that there is statistical significant difference in using of capital budgets techniques that depends on discounting of cash flows and the traditional techniques. And there is no a statistical significant difference in using capital budgets between corporations depend on their size, and their financial performance.

Keywords: Capital budgets; Jordanian industrial corporations; Financial performance.

1. Introduction

Company during its life takes many investment decisions that related in investment in long-term assets, such as the construction of new buildings, the purchase of a new machine, create a production line. ..., these decisions are important because of large amount of funds needed, the length of the period, and risk related to these decisions, so the using of appropriate decision models is high degree of importance. Horngren, et al., (2003) defined capital budgeting as making long term planning decisions for investments in projects. Capital budgeting is a decision making and control tool that spans multiple years.

Long term investment decision - making process takes six stages as follows: (Hajjaj, and Makram, 2001)

Verification phase, research phase, collecting information phase, selection phase, funding phase and preparation and controlling phase. Management must establish a program for timing of acquiring fixed assets which meet their financial needs, and take advantage of opportunities such as increased demand for its products. Doing programs for expansion requires investment of large sums of money, and so it is wise to think about before a reasonable time, because getting money for expansion may require several years (Abdullah, 1980).

The global conditions, increasing competition, technological developments, e - commerce and other factors increases the important of providing appropriate information and cost at the right time. Managerial Accounting which includes methods and scientific bases, based on financial and non - financial information, including budgets that can be used in evaluating of investment projects. Which help management to carry out the various functions and to help meet their goals, like continuing in rendering services and selling goods in the market and make profits.

1.1 Study Objectives

This study aimed to explore the primary following objectives:

- 1- Identifying the most important ways of capital budgets techniques used by Jordanian Industrial Corporation for evaluating long term investments.
- 2- State if an industrial corporation takes into consideration the risks associated with investment projects and methods of measuring these risks.
- 3- To study the relationship between the use of capital budgets techniques and corporation's size.
- 4- To examine the relationship between the use of capital budgets techniques and corporation's financial performance.

Secondary objectives were reached:

- 1- To know if industrial corporations are taking into account the prevailing inflation rate, discounting rate in calculating cash flows.
- 2- Methods used for estimating the cash flows.
- 3- The extant of using computers in assessing long-term investment projects and identifies the most important software used.
- 4- Verification of the follow - up and control ways for projects and investment decisions after putting them into practice.

2. Literature Review

Barjaktarovic et al (2015) revealed that 22 % of the Serbian firms from the examined sample most frequently use

NPV and IRR. While 24% of the companies often use IRR and the payback period (similar to the results obtained in the CEE region); 76% of the respondents have stated that they estimate the cost of capital using some formal technique, 40% of the respondents calculate the cost of capital according to the investors' required return, 9% use the CAPM and 40% determine the cost of capital using the WACC. The usage of the CAPM is very low (coincides with the results obtained in the CEE region, 81% of the companies regularly did project cash flows' estimations and 73% of the companies assessed the project risk; 42% of the companies used a risk adjusted discount rate.

A study by (Vecino et al, 2015) identify the capital budgeting practices in Colombia. The method used to gather information was a questionnaire applied to 300 companies, using the data to perform a statistical descriptive analysis, which highlights the net present value, the internal rate of return and the benefit/cost ratio as the main criteria. An inferential analysis was conducted for the effect of several company characteristics on a utilitarian variable called «proper use index». This analysis led to the conclusion that the company size and the academic level of the decision makers are related to the criteria and practices in the capital budgeting process.

Mindes and Saito (2014) compared capital budgeting techniques employed in listed and unlisted companies in Brazil. They surveyed the Chief Financial Officers (CFOs) of 398 listed companies and 300 large unlisted companies, and based on 91 respondents, the results suggest that the CFOs of listed companies tend to use less simplistic methods more often, for example: NPV and CAPM, and that CFOs of unlisted companies are less likely to estimate the cost of equity, despite being large companies. These findings indicate that stock exchange listing may require greater sophistication of the capital budgeting process.

A paper by Deunfeldt and Hartwig (2008) aims to extend and contribute to prior research on the association between company characteristics and choice of capital budgeting methods (CBMs). Design/methodology/approach: A multivariate regression analysis on questionnaire data from 2005 and 2008 is used to study which factors determine the choice of CBMs in Swedish listed companies. Findings: Our results supported hypotheses that Swedish listed companies have become more sophisticated over the years (or at least less unsophisticated) which indicates a closing of the theory-practice gap; that companies with greater leverage used payback more often; and that companies with stricter debt targets and less management ownership employed accounting rate of return more frequent. Moreover, larger companies used CBMs more often. Originality/value: The paper contributes to prior research within this field by being the first Swedish study to examine the association between use of CBMs and as many as twelve independent variables, including changes over time, by using multivariate regression analysis. The results are compared to a US and a continental European study.

Abo huadiy (2011) aimed to determine the importance of using accounting information in rationalizing the decisions of capital expenditures, to measure the perception of such importance, and to identify the extent of using this information by management in rationalizing decisions of capital expenditures. In addition, Identifying challenges that may limit such use, specifying the ways to assess the capital expenditures decisions by companies listed in the Palestine Exchange. Many firms listed in Palestine Exchange make plans of their investments annually, but there is a limited number of companies do not develop a plan at all, that means, these companies do not have a capital budget, and they assess their capital decisions simultaneously. In addition, the firms listed in Palestine Exchange use discounted cash flow methods (Profitability Index and Internal Rate of Return) to evaluate capital investment projects.

Arnold & Hatzopoulos (2000) aimed to determine the extent of use of evaluation methods for capital investment projects in the UK corporations. Data were collected through a questionnaire distributed to financial managers in these companies. The results of the study showed that there is a tendency to use capital budgets methods that based on the time value of money such as NPV and IRR 97% and 84% respectively in large companies. While Pike (1988) study showed a tendency to use IRR more than NPV, and the tendency towards using of NPV other than traditional methods. In addition to the previous methods payback period increased by 70% and ARR method 56%, especially when making routine decisions or when the underlying assumptions NPV unrealized, and the researcher attributed the factors for increasing the use of methods based on DCF (Discounted cash flows) for computers and thus ease of doing calculations. Researcher concluded most used methods for risk measurement is the sensitivity analysis by 85% of the companies. Three quarters of the companies take account of inflation, and that the most used method for the discount rate is the weighted average rate 54%, then debt ratio by 11%. Researcher showed that there's awareness and perception of the companies for review and scrutiny of investment projects after implementation.

Pike (1996) aimed to study the application of capital budgets in 100 of the UK companies based on a comparative study of the same subject and for the same sample of companies conducted by the same researcher in two periods from 1975- 1992. The study showed that there was an increase in the use of IRR and NPV 81% and 74%, respectively. Researcher attributed this to the increased awareness of the time value of money in decision making process and increasing use of computers. The study showed the increasing use of payback period method by 94%, while using of ARR method fairly stable at 50%. Companies justified this that the

traditional methods of capital budgets are better measurement of non - strategic alternatives for intangible elements of lowering risk. Sangster, (1993) study showed that using of ARR method remained stable during 17 years, and shows that the use of sophisticated capital budgeting methods that based discount cash flows associated with the company 's size by using the test Chi-Square X^2 and reasoned that the larger the size of the company the greater the dependence on the computer and ready - made software, the study showed increasing trend towards risk assessment by 26% in 1975 to 92% in 1992. And that the most frequently used method is a sensitivity analysis by 88% taking into account prevailing inflation rates. Researcher attributed the results of the study to the commoners for technological, education and economic conditions that prevailed from 1975-1992.

A study by (Sangster, 1993) depends on a comparison of the results of a survey conducted on 500 companies from major Scottish companies in 1989 with previous studies conducted on UK companies. The companies were divided based on the volume of sales to large and small companies, the data was collected through a questionnaire. The study sought to find out the methods currently used in assessment of capital investments, changes in use of them compared with previous studies, and to check whether major companies rely more on sophisticated capital budgets based on DCF methods than small businesses, and if ARR method still the prevalence despite its flaws mentioned in the literature of managerial accounting. Results showed that payback period method is the most common way by 78% , IRR , NPV and finally ARR respectively. Using DCF methods are the same as payback period method. IRR method is the most common way than NPV despite the theoretical advantages of NPV and this was the opposite of (Arnold & Hatzopoulos, 2000) study , this study did not produce results confirm the existence of a relationship between the size of the company and the use of methods based on DCF , this study came with results opposite of previous studies which confirmed the existence of an inverse relationship between the size of the company and using of ARR method. Researcher attributed the causes of variation results to factors related to methods of analysis, the study population and the study sample, ways of asking questions, and the researcher said there are other factors that might have an impact on the increased use of companies to DCF methods, except the size of companies and he mentioned organizational changes, the need for the information systems, technological developments , the use of computers and ready - made programs.

Pike (1988) aimed to verify the trend towards the use of capital budgets and sophisticated methods of control processes. It showed the impact on the efficiency and effectiveness of the investment decision - making, the study has been performed on two stages in 1980 , a survey was conducted on 208 of the largest companies UK through a questionnaire distributed to CFOs, and during 1986's a survey made to the same companies. The study showed regarding the preparation of capital budgets for a period exceeding two years that 3/4 companies prepared it, 26% of companies used specialized staff to study investment projects, 71% of companies are doing to develop a discount rate commensurate with the risk and inflation, 86% of the companies based on risk measurement, different ways and the most used is sensitivity analysis by 71% and also found that 54% of companies applied responsibility accounting on investment projects, with corporate awareness of the importance of reverse feedback information to make future capital decisions and, and it became clear to the researcher that the internal rate of return and net present value used increase from 58% to 84% in 1986 and that payback period method as one of the traditional methods are still used by 92%, the study showed that the use of sophisticated methods of assessing investment projects associated positively in effective capital budgeting decisions with respect to the evaluation and supervision.

A study by (Mills, 1988) aimed to discover the difference in application between UK companies and USA, the study showed that most UK firms especially larger ones rely more on simple ways, such as the payback period, and at the same time there is a tendency to use capital budgets methods based on discounted cash flow such as NPV and IRR .The study on UK companies did not showed a relationship between corporate performance, size , and the use of capital budgeting techniques as appeared on previously mentioned studies for (Klammer, 1973) and (Haka *et al*, 1985) .Researcher found that companies of USA more using capital budgets methods based on DCF and there is a preference for the method of NPV than IRR with the continuity of application of payback period.

A study by (Jones, 1986) focused on studying the methods of planning and capital budgets and controlling in UK companies and changing in use between 1975 and 1981 , data were collected through a questionnaire distributed to CFOs. The study of 1975 showed that the planning and forecasting methods used were not sophisticated and simple, and the results of the comparative study between the two periods were mixed ,some methods were changed in applied as expected, as reducing of the period of the plans from 3-5 years and focus on the process of providing reverse information quickly with more attention to financial control, and others not as expected he found that the use of computers in the field of planning and taking decisions was 29% by the companies, the most source of information were internal sources, there is a growing trend for using DCF methods with continuity of using payback period method and stability in using ARR. The researcher attributed results to the prevailing economic conditions and high inflation, the study showed a clear correlation

between the size of the company and application of control and advanced planning techniques for large companies, but he didn't find a relationship between the use of these methods and the type of industry .

In a study (Mubarak, 1997), which aimed to review the reality of using accounting information system in the Saudi industrial firms, compared those results with the results of other similar study conducted by the same researcher to the Egyptian industrial firms, testing the imposition symmetry between firms practices in both countries. On the other hand, research aims to review the practices in some developed countries such as Japan and the United States shed light on the similarities and differences in management accounting practices in those countries and interpreted it. Researcher found that the investment projects that depend on the discounted cash flow valuation models are the most common ways in use at US firms by 82%, and by contrast, the Japanese firms give first place to pay back period method by 52%, while in Saudi Arabia and Egypt , they used a variety of models for the evaluation of investment projects but payback period method took the first place in Saudi Arabia by 36%, Egypt 33%. And about taking the risk measurement into account there was a significant differences between firms and US firms the most applying of risk measurement. .The researcher saw that payback period was most preferred in industries that are characterized by their exposure to rapid technological changes and obsolescence of its products; researcher attributed the difference in application between firms to differing cultural and economic environment.

A study by (Al - Obeidi, 1993) to the reality of investment expenditure and control of the Libyan industrial companies in order to know the availability of elements of the efficient application and effective system of investment budgets, and identify the causes of deficiencies in the application of capital budgets, where the study showed a lack of the elements for the application of capital budgets efficiently and effective, and that few companies used sophisticated methods for evaluating capital budgets which take into account the time value of money and do not give any attention to the risk considerations when evaluating investment projects, in addition to not review and control the implementation of investment projects results.

3. Data and Methodology

3.1 Sample of the study

The study was conducted on all Jordanian Public Shareholding industrial corporations listed on the Amman Stock Exchange in 2016 .Excluding corporations that their financial statements are not available. A questionnaire was distributed to the corporations, 50of the questionnaires were recalled and 6 questionnaires were excluded for not suitability for analysis, and thus reached the final sample size of 44 corporations.

3.2 Sources and method of data collection:

A questionnaire was designed for data collection; it was distributed to all CFOs in the sample. The questionnaire divided into two sections, the first section included general information about the company in order to ascertain the main characterization of the sampler, while the second section contain questions about the main methods of capital budgets techniques used by Jordanian industrial corporations, the discount rate used, methods of estimating cash flows, methods of estimation and measurement of risk and the extent of follow - up and control of the implementation of capital budgets.

The financial information about the corporations was collected from the companies guide issued by Amman Stock Exchange guide.

3.3 Hypotheses of the study:

This study tested the following hypotheses:

H₀1: Jordanian industrial corporations do not used capital budgeting techniques in evaluation of investment projects.

H₀2: There is no a statistical difference in using capital budgets techniques based on discounted of cash flows and traditional capital budgets techniques (payback period and accounting rate of return).

H₀3: There is no statistical difference between the use of capital budgets techniques in Jordanian industrial corporations and their size.

H₀4: There is no statistical difference between using corporations of capital budgets techniques and it's earning.

4. Results

Statistical package for Social Sciences SPSS was used to analyze the data, and all hypotheses have been tested at 95% confidence level, which was offset by the level of significance (importance) 0.05 to interpret the test results which used by most of the studies on this subject. Cronbach alpha used to measure the reliability of the questionnaire, which amounted to 86.9% and this is considered a high degree of reliability. Descriptive statistics measurement used. ANOVA used to test validate the second hypothesis. One-Way-ANOVA used to examine the third and fourth hypotheses, in order testing statistically significant between the averages differences between the groups. Pearson correlation coefficient also used to measure of the degree of relationship between two variables

to support the examination the third and fourth hypotheses (Zoubi and Tlavhh, 2000).

The following table showed the results of using capital budgets techniques:

Table (1)

Jordanian industrial corporations using capital budgets techniques

Capital Budget techniques	NPV	IRR	PBP	ARR	PI	RI
Frequencies (%)	68.2	56.8	70.5	56.8	65.9	75

, while the results of the data analysis came as follows:

The pervious table showed the percentage of using capital budgets techniques in descending order came as follows: the most used residual income method by 75%, followed by the payback period method by 70.5%, net present value by 68.2%, profitability index 65.9%, and using of the internal rate of return and the accounting rate of return equally by 56.8 %.

To examine the second hypothesis ANOVA test was used to verify if there is a difference between the use of the different capital budgeting techniques, the test results showed a statistically significant variation between the corporations in using of traditional capital budgets methods , which includes payback period method ,accounting rate of return and residual income method, and between capital budgets techniques that depends on discounting of cash flows and taking the time value of money into account , which include net present value, internal rate of return, and profitability index method.

The following table showed ANOVA analysis between capital budget techniques:Table (2)

ANOVA analysis between capital budget techniques

PBP *NPV		PBP*IRR		PBP*PI		ARR*NPV		ARR*IRR		ARR*PI	
F	Sig	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig
3.214	.023	12.776	.000	2.794	.039	5.479	.001	19.033	.000	5.973	.001
RI*NPV		RI*IRR		RI*PI							
F	Sig	F	Sig	F	Sig						
3.672	.012	3.858	.010	3.075	.027						

One way ANOVA analysis showed the following results:

Table (3)

One Way ANOVA analysis

Capital budgets techniques	NPV	IRR	PBP	ARR	PI	RI
F	4.975	2.755	.353	.045	1.531	.128
Sig	.012	.075	.705	.956	.228	.880

Concerning in examination of the third hypothesis the ONE WAY ANOVA test was used to verify its authenticity, the companies divided into three groups depend on their total assets, large companies with total assets exceeded 60 million Jordanian dinars, medium companies which the value of its total assets between 10-60 million Jordanian dinars and small companies which its total assets less than 10 million dinars. The results showed that there isn't a statistical significance variation between corporations in using of capital budgets techniques depending on their size, but there was statistically significant variation between corporations used net present value method and their size, using of Pearson correlation showed an inverse relationship between the used of NPV and the size of the company and it not statistically significant

Table 4

Correlations								
		NPV	IRR	PBP	ARR	PI	RI	size
size	Pearson Correlation	-.230	-.251	-.122	-.038	-.241	-.061	1
	Sig. (2-tailed)	.133	.100	.431	.805	.116	.692	.
	N	44	44	44	44	44	44	44

The study showed that companies are using capital budgeting methods to evaluate all investment projects regardless the size of the project.

Concerning the examination of the fourth hypothesis ONE WAY ANOVA test was used for verification of it, the results showed that there isn't a statistically significant relationship between using corporation of capital budgets techniques and its financial performance. Pearson correlation coefficient used to test results of the third and fourth hypotheses, and the results came to confirm that in general there is not a relationship between the corporation using of capital budgets techniques and its size, and its financial performance.

Table 5

		NPV	IRR	PBP	ARR	PI	RI
	N	44	44	44	44	44	44
profitability	Pearson Correlation	-.125	-.123	-.210	-.156	-.036	-.134
	Sig. (2-tailed)	.419	.425	.171	.313	.815	.387

The study showed that the risk, inflation rates and expected growth are taken into account in determining the discount rate used, and that there is diversity in the use of discount rates, where discount rates that most commonly used is the required rate of return desired by the company.

With regard to the estimate of cash flows, the most widely used method depend on the accounting profits adjusted for non - cash expenses, followed by the using estimated cash flows for investment project.

The most commonly used methods for estimating risk is the sensitivity analysis by 63.6%, followed by the probabilistic method of distribution of cash flows.

Risk taken usually into account by raising the required rate of return, or reduce desired payback period.

The study showed that almost all companies used verification of follow - up and control of projects and investment decisions after putting them into practice, in addition to employing experts and advisers for investment outside the company. Firms used computers in evaluation of investment projects, especially EXCEL program. There isn't any soft ware designed for capital budgets to evaluate the investment projects.

5. Conclusions and recommendations

Results of the study can be summarized as follows:

1. The most capital budgets techniques used were the traditional ones that do not take into consideration the discounted cash flows and capital budgets techniques in descending order came as follows: the most used residual income method by 75%, followed by the payback period method by 70.5%, followed by the method of net present value by 68.2%, followed by profitability index method by 65.9%, While using of the internal rate of return and the accounting rate of return equally by 56.8 percent
2. Jordanian industrial company applied capital budgeting methods to evaluate investment projects, take into account inflation and the risks rates.
3. The results showed a statistically significant variation between the corporations in using of traditional capital budgets methods, which includes payback period method, accounting rate of return and residual income method, and between capital budgets techniques that depends on discounting of cash flows and taking the time value of money into account, which include net present value, internal rate of return, and profitability index method.
- 4- Corporations used mainly traditional methods in evaluation capital investment projects such as residual income and payback period, and this is similar to what brought by the previous studies.
5. In general there is not a statistically significant relationship between corporations used of capital budgets techniques and its size, and its financial performance.

5.1 Recommendations

1. Encourage companies to use capital budgets techniques that take into account the discounted cash flows, and the concept of time value of money to take the right investment decisions
2. The need to develop soft ware's for capital budgets to increase the efficiency and effectiveness of the investment decisions for the benefit of private companies, and the national income.

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