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The Theory-Practice Gap of Project Appraisals

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ABSTRACT

This paper is intended to examine the capital budgeting practices of listed companies in Malaysia. A comparison is made between the Main Board and Second Board companies with respect to the techniques used in evaluating major capital investment projects. In achieving the intended purpose, 356 questionnaires were sent to companies listed on the Main Board and 254 to the Second Board of nine industrial sectors of Bursa Malaysia. Descriptive and inferential statistics were used to analyze the data. The results of the study indicate prevalent use of the payback and the accounting rate of return (ARR) techniques in evaluating major capital investment projects. This is followed by the net present value (NPV) and the internal rate of return (IRR) methods. Large and small companies in an emerging market such as Malaysia prefer a simpler and less sophisticated technique in the assessment of major investment projects. This is inconsistent to the proposition that the theory-practice gap has narrowed in recent years. As for the non financial criteria 22.9% of the Main Board companies used such evaluation in their project assessments. This is not observed in the Second Board companies which are considered to be smaller than the Main Board companies. With respect to the usage frequency of the financial analysis techniques, the more complicated the technique, such as the IRR, the higher are the percentages of the smaller companies not using or rarely used the method.

ABSTRAK

Artikel ini bertujuan untuk meneliti amalan belanjawan modal bagi syarikat tersenarai di Malaysia. Perbandingan tentang teknik yang digunakan dalam menilai projek utama pelaburan modal dibuat di antara syarikat yang berada di Papan Utama dan Papan Kedua. Bagi mencapai matlamat tersebut, sebanyak 356 borang soal selidik dihantar kepada syarikat tersenarai di Papan Utama dan 254 kepada syarikat tersenarai di Papan Kedua dalam sembilan sektor industri di Bursa Malaysia. Statistik deskriptif dan inferens digunakan untuk menganalisis data. Keputusan kajian menunjukkan penggunaan yang ketara bagi tempoh bayar balik dan kadar pulangan perakaunan dalam menilai projek utama pelaburan modal. Ianya diikuti dengan kaedah nilai masa kini (NPV) dan kadar pulangan dalaman (IRR). Syarikat besar dan kecil dalam pasaran membangun seperti Malaysia

lebih mengutamakan teknik yang mudah dan kurang canggih dalam menilai projek pelaburan utama. Ianya tidak sejajar dengan usul yang menyatakan jurang amalan-teori semakin berkurangan kebelakangan ini. Bagi kriteria bukan kewangan, 22.9% syarikat di Papan Utama menggunakan kaedah penilaian ini dalam menilai projek. Ianya tidak diamalkan di kalangan syarikat Papan Kedua yang lebih kecil daripada syarikat Papan Utama. Bagi kekerapan penggunaan teknik analisis kewangan, semakin kompleks teknik tersebut (contohnya IRR), semakin tinggi peratusan syarikat kecil tidak menggunakan atau jarang menggunakan kaedah berkenaan.

INTRODUCTION

Several studies have been done to examine the application of capital budgeting techniques as tool to assess potential projects and risk of a project in the corporate world (Abdullah & Nordin 2005; Brounen 2004; Ryan & Ryan 2002; Graham & Harvey 2002; Arnold & Hatzopoulos 2000; Kester, Chang, Echanis, Shalahuddin, Mansor, Skully, Tsui and Wang 1999). However, not many studies have been done specifically on Malaysian companies' capital budgeting practices. The intention of this study is to focus on capital budgeting practices adopted by Malaysian listed companies. The idea of applying capital budgeting theory lies within the concept of maximizing shareholders' wealth where shareholders are the owners of a company. By becoming the owners, shareholders expect the company to take a project that would enhance the value of the company. Capital budgeting techniques act as a tool to assist a company in determining the value of a project, which then will hopefully add value to the company. Adequate evaluation reduces the risks of applying scarce resources to projects that might provide cost of capital which is higher than the returns, resulting in the creation of value.

There are various techniques that can be used to estimate the value of a project, which include the payback period, accounting rate of return (such as return on investment—ROI, return on equity), internal rate of return (IRR) and net present value (NPV). These techniques are found to be useful for investment decision-making although the techniques used should preferably reflect the time value of money. The accuracy of the evaluation, however, depends on how well a company estimates its cash flows.

Amongst all the techniques, the payback period method is the simplest and the easiest to use; whereas, NPV and IRR are considered to be more sophisticated and complex methods because their applications require the determination of a discount rate, which then could be adjusted to reflect the risks of the cash flows. In this case, the discount rate is adjusted (risk adjusted discount rate—RADR) to reflect the cash flow risks—the higher the

risk, the higher the RADR and the lower the risk, the lower the RADR. Even though these two methods are considered complicated, they could probably be the most preferable tools in assisting decision-making.

This study examines the extent to which investment evaluation techniques are being used by the Malaysian listed companies. Specifically, a comparison is made between the Main Board and the Second Board companies to see whether there are major differences in the techniques employed in evaluating capital investment projects between the two groups.

The paper is divided into five section. Section Two will provide a cross country comparison of projects assessment which is then followed by a description of the data and research design in Section Three. An analysis of the results is reported in Section Four and Section Five concludes the study.

CROSS COUNTRY COMPARISON OF PROJECTS APPRAISAL

A number of studies have looked at investment appraisal techniques and findings of these studies were inconclusive depending upon whether the studies were being implemented in the developed or emerging countries as could be referred in Table 1.

Brounen (2004) reported that companies in the UK, Netherlands, Germany and France extensively used the payback method as evidenced by the respective response of 69.2%, 64.7%, 50% and 50.9%. In addition, the payback method was also found to be more popular among private companies than public companies. The NPV and the IRR came after the payback period. In contrast to what was found on companies in the UK by Brounen (2004), a study by Arnold and Hatzopoulos (2000) showed that over 90% of small and medium-sized companies surveyed used either the IRR or the NPV to assist in deciding major financial commitments. Their finding indicated that the theory-practice gap had been narrowed.

Unlike Brounen (2004) but consistent to Arnold and Hatzopoulos (2000), a survey done by Ryan and Ryan (2002) on Fortune 1000 US companies found that companies in the US preferred the NPV and the IRR to all other capital budgeting methods. This was consistent with what had been suggested by most finance textbooks. A similar finding was found in a study conducted by Graham and Harvey (2002). As for multinational companies in the US, Shao and Shao (1996 1993) found that foreign subsidiaries of US-based multinational enterprises and European affiliates of US transnational companies preferred sophisticated capital budgeting techniques (NPV, adjusted present value, IRR and profitability index) as primary methods of analysis. The internal rate of return had been chosen as the top rank method.

A study conducted in Canada revealed a similar result (Jog & Srivastava 1995; Blazouske, Carlin & Kim 1988) where discounted cash flow methods

TABLE 1. A summary of investment appraisal techniques across country

Author(s)	Sample	Findings
Brounen (2004)	6,500 companies in the UK, Netherlands, Germany & France	69.2% (UK), 64.7% (Netherlands), 50% (Germany) & 50.9% (France) chose the payback period as their favorite technique
Arnold & Hatzopoulos (2000)	UK	90% of small & medium-sized companies used IRR & NPV
Ryan & Ryan (2002)	Fortune 1000 US companies	49.8% & 44.6% utilized NPV & IRR respectively
Graham & Harvey (2002)	392 CFOs of US companies	74.9% & 75.7% utilized NPV & IRR respectively
Shao & Shao (1996)	188 US multinational companies	IRR top rank method
Shao & Shao (1993)	European affiliates of US transnational companies	IRR top rank method
Jog & Srivastava (1995)	133 large Canadian companies	More than 75% utilized IRR & NPV
Blazouske, Carlin (1988)	208 Canadian companies	IRR & NPV most popular & Kim
Kester et al. (1999)	Australia, Indonesia, Malaysia & Philippines	IRR & NPV most popular
	Hong Kong	Payback most popular
	Singapore	IRR & Payback most popular
Abdullah & Nordin (2005)	Malaysian Main Board companies (conducted in 1999)	Accounting rate of return (ARR) NPV most popular
Pinches & Lander (1997)	South Korea, Taiwan, Singapore & India	Payback & IRR
Kester & Tsui (1996)	Singapore	Payback & IRR
Jain, Jain & Tarde (1995)	64 companies from the Bombay Stock Exchange	50% used ARR & payback; 10% used NPV & IRR; 40% used traditional & DCF techniques
Hall (1998)	South African companies	33.8% and 32.3% utilized the respective ROI & IRR

had become a norm. In this case, the IRR was used more frequently than the NPV. Yet, most companies had been using multiple investment appraisal techniques to assess capital investments. Both surveys presented evidence of a narrow theory-practice gap.

When an analysis was done on countries in the Asia-Pacific region (Australia, Indonesia, Malaysia and Philippines), discounted cash flow techniques (NPV or IRR) were ranked as the most important techniques for evaluating projects (Kester et al. 1999). On the other hand, Hong Kong respondents utlized the payback method while Singapore equally rated the IRR and the payback method as the most important technique. In 1999, a survey was conducted by Abdullah and Nordin (2005) on the Malaysian Main Board listed companies. They revealed that majority of the companies used accounting rate of return (ARR) and net present value techniques. The payback method and internal rate of return were ranked third and fourth. This was also the case for South Korea, Taiwan, Singapore and India (Pinches & Lander 1997). Net present value was not a widely applied capital budgeting technique in making capital investment decisions in these newly industrialized countries. Most of the companies chose the payback period method as the main tool to evaluate a project.

However, in an earlier study done in Singapore (Kester & Tsui 1996), discounted and non-discounted cash flow methods (IRR & payback) were ranked equally important in evaluating capital investment project. The payback method was popular because it was easy to calculate and to understand. Furthermore, it was also viewed as a technique that could assess risk since it did not include cash flows in a distant future, which were considered to be more risky than near term cash flows. However, according to the authors, the quantitative analysis used by a company most likely depended on the size of a project—the greater the size of a project, the more sophisticated the analysis.

According to a survey done by Jain, Jain and Tarde (1995) on companies listed on the Bombay Stock Exchange, almost half of the sample companies relied on traditional techniques, such as the accounting rate of return and the payback period. Discounted cash flow techniques were not of primary importance because they were believed to be too complex to use. "Simplicity leading to less time and cost involved" and "easy explainability to the top management" were among the reasons why these companies preferred the payback period method. Similarly, a study conducted by Hall (1998) on South African companies showed that the return on investment (ROI) and the IRR were regarded as the most important capital budgeting method. Priorities were given to the non discounted cash flows technique, which is in contrast to the suggestion made in textbooks.

COMPANY SIZE

Size of a company also played a role in distinguishing the type of capital budgeting techniques applied. According to Brounen (2004), large European firms used the NPV significantly more often than the smaller firms. He further indicated that other than the UK, the payback method was more popular among smaller European companies. An earlier study of UK companies conducted by Drury and Tayles (1996) also found a similar result where discounted cash flow techniques were highly used by larger companies as could be referred in Table 2. In their study, 90% of the larger companies and only 35% of the small companies 'often' or 'always' used either the NPV or the IRR discounting methods. This finding was also consistent to the result reported by Arnold and Hatzopoulos (2000).

TABLE 2. A summary of investment appraisal techniques based on company size

Author(s)	Sample	Findings
Brounen (2004)	6,500 companies in the UK, Netherlands, Germany & France	Large European firms used NPV more often than smaller firms. Other than UK, payback method more popular among smaller firms
Arnold & Hatzopoulos (2000)	UK	97% of large companies used NPV & 84% used IRR
Drury & Tales (1996)	UK Largest companies	63%, 50% & 30% used IRR, NPV & payback respectively
Danielson & Scott (2005)	US small companies	29% used "gut feel" followed by payback & ARR
Block (1997)	232 small businesses in the US	42.7% & 27.6% utilized payback & NPV/IRR respectively
Graham & Harvey (2002, 2001)	US firms	Small firms used payback & large firms used NPV

Investment appraisal studies had also been conducted among small companies in the US. According to Danielson and Scott (2005), small businesses with less than 250 employees, indicated that 29% of the sample firms selected the "gut feel". The next choice was the payback period, followed by the accounting rate of return. Only 14% of the sample chose discounted cash flow analysis as their primary investment evaluation method. This result was also consistent to a study performed by Block (1997) where

small businesses preferred the payback method. It was believed that small business companies were particularly interested in how quickly a loan could be paid back, and this was one of the reasons why they would prefer to use the payback method instead of the discounted cash flow methods. At this point, bankers were primarily interested in the company's ability to pay back the loan, rather than maximizing the company's shareholders wealth. As such, the theory-practice gap widen among the small companies.

However, Graham and Harvey (2002; 2001) found a contradictory evidence where their result indicated that small companies used the payback period almost as frequently as the NPV or the IRR. This showed that small companies were increasingly showing an interest in the application of sophisticated method in assessing investment projects. However, the definition of "small businesses" addressed by different researchers might influence the results. When it came to large firms, Graham and Harvey (2002; 2001) found that these firms were significantly more likely to use the NPV than small firms. Less sophisticated methods such as the payback period and the accounting rate of return had nearly disappeared as the primary method of analysis for large companies (Block 1997). Klammer in his article for the year 1972 (cited in Block 1997) showed that the use of discounted cash flow methods among large companies had been steadily increasing from 16.7% in 1959 to 33.7% in 1964 and expanded to 43% in 1970. An earlier study done by Ross (1986) on capital budgeting practices among large companies also found a similar result. Their finding indicated a prevalent use of discounted cash flow (DCF) methods, especially the IRR.

METHOD

Two types of data—primary and secondary—were used in this study. The secondary data included information of companies listed on the Main Board and Second Board of Bursa Malaysia taken from News Straits Times and Datastream; whereas relevant articles related to this study were taken from journals. The primary data was obtained mainly by administering structured questionnaires sent to 610 randomly selected companies listed on the Main Board (MB) and Second Board (SB) of Bursa Malaysia in February 2004. As shown in Table 3 (page 8), out of 610 companies, 356 companies are those listed on the Main Board and another 254 companies are those listed on the Second Board of Bursa Malaysia.

As for the selection of companies from each industry, a disproportionate stratified sampling was used. There were nine industries selected on the Main Board which were technology, consumer products, industrial products, construction, trading and services, properties, plantation, mining and hotel. Similar industries were also selected for the Second Board except for mining

and hotel. However, industries such as finance, unit trusts and infrastructure project companies were excluded. This was because finance and unit trust companies were considered as companies that have assets that are highly volatile in nature and presentation of the accounting variables differ from other industries. As for the infrastructure project companies, the capital budgeting decisions might be different from the selected industries because companies in this industry normally involved in large capital investment projects.

TABLE 3. Industry classification of sample companies

	Main Board			Second Board		
Industry	Sent	Response	Rate	Sent	Response	Rate
Technology	15	3	20%	5	0	0%
Consumer Products	64	13	20%	55	6	11%
Industrial Products	125	28	22%	124	12	10%
Construction	33	5	15%	16	1	6%
Trading/Services	77	17	22%	48	6	13%
Properties	15	0	0%	2	0	0%
Plantation	17	4	24%	4	0	0%
Mining	4	0	0%			
Hotel	6	0	0%			
Total	356	70	20%	254	25	10%

The questionnaire was adapted from Arnold and Hatzopoulos (2000) with a few adjustments made to incorporate the Malaysian environment. Most of the questions were close-ended. It is observed from Table 3 that the response rate for the questionnaire was only 20% or 70 out of 356 companies for the Main Board and 10% or 25 out of 254 companies for the Second Board. The highest response rate came from the plantation sector for the Main Board and trading/services sector for the Second Board with a respective 24% and 13% response rate. None of the selected companies from the properties, mining and hotel industries of the Main Board responded to the survey. Similarly, the properties and plantation industries of the Second Board did not provide any response to the survey.

In order to achieve the first objective of the paper that is to examine the capital budgeting practices among listed companies on the Main and Second Board, a descriptive statistic was utilised. Cochran's Q, Chi-Square and Kruskal-Wallis tests were used to examine whether there were differences in the capital budgeting practices between the Main Board and Second Board companies.

ANALYSIS OF RESULTS

In referring to Panel B of Table 4, it is observed that the average market value of the sample companies for the Main Board and the Second Board are RM1,741 million and RM69 million respectively. As compared to all listed companies in both the Main Board and Second Board, the average market value of the sample companies for the Main Board was much higher; whereas the average market value of the sample companies for the Second Board was lower than the average shown for all listed companies. These figures indicated that the companies on the Main Board were large in size as compared to their counterparts on the Second Board, which were smaller in size. It became a base for the segregation of large versus small companies in our sample. With respect to the Main Board sample companies, out of 70 companies, there were nine companies categorized under the classification of having an above average market value while the remaining companies categorized as having a below average market value. Similarly, the Second Board sample companies also showed that most of these companies were below average size company, with only eight companies having above average market value.

TABLE 4. Size of listed companies

Panel A Market Value of All Listed Companies on Bursa Malaysia as of 31 December 2004

	Market value (million)	Number of companies	Average Market Value (million)
Main Board	RM692,480	622	RM1,113
Second Board	RM21,290	278	RM77

Panel B Market Value of Sample Companies as of 31 December 2004

	Market value (million)	Number of companies	Average Market Value (million)
Main Board	RM121,856	70	RM1,741
Second Board	RM1,719	25	RM69

Table 5 showed the average market value of the sample companies based on each industry. It is obvious that trading/services and plantations industries average market values are rather large with a respective value of RM4,602.82 million and RM3,200.33 million. These two industries might have influence the average market value of the total sample of the Main

Board. As for the Second Board sample companies, the differences among the average market values for the consumer products, industrial products, construction and trading/services are not as large as the Main Board sample companies with the highest average market value of RM83.12 million for trading/services.

TABLE 5. Average market value of sample companies based on industry

Industry	Main Board		Second Board	
	Number of Companies	Average Market Value (Million)	Number of Companies	Average Market Value (Million)
Technology	3	RM298.31	0	NA
Consumer Products	13	RM765.29	6	RM67.26
Industrial Products	28	RM596.29	12	RM63.88
Construction	5	RM653.44	1	RM50.27
Trading/Services	17	RM4,602.82	6	RM83.12
Plantation	4	RM3,200.33	0	NA
Total	70	RM1,740.80	25	RM68.77

When an analysis was made on the annual capital budget of the sample companies, 45.6% or 31 companies from the Main Board and 56% or 14 companies from the Second Board had their annual capital budget in the range of RM1.1 million to RM20 million (Table 6). None of the Second Board companies had an annual capital budget beyond RM50 million. In contrast to this, there were eight, six and five Main Board companies that were having an annual capital budget in the range of RM50.1 million to RM100 million, RM100.1 million to RM200 million and above RM200 million respectively.

In terms of the ranking among the techniques used to appraise major investments based on a frequency count, payback came first, which was followed by ARR, NPV and IRR for both the Main Board and Second Board companies (Table 7). Non-financial criteria was the least used technique by companies from the Main Board, whereas among the Second Board sample companies, non-financial criteria was not being used at all.

In order to examine whether there was a significant difference in the usage of the various techniques, a Cochran's Q value of 65.241 at a one percent significant level, which could be referred in Table 8, shows that overall there was a significant difference in the techniques selected. This finding contradicts to the evidence provided by some researchers who found that the discounted cash flow techniques were the preferred choice among

TABLE 6. Annual capital budget of sample companies

		Listing		Total
		Main Board	Second Board	
Budget	Up to RM1 million	2	7	9
	2.9%	28%	9.7%	
RM1.1 - RM20 million		31	14	45
	45.6%	56%	48.4%	
RM20.1 - RM50 million		16	4	20
	23.2%	16%	21.5%	
RM50.1 - RM100 million		8	0	8
	11.6%	.0%	8.6%	
RM100.1 - RM200 million		6	0	6
	8.7%	.0%	6.5%	
RM200 +	5	0	5	
7.2%	.0%	5.3%		
Total		68	25	93
		100.0%	100.0%	100.0%

Note: The first line provides the number of companies; whereas the second line gives the percentage within listing

TABLE 7. Financial analysis used for the appraisal of major investments

	Main Board	Second Board	Total
Payback	68.6% (48)	72% (18)	69.5% (66)
ARR	61.4% (43)	52% (13)	59% (56)
IRR	52.9% (37)	32% (8)	47.4% (45)
NPV	54.3% (38)	44% (11)	51.6% (49)
Non-financial criteria	22.9% (16)	0% (0)	16.84% (16)

practitioners (Arnold & Hatzopoulos, UK 2000; Ryan & Ryan, US, 2000; Kester et al. Australia, Indonesia, Malaysia and Philippines 1999; Jog & Srivastava, Canada 1995; Blazouske, Carlin & Kim, Canada 1988). Nevertheless, the finding of this study is consistent to those reported by Pinches and Lander (South Korea, Taiwan, Singapore and India 1997) and Jain, Jain and Tarde (India 1995) who concluded that NPV was not widely applied in these newly industrialized and developing countries. Hence, the existing result is inconsistent to the proposition that the theory-practice gap has narrowed considering improvements in financial knowledge among decision makers and technological developments.

TABLE 8. Overall differences in the techniques used

	Value	
	0	1
Payback	29	66
Accounting Rate of Return	39	56
Internal Rate of Return	50	45
Net Present Value	46	49
Non-financial criteria	79	16
Cochran's Q	65.241(a)	
Asymp. Sig.	.000	

a 1 is treated as a success

A Chi-Square test was then executed to examine specifically, which among the techniques used provide a difference between the Main Board and Second Board companies. The results are reported in Table 9. It is observed that there were no significant differences in the techniques used for both the Main Board and Second Board companies except for the IRR and non financial criteria approaches. Chi-Square values of 3.214 and 6.872 for the respective IRR and non financial criteria showed that there was a significant difference of the techniques used by the Main Board and Second Board companies at the 10 percent and one percent levels.

Table 10 indicates the usage frequency of financial analysis techniques for both the Main Board and Second Board sample companies. In general, among the Main Board companies that used the payback method, majority of them often and always used it; whereas those that have selected the accounting rate of return in evaluating projects, about 68.5% of the companies often, mostly and always used this technique whereas 7.1% and 24.3% of the respondents rarely and never used it. In terms of the frequency use for IRR, about 28.6% of the companies always used the IRR, 17.1% often used it, and 11.4% mostly used the method. Approximately 42.9% of these companies rarely or did not use the IRR. As for the NPV technique, 58.5% of the Main Board companies almost always used it and 41.4% rarely and never used the NPV.

As for the Second Board sample, 84% selected often, mostly or always used the payback and only 16% rarely or did not use this technique. For the second non discounted cash flow approach, ARR, 52% among the 13 Second Board companies mentioned that they often and mostly used it while the remaining claimed that they had rarely or never used this approach. It appears that the more complicated the technique, such as the IRR, the higher were the percentages of the Second Board companies not using or rarely use the method. In this case, 64% of the Second Board companies fall under this

TABLE 9. Differences in the individual technique used

Listing		Payback			Internal Rate of Return			Accounting Rate of Return			Net Present Value			Non-financial criteria		
		No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes	Total
Main Board	Count	22	48	70	33	37	70	27	43	70	32	38	70	54	16	70
	Expected Count	21.4	48.6	70.0	36.8	33.2	70.0	28.7	41.3	70.0	33.9	36.1	70.0	58.2	11.8	70.0
Second Board	Count	7	18	25	17	8	25	12	13	25	14	11	25	25	0	25
	Expected Count	7.6	17.4	25.0	13.2	11.8	25.0	10.3	14.7	25.0	12.1	12.9	25.0	20.8	4.2	25.0
Total	Count	29	66	95	50	45	95	39	56	95	46	49	95	79	16	95
	Expected Count	29.0	66.0	95.0	50.0	45.0	95.0	39.0	56.0	95.0	46.0	49.0	95.0	79.0	16.0	95.0
Pearson Chi-Square	Value	.102			3.214			.677			.780			6.872		
	Asymp. Sig. (2-sided)	.749			.073			.411			.377			.009		

TABLE 10. Usage frequency of financial analysis technique

	Didn't use techniques	Rarely	often	mostly	always	Total
Main Board						
Payback	12.9% (9)	12.9% (9)	28.6% (20)	15.7% (11)	30% (21)	100% (70)
ARR	24.3% (17)	7.1% (5)	17.1% (12)	27.1% (19)	24.3% (17)	100% (70)
IRR	24.3% (17)	18.6% (13)	17.1% (12)	11.4% (8)	28.6% (20)	100% (70)
NPV	24.3% (17)	17.1% (12)	11.4% (8)	15.7% (11)	31.5% (22)	100% (70)
Second Board						
Payback	12% (3)	4% (1)	44% (11)	20% (5)	20% (5)	100% (25)
ARR	24% (6)	24% (6)	20% (5)	32% (8)	0% (0)	100% (25)
IRR	40% (10)	24% (6)	16% (4)	12% (3)	8% (2)	100% (25)
NPV	24% (6)	20% (5)	28% (7)	24% (6)	4% (1)	100% (25)

category whereas 16%, 12% and 8% often, mostly and always used the IRR. When it comes to NPV, 56% of the Second Board companies often, mostly and always applied this technique. The remaining 44% did not use or rarely used the NPV.

A Kruskal-Wallis test was then run to examine whether there exist differences in terms of the usage frequency of all investment appraisal techniques between the Main Board and Second Board companies. Based on the ranking of the usage frequency from the lowest to the highest number, it appears that there were no significant differences in the usage frequency of the payback and NPV method for companies listed on the Main Board and Second Board. Nevertheless, it could be observed from Table 11 that when it comes to the ARR and IRR techniques, there was a significant difference in the usage frequency of companies listed on the Main Board and Second Board. A Chi-square of 3.606 and 4.585 with a respective asymptotic significance of 0.058 and 0.032 for the ARR and IRR techniques, showed that the usage frequency differences were significant at the 10 percent and 5 percent levels. The Main Board companies used more of the ARR and IRR than the Second Board companies.

Table 12 highlights a combination of financial analysis techniques used by the responding companies in evaluating their projects. There were four Main Board companies or 5.7% of the respondents that did not use any investment appraisal technique in evaluating major investment projects; whereas most of the Second Board companies used certain methods in their evaluation. This is inconsistent to the findings of Danielson and Scott (2005) who found that 29% of the small companies used subjective judgement. Out of 70 Main Board and 25 Second

TABLE 11.Differences in usage frequency of financial analysis technique

	Listing	Mean Rank	Chi Square	Asymp. Sig
Payback	Main Board	48.36	.048	.827
	Second Board	47.00		
Accounting Rate of Return	Main Board	51.13	3.606	.058*
	Second Board	39.24		
Internal Rate of Return	Main Board	51.53	4.585	.032**
	Second Board	38.12		
Net Present Value	Main Board	50.34	2.009	.156
	Second Board	41.44		

Note: Main Board 75 companies; Second Board 25 companies;
* significant at $\alpha = 0.10$; **significant at $\alpha = 0.05$

TABLE 12. Combinations of financial analysis techniques used in appraising major investments

	Main board	Second board	Total
No method	5.7% (4)		4.2% (4)
Single method			
Payback	1.4% (1)	20% (5)	6.3% (6)
ARR	8.6% (6)	12% (3)	9.5% (9)
IRR	1.4% (1)		1.1% (1)
NPV	2.9% (2)	4% (1)	3.2% (3)
Non-financial criteria	2.9% (2)		2.1% (2)
Total	17.1% (12)	36% (9)	22.1% (21)
Two methods			
Payback+ ARR	10% (7)	12% (3)	10.5% (10)
Payback+ IRR	7.1% (5)	4% (1)	6.3% (6)
Payback+ NPV	2.9% (2)	8% (2)	4.2% (4)
ARR+ IRR	1.4% (1)		1.1% (1)
ARR+NPV		12% (3)	3.2% (3)
IRR+ NPV	4.3% (3)		3.2% (3)
Payback +Non-financial criteria	1.4% (1)		1.1% (1)
Total	27.1% (19)	36% (9)	29.5% (28)
Three methods			
Payback + ARR +IRR	4.3% (3)	8% (2)	5.3% (5)
Payback + ARR + NPV	5.7% (4)		4.2% (4)
Payback + IRR+ NPV	5.7% (4)	12% (3)	7.4% (7)
ARR + IRR +NPV	2.9% (2)		2.1% (2)
ARR + NPV+ Non-financial criteria	1.4% (1)		1.1% (1)
Payback + NPV+ Non-financial criteria	1.4% (1)		1.1% (1)
Payback+ ARR +Non-financial criteria	1.4% (1)		1.1% (1)
Total	22.9% (16)	20% (5)	22.1% (21)
Four methods			
Payback + ARR + IRR + NPV	14.3% (10)	8% (2)	12.6% (12)
Payback + ARR + NPV + Non-financial criteria	1.4% (1)		1.1% (1)
Payback + ARR + IRR + Non-financial criteria			
Payback + IRR + NPV + Non-financial criteria	1.4% (1)		1.1% (1)
Total	17.1% (12)	8% (2)	14.7% (14)
Five methods			
Payback+ ARR +IRR +NPV + Non-financial criteria	10%(7)		7.4% (7)

Board companies, only 12 or roughly 17.1% and 9 or 36% of the respondents from the respective Main Board and Second Board companies used a single technique to evaluate their projects. There were 19 or 27.1% of the Main Board companies that combined two methods in evaluating major projects. When it comes to a combination of three, four and five methods in evaluating major investment projects, the Main Board companies were more evident in using a few techniques to assess major investment projects as compared to the Second Board companies. There were only five and two Second Board companies that utilised a combination of three and four methods in their evaluation of projects as compared to 19 and 16 Main Board companies that combined three and four methods. As expected, none of the Second Board companies used more than four methods in evaluating projects. In contrast to this, seven out of 70 Main Board companies or 10% of the respondents utilised five methods in evaluating major investment projects.

Apparently, the sample companies tend to adopt the non-discounted techniques rather than the sophisticated approaches where 82.9% of the Main Board companies and 96% of the Second Board companies employed at least one of the less complicated or non-discounted techniques. In order to examine whether there were differences in the combination of the techniques used in assessing major investment projects between the Main Board and Second Board companies, a chi square analysis was run. As observed in Table 13, the Main Board companies normally employed three or more methods in their evaluation. The actual count of 16 for the three

TABLE 13. Differences in combinations of financial analysis techniques used in appraising major investments

Listing		Single method	Two methods	Three methods	Four methods	Total
Main Board	Count	12	19	16	19	66
	Expected Count	15.2	20.3	15.2	15.2	66.0
Second Board	Count	9	9	5	2	25
	Expected Count	5.8	7.7	5.8	5.8	25.0
Total	Count	21	28	21	21	91
	Expected Count	21.0	28.0	21.0	21.0	91.0
Pearson Chi-Square		6.338				
Asymp. Sig. (2-sided)		.096				

Note: No method group has been dropped since the expected count is less than five. Four and five methods have been grouped together to avoid an expected count of less than five.

methods and 19 for the four methods were greater than their expected count of 15.2. This result could not be observed on the Second Board companies where the actual count was less than the expected count. The fact that the Second Board companies were smaller in size shows that these companies utilised the single method or two methods proportionately more than the Main Board companies. This was evident in their actual count of 9 in each combination which was greater than the expected count of 5.8 for the single method and 7.7 for the two.

Combinations of financial analysis techniques used in appraising major investmentsmethods. The difference in the combination of the techniques used between the Main Board and Second Board companies was significant at the 10 percent level with a chi square value of 6.338.

CONCLUSION

Graham and Harvey (2001, 2002) found that large firms from a developed country such as the United States would normally used the discounted cash flow techniques—net present value and internal rate of return—in appraising major investment projects. This is further supported in a study by Danielson and Scott (2005). According to them, small companies that are having less than 250 employees indicated that the payback period followed by the accounting rate of return were the primary investment evaluation methods employed by these companies. This is in line with Arnold and Hatzopoulos (2000)'s findings where 100% of its large firms used either the IRR or NPV as compared to 91% for small firms. Similarly, Jog and Srivastava (1995) also found that the discounted cash flow methods have become a norm among large Canadian companies. Other researchers that have found comparable findings are Block (1997), Drury and Tayles (1986), Graham and Harvey (1999) and Ross (1986). These evidences are not consistent to the findings of this study. Malaysian listed companies that appeared on the Main Board and the Second Board selected the payback period and the accounting rate of return over the discounted cash flow techniques.

There are no disputes in terms of the choices made which indicate that large and small companies in this study prefer a simpler and less sophisticated technique in the assessment of major investment projects. This is inconsistent to the proposition that the theory-practice gap has narrowed in recent years. That was seen in the developed countries but in a developing country like Malaysia with its technological advancement and improvements in financial knowledge among decision makers, the theory-practice gap still exists and it has not thinning in recent years as claimed by Arnold and Hatzopoulos (2000), Graham and Harvey (2002) and Ryan and Ryan (2002). The results of this study are consistent to the findings reported by Jain, Jain and Tarde (1995) on listed companies in India, Pinches and Lander (1997) on companies

listed in South Korea, Taiwan, Singapore and India and also Brounen (2004) on European companies. Nevertheless, if a comparison is made between the results reported here and those of Abdullah and Nordin (2005) and Kester et al. (1999) where NPV and IRR were found to be the most important techniques for evaluating projects in Malaysia, it seems there is a change in the selection of the techniques employed in assessing major investment projects in recent years.

We could observe that companies in developing countries such as Malaysia were moving towards the use of less sophisticated techniques. Adoption of the payback method could probably be explained by looking at the companies' liabilities. It is likely that companies are more interested in how quickly a loan could be paid back. According to Block (1997), small businesses are more interested in how quickly a loan could be paid back. Because of that, they would probably adopt the payback method instead of discounted cash flow method. Besides, the payback method is also considered as the most simple and easy to understand method. As stated by Jain, Jain and Tarde (1995), companies in India chose the payback method for two reasons, "simplicity leading to less time and cost involved" and "easy explainability" to the top management".

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