

CAPITAL BUDGETING TECHNIQUES EMPLOYED BY SELECTED SOUTH AFRICAN STATE-OWNED COMPANIES

J.H. Hall, T. Mutshutshu

Abstract

An analysis of the prior literature revealed few studies on the capital budgeting practices of state-owned companies (SOCs). The goal of this study was therefore to investigate the capital budgeting techniques employed by decision-makers in South African state-owned companies. The results indicated that the NPV and IRR techniques were used by 43% of respondents (the NPV was slightly more popular). WACC emerged as the preferred discount rate for capital budgeting purposes. In considering project risk, state-owned companies seem to prefer sensitivity analysis. It is thus recommended that academics emphasise the importance of NPV as a primary capital budgeting technique.

Keywords: Net Present Value (NPV), Internal Rate of Return (IRR), Capital Budgeting Techniques, Weighted Average Cost of Capital (WACC)

* *Department of Financial Management, University of Pretoria, Pretoria, 0001, Republic of South Africa*

Tel.: +27 12 420 3389

Fax: +27 12 420 3916

E-mail: john.hall@up.ac.za

** *Chief Advisor: Economic Regulation and Financial Planning, ESKOM, Republic of South Africa*

1. Introduction

In recent decades, capital budgeting has attracted much interest, and there has been copious research on the topic. Many of these studies have been conducted on private sector businesses (the term “private sector” is used in this context to refer to businesses that are not owned by the government), and the samples used in these studies have often been drawn from local stock exchanges. However, in the United States (US) and Canada, two studies by Burns and Walker (1997) and Chan (2004) respectively are examples of capital budgeting studies on government-owned utilities.

In the South African context, scrutiny of the financial academic literature revealed no studies published on the capital budgeting practices of South African state-owned firms, although a number of studies on the capital budgeting practices used by South African private sector firms have been conducted, for example, by Hall (2000), Hall (2001), Gilbert (2003), Du Toit and Pienaar (2005), Correia and Cramer (2008) and Hall and Millard (2010).

The main purpose of this study was therefore to address the knowledge gap regarding the absence of research on capital budgeting techniques used by state-owned companies. This study thus sought to determine which capital budgeting techniques are employed by decision-makers in state-owned companies in South Africa, and to investigate the methods these entities use to determine the weighted average cost of capital (WACC).

The specific objectives of this study were to answer the following questions:

What capital budgeting techniques do state-owned companies use in the evaluation of capital budgeting projects?

What, if any, discount rate is used for capital budgeting purposes?

How is the discount rate that is used in the capital budgeting process calculated?

How, if at all, do these institutions account for risk in the capital budgeting process?

Apap and Masson (2005) observe that information on the capital budgeting techniques applied by publicly traded utilities is useful not only to the management of these utilities, but also to investors. Hence, the current study sought to add to the body of knowledge by identifying the capital budgeting practices applied by decision-makers in South African state-owned companies. In addition, a determination of the cost of equity of state-owned companies that do not have the benefit of the stock exchange to determine proxies and betas holds some potential for new understanding on capital budgeting practices. The lack of academic research in this field thus far presented an opportunity for new learning. The opportunity to add new knowledge should also be seen against the backdrop of the massive investment drive in South Africa to catch up with the backlog caused by previous underinvestment, and by unprecedented economic growth in the last decade. This study's results can also be compared to those of

previous studies. In addition, the recommendations from the results of this study will assist management, decision-makers and government in using sound capital budgeting techniques in their investment programmes.

The article is set out as follows: a literature review involves a synthesis of the current literature available, both internationally and locally, on the topic of capital budgeting, and addresses particularly the issues of cash flow determination, capital budgeting techniques, the determination of the discount rate and the incorporation of risk in the capital budgeting process. This is followed by a discussion of the research design and methods. Thereafter the empirical results and analysis are discussed. Finally, conclusions and recommendations for further studies are provided.

2. Literature Review

The literature review in this study explores the choice of capital budgeting techniques available, including the incorporation of risk in the capital budgeting process, as found in both international studies and local South African studies.

2.1 Determination of cash flows

The determination of cash flows is consistently considered to be one of the most important and complex stages of the capital budgeting process.

In their survey of Taiwanese firms, Haddad *et al.* (2010) found that approximately half of the respondents considered project definition and cash flow determination the most difficult aspects of the capital budgeting process. Bennouna *et al.* (2010) point out that previous studies indicated that Canadian firms did not determine cash flows properly in their capital investment analysis. However, in their research, Bennouna *et al.* (2010) found that an overwhelming percentage of the firms (91.5%) in their study correctly computed net present value (NPV) or internal rate of return (IRR) on a cash flow basis, rather than accounting income. A large proportion treated inflation, interest expenses and other financial costs correctly.

In the South African context, Hall (2000), Brijlal and Quesada (2009) and Hall and Millard (2010) found that their respondents from private firms regarded project definition and cash flow estimation as the most important and difficult stages of the capital budgeting process.

The estimation of cash flows is based on a combination of methods, in particular, subjective management estimations with consensus of expert opinions, and quantitative methods (Hall, 2000; Hall and Millard, 2010). A matter for concern was the significant number of respondents who used only subjective management estimates, who were not able to say how their cash flows were determined, or who

did not make any adjustments for inflation (Hall, 2001).

2.2 Capital budgeting techniques

Capital budgeting techniques can be divided into the academically superior discounted cash flow techniques, such as NPV, IRR and the modified internal rate of return (MIRR), and non-discounted cash flow methods, such as the payback period (PBP) and accounting rate of return (ARR). Financial theory advocates using the NPV rather than the IRR, because the IRR may give incorrect results when projects are mutually exclusive (Ryan and Ryan, 2002; Du Toit and Pienaar, 2005; Bennouna *et al.*, 2010). The findings of prior international and South African studies on the choice of capital budgeting techniques are discussed below.

A review of international studies reflects a constructive increase in the adoption of discounted cash flow techniques over time (Burns and Walker, 1997; Arnold and Hatzopoulos, 2000; Ryan and Ryan, 2002; Graham and Harvey, 2002; Truong *et al.*, 2008; Bennouna *et al.*, 2010; Baker *et al.*, 2011; Kester and Robbins, 2011). Furthermore, it is encouraging to note the increased preference for the NPV over the IRR technique in the capital budgeting process (Ryan and Ryan, 2002; Truong *et al.*, 2008; Baker *et al.*, 2011).

However, it is still a matter of some concern that a significant number of firms continue to use non-discounted cash flow techniques, in particular, PBP (Graham and Harvey, 2002; Brounen *et al.*, 2004; Chan, 2004; Apap and Masson, 2005; Haddad *et al.*, 2010; Kempe and Meyer, 2011). The appeal of the PBP was found to be the simplicity of its computation and ease of comprehension, and it is often used to supplement discounted cash flow techniques (Burns and Walker, 1997; Leon *et al.*, 2008). The size of a project and the size of a firm were found to be two factors that influence the adoption of capital budgeting techniques (Payne *et al.*, 1999; Kester and Robbins, 2011).

A considerable amount of research had been done on the topic of capital budgeting in developed countries, but developing countries have not received the same amount of coverage in respect of research on the topic (Brijlal and Quesada, 2009).

A review of earlier South African studies shows mixed results regarding the use of capital budgeting techniques, as both discounted cash flow and non-discounted cash flow techniques being used, in some cases with a preference for non-discounted cash flow techniques (Hall, 2000; Gilbert, 2003). Lack of knowledge of discounted cash flow techniques was cited as a possible reason for this phenomenon (Gilbert, 2003). However, Gilbert's (2003) finding was in contrast with Hall's finding that South African decision-makers were academically well-qualified (Hall, 2001; Hall and Millard, 2010).

However, over time, it appears there has been an increase in the popularity of discounted cash flow techniques, especially amongst large firms, although small and medium businesses still seem to prefer the rather crude PBP method (Du Toit and Pienaar, 2005; Correia and Cramer, 2008; Brijlal and Quesada 2009; Olawale *et al.*, 2010; Viviers and Cohen, 2011). Some studies using South African data show a clear preference for using the IRR rather than the NPV (Du Toit and Pienaar, 2005; Correia and Cramer, 2008), whereas other studies show a preference for the NPV over the IRR (Brijlal and Quesada, 2009; Hall and Millard, 2010).

As has been reported in international studies, South African studies found that local companies tended to use a number of different techniques (Napier, 2000; Gilbert, 2003). Furthermore, the size of the business and the size of the capital budget were also factors in the choice of capital budgeting techniques – decision-makers in listed companies seem to prefer discounted cash flow techniques, whereas decision-makers in smaller businesses seem to opt mainly for PBP (Hall, 2000; Correia and Cramer, 2008; Brijlal and Quesada, 2009).

To conclude, from a South African point of view, there is evidence of a positive trend towards the adoption of discounted cash flow methods, particularly the NPV (Correia and Cramer, 2008).

Financial considerations are an integral part of the investment decision, but other qualitative factors also play a role in the decision-making process. Non-financial (qualitative) factors are playing a growing and more significant role in the capital budgeting process (Hall and Millard, 2010). The following reasons have been cited for this phenomenon in the South African context, amongst others: employee safety (Hall, 2000), the continuity of existing product lines (Hall, 2000), legal requirements (Du Toit and Pienaar 2005), strategic factors (Du Toit and Pienaar, 2005), environmental considerations (Du Toit and Pienaar, 2005; Viviers and Cohen, 2011), keeping up to date with technological developments (Du Toit and Pienaar, 2005), and increased government regulation (Hall and Millard, 2010).

2.3 Determination of the discount rate

The cost of capital is a key parameter in the capital budgeting process. Although previous studies have indicated that Canadian firms used subjective judgement to determine the discount rate (Payne *et al.*, 1999), later studies have shown a positive trend in that WACC was used by a substantial number of respondents (Bennouna *et al.*, 2010; Ryan and Ryan, 2002; Baker *et al.*, 2011). Canadian municipalities, however, used the cost of debt as their discount rate (Chan, 2004). For publicly traded utilities in the United States, Apap and Masson (2005) found that over half of the respondents used WACC.

Private sector European firms reportedly determined the cost of equity by using the Capital Asset Pricing Model (CAPM) (Brounen *et al.*, 2004), whilst an overwhelming majority of Australian firms also used the CAPM to determine the cost of equity and used the target weights to determine the WACC (Truong *et al.*, 2008). However, less than 15% of Indonesian companies reported using the CAPM to determine the cost of equity, despite the high rate of adoption of discounted cash flow techniques (Leon *et al.*, 2008).

In the South African context, the results are mixed in that, although studies show a positive trend for the adoption of CAPM in listed firms (Correia and Cramer, 2008) and the Brijlal and Quesada (2009) study shows a low adoption rate of WACC.

In conclusion, international studies show a preference for the use of WACC and CAPM as tools in the capital budgeting process. South African results on the use of WACC and CAPM were mixed and not consistent, but the majority of respondents appeared to use the WACC and the CAPM in evaluating capital budgeting projects.

2.4 The incorporation of risk in the capital budgeting process

There are a number of methods to incorporate risk in the capital budgeting process. These are a scenario analysis, the certainty equivalent method, sensitivity analysis, simulation analysis and decision tree analysis. In addition, firms can adjust their discount rate or their cash flows to adjust for risk in the capital budgeting project. Sensitivity analysis has proved to be very popular as a risk analysis tool amongst firms internationally (Brigham and Pettway, 1973; Graham and Harvey, 2002; Leon *et al.*, 2008; Bennouna *et al.*, 2010; Haddad *et al.*, 2010). The next most popular technique to incorporate risk was found to be an adjustment to the discount rate and cash flows by means of simulation and scenario analysis (Ryan and Ryan, 2002; Chan, 2004; Bennouna *et al.*, 2010; Kester and Robbins, 2011). The level of management education and leverage levels of decision-makers were identified as key determinants in the choice of risk analysis techniques (Graham and Harvey, 2002; Baker *et al.*, 2011).

Results from South African studies suggested that there was large a gap between theory and practice regarding risk analysis, finding little use of quantitative methods of risk adjustment in the capital budgeting process (Hall, 2001; Gilbert, 2003). Where risk analysis was performed, sensitivity analysis was the preferred technique for incorporation in the capital budgeting process (Hall, 2001). However, more recent studies have found a strong preference for sensitivity analysis (Correia and Cramer, 2008; Hall and Millard, 2010). The increase in the use of quantitative techniques could be attributed to “an increasingly uncertain world where risk factors have to be

incorporated in any financial decision” (Hall and Millard, 2010). However, a high level of use of subjective (non-quantitative) methods of risk adjustment in smaller businesses still prevails (Brijlal and Quesada, 2009). Du Toit and Pienaar (2005) suggest that the high level of use of the PBP method (over 40%) could be attributed to the use of this method as a risk measure, because it provides an assessment of the period required to recover the capital spent.

The findings of previous studies appear to suggest that sensitivity analysis is the prominent measure for risk assessment, followed by the adjustment of the discount rate and cash flows.

The review on capital budgeting practices reveals a gap between what is considered theoretically sound and what is actually applied in practice by decision-makers. Baker and Fox (2002) describe this as “an uncomfortable gap between investment appraisal models in literature and current practice.” There is an obvious split between the two, although there are clear signs that the gap is narrowing, as academically sound capital budgeting practices are gaining momentum and are increasingly being brought into the workplace.

The next section addresses the research design and methods used in order to achieve the objectives of this study.

3. Research Method

In this section, the population, questionnaire, collection of data, responses and analysis techniques used in this study are discussed.

The population for this study consisted of South African state-owned companies involved in the execution of infrastructural projects and state-owned companies that provided such companies with funding. Given the limited number of such organisations in South Africa, the approach adopted in the study was to include all entities that met the identified requirements. Therefore, sampling was not required. There were 14 state-owned companies that fitted the profile. The primary data were collected by means of a survey based on structured questionnaires. The questionnaire consisted of 31 questions structured in such a way that information on the state-owned company as an entity, the decision-makers’ profile, their choice of capital budgeting method, the way they calculate WACC, as well as the incorporation of risk in the capital budgeting process, was obtained.

The questionnaires were distributed to the chief financial officers (CFOs) or their equivalent in the organisations by means of electronic mail. The e-mail was preceded by a courtesy telephone call to give a high-level briefing on the study to the individual who was being approached.

The data collection questionnaire took the form of an interactive Excel spread sheet with drop-down menus to save participants time, and to ensure

the accuracy of the results. Upon receipt, the data were consolidated manually into one sheet. The data were analysed using the statistical functions in the Excel spread sheet, and the results were presented by means of descriptive statistics.

4. Empirical Results and Analysis

The results of the study provide a unique insight into the capital budgeting processes of state-owned companies, an important sector of the South African economy on which no previous studies on these processes could be found.

Although the sample included 14 state-owned companies, only six responded, despite several attempts to achieve a higher return rate. Issues of confidentiality were cited as the greatest concern to those who did not return the research instrument, despite assurances that the responses would be treated with the strictest confidentiality and that no particular state-owned company would be associated with the data. Some state-owned companies had been subject to extensive negative media coverage regarding their capital programmes, which may be a contributing factor in their reluctance to participate in the study.

The completed questionnaires received from the six state-owned companies that responded were all of a usable quality. This is predominantly the result of the fact that the respondents were willing to engage with the researcher where further clarification was required. Therefore, the overall response rate was approximately 42%.

4.1 Company and decision-maker’s profile

The state-owned companies represented in the responses operate in various sectors of industry. However, for reasons of confidentiality, given the small number of respondents, the sectors cannot be identified here.

The data collection instrument was directed at the CFOs of the organisations or their equivalent, who were e-mailed the questionnaire. All except two respondents indicated that they were chartered accountants (CAs) in various positions who played an advisory role in capital budgeting decisions. The CFOs were ultimately responsible for the final capital budgeting decisions.

With regard to the CFOs’ age profile, half of the responding companies had CFOs between the ages of 40 and 49, and a third of the CFOs were below the age of 40. All these CFOs were CAs[SA], and one had a master’s degree. Of the CFOs, 83% had been with their companies for less than four years, and only one had been with the company for more than nine years.

The extent of the fixed assets managed by the state-owned companies and the revenue they generate are a reflection of the strategic importance of these

entities in the delivery of essential services to the country. Only one company manages assets of less than R5bn; two companies manage fixed assets of between R11bn and R50bn; the other three have assets greater than R50bn.

The results on the size of the companies' capital budget are presented in Table 1. The annual

capital expenditure by these state-owned companies is substantial: more than 50% of the companies spend less than R10bn on their capital projects annually, but 33% spend between R10bn and R50bn. This could be attributed to the fact that in the last few years, some state-owned companies have embarked on substantial infrastructure expansion projects.

Table 1. Annual capital expenditure by state-owned companies

Annual capital expenditure	%
Less than R10bn	50%
R10bn - R50bn	33%
R51bn - R100bn	17%
R101bn - R200bn	0%
More than R200bn	0%
	100%

The sections below deal with the responses of the six state-owned companies on their capital budgeting processes, namely the stages of their capital budgeting decisions, their capital budgeting techniques, cash flow estimation methods, risk-adjustment techniques and qualitative considerations.

4.2 Stages in the capital budgeting process

The questionnaire sought to determine the *importance* that the state-owned companies attached to the various stages of the capital budgeting process, from "project definition to post-implementation review. Furthermore, the respondents were asked to rate the *complexity* of each stage of the capital budgeting process. Table 2 reflects the results.

Table 2. Capital budgeting stages: importance and complexity

Capital budgeting stage	Most important	Most complex
Project definition and cash flow estimation	22%	40%
Analysis and selection	22%	0%
Implementation	56%	60%
Post-implementation review	0%	0%
	100%	100%

Project implementation was considered the most important and complex stage of the capital budgeting process. This result is contrary to findings of previous studies discussed in the literature review, where the cash flow estimation stage was consistently rated as one of the most important and risky activities in the capital budgeting process.

This finding on the importance and complexity could be attributed to the fact that state-owned companies have to compete with the private sector for the necessary human resources skills. Furthermore, maintaining the physical capacity to execute large-scale infrastructure projects has proven to be difficult for the state-owned companies. This in turn could be attributed to the fact that there is an acknowledgement that the increase in the demand for goods and services

has not been matched by growth in the executing capacity of these companies.

The importance attached to the implementation stage by the respondents in the state-owned companies could also be attributed to the pressure exerted on government to deliver goods and services to the general population.

In contrast to the findings of previous studies, 40% of the respondents considered the project definition and cash flow estimation stages to be the most complex stages of the capital budgeting process. The complexity of cash flow estimation could be the result of the significant cost overruns of major infrastructural projects experienced by the state-owned companies.

Considering the size of the projects in monetary value, it is of concern that none of the respondents rated the post-implementation review of the projects as either important or complex. Only half of the respondents reported doing any form of post-audits. Hall and Millard (2010:90) observe that this stage is important for learning from experience and ensuring the transfer of knowledge in an organisation. It is also important to prevent potentially costly errors. Given the increased negative media coverage of infrastructural projects by state-owned companies, it is expected that in future this stage of the capital budgeting process will receive a greater deal of attention and will achieve a higher level of importance.

4.3 Cash flow estimation methods

As indicated in Table 1, the project definition and cash flow estimation stages were ranked the second most complex stages of the capital budgeting process. When asked to respond on how the companies determined the cash flow requirements of the projects, the respondents indicated that they used a combination of techniques and did not rely on one technique only. Table 3 reflects the results of the responses.

Table 3. Cash flow estimation methods

Cash flow estimating methods	%
Management estimates	13%
Expert opinions	27%
Quantitative methods	13%
Previous experience	33%
Other	13%
	100%

Previous experience was the most popular technique adopted for estimating cash flows. This finding may suggest that errors in the process of estimating cash flows may occur if the previous experience was not modified to take into consideration the actual cash flows during the project. The mitigating factor for this risk is that, as indicated, the respondents used more than one technique to determine cash flows.

It was reassuring to observe that more than 50% of the respondents used formal techniques (excluding the use of management subjective estimates and previous experience) for cash flow estimation. Previous studies reported a high use of subjective management judgement and a lack of

quantitative methods for this integral component of the capital budgeting process, despite the fact that substantial sums were concerned.

4.4 Capital budgeting techniques

The respondents were asked to indicate their preferred capital budgeting techniques. As with the cash flow estimation techniques, the respondents indicated a preference for more than one capital budgeting technique. One respondent indicated that the company's investment committee required the results of all the techniques mentioned, with the exception of real options. Table 4 reflects the preferred capital budgeting techniques.

Table 4. Preferences for capital budgeting techniques

Preferences for most used capital budgeting technique	%
Net present value (NPV)	25%
Internal rate of return (IRR)	17%
Modified internal rate of return (MIRR)	8%
Profitability index (PI)	17%
Payback period (PBP)	17%
Return on investment (ROI)	8%
Real options	0%
Other	8%
	100%

It was disappointing to observe that only 25% of the state-owned companies preferred to use the NPV method. If the primary use of IRR is included, this brings the total for the NPV and IRR techniques to 42%. In cases where the NPV was not the most preferred technique, 15% of the respondents indicated that the NPV technique was used as a secondary technique to support the primary technique. Overall, there is a significant use of discounted cash flow techniques for capital budgeting decisions.

The preference for using the NPV over using the IRR supports financial theory, which advocates using the superior NPV rather than the IRR technique, as the IRR may give incorrect results in the case where multiple projects being assessed are mutually exclusive (Bennouna *et al.*, 2010). In contrast to the study on listed South African companies where Hall and Millard (2010) found that there was no significant difference between the preference for the NPV and the IRR, the results of this study found a significant preference for the NPV compared to the IRR among the respondents from the state-owned companies.

The IRR and PBP techniques received an equal and significant rating of 17% use each. This is consistent with previous studies, which observed that the use of the IRR and PBP techniques remain high, although there has been an increase in the popularity of the NPV technique. It is likely that the continued use of the IRR and PBP techniques is attributable to the fact that these measures are easy to calculate and understand. The MIRR, return on investment (ROI) and Other techniques also received an equal rating of 8%.

Although the real options technique was not the respondents' preferred technique, two state-owned companies indicated that they used it as a secondary technique. This result is in contrast to the findings of previous studies, which reported the emergence of the use of real options as a capital budgeting technique in engineering-driven, construction and large industrial businesses that had substantial capital investments and high risk levels (Triantis and Borison, 2001; Verbeeten, 2006; Baker *et al.*, 2011). The insignificant use of the real options technique by state-owned companies could be attributed to pressure

to increase the capacity to meet rising demands for their services – the situation on the ground means that it is not a realistic option to abandon projects once a decision has been made and communicated. This may also be the reason for the significant cost overruns on projects undertaken by state-owned companies.

Where the NPV and IRR were used, the respondents were asked which of the two they preferred. In their responses, 66% indicated a preference for the NPV technique. Whilst the popularity of NPV and IRR is significant and encouraging, the fact that they are not equally used is a concern, given that the decision-makers responsible for the capital budgeting process from a financial point of view were all CAs and were in a position to influence senior management to use theoretically sound techniques. In addition, the equal popularity of the IRR, profitability index - PI and PBP is a concern, given the academic qualifications of the decision-makers. The concern in this regard must also be seen in the light of the fact that approximately 83% of the CFOs are below the age of 50, and are expected to be familiar with any recent developments in the field of capital budgeting.

Therefore, there is room for improvement in the use of theoretically sound techniques and the correct determination of cash flows in the capital budgeting processes of state-owned companies in South Africa.

4.5 Determining the discount rate

An important consideration in the use of the NPV is the discount rate that is being applied. Where the respondents indicated that they used the NPV technique, they were requested to indicate what discount rate they used. All the respondents indicated that they used WACC. Furthermore, 83% indicated that they used the CAPM to determine the cost of equity, and one respondent indicated that it used a proxy of the rate from a listed entity. In other words, the state-owned company based its cost of equity on the cost of equity of a listed company in a similar industry. The results on the ways in which cost of equity is determined are set out in Table 5.

Table 5. Determination of the cost of equity

Determination of the cost of equity	%
Proxy of other private entity	17%
Estimated figure	0%
Capital asset pricing model (CAPM)	83%
	100%

All the state-owned companies indicated that where WACC was used government bonds were used as a proxy for the risk-free rate. In determining the beta, 50% indicated that they used the betas of listed

peer companies, and the other 50% used published sources (17%) and own determined betas (33%), as indicated in Table 6.

Table 6. Determination of beta

Determination of beta	%
Published source	17%
Own determined beta	33%
Other (benchmarked against peers)	50%
	100%

Of the respondents, 67% indicated that they used published sources for determining the market risk premium while 83% indicated that they used long-term targets of debt and equity in their consideration of WACC.

All respondents also indicated that they used discount real cash flows with a real discount rate or, alternatively, nominal cash flows with a nominal discount rate. Furthermore, half of the respondents had only one company-wide discount rate, whilst the other half used different discount rates for various subsidiaries, divisions and projects.

The approaches used by the decision-makers of the state-owned companies in their use of WACC appeared to be sound, as the correct theoretical precepts were generally used.

4.6 Qualitative considerations for capital projects

Given the nature of infrastructure projects undertaken by state-owned companies and their mandates, emanating from their shareholder's (government)

priorities, it is understandable that considerations other than quantitative factors would play a significant role in the capital budgeting processes of these companies. One respondent observed that in the consideration of the capital budgeting techniques, the outcome of the quantitative calculation could be completely overridden by statutory or regulatory considerations.

Previous studies found that non-financial (qualitative) factors play a growing and significant role in the capital budgeting process of firms in the private sector (Hall and Millard, 2010).

The respondents were asked how they would rank the importance of quantitative factors against qualitative factors in the decision-making process on capital projects. A total of 56% of the state-owned companies responded that quantitative factors play a role in the decision-making process of their capital budgeting decision, whilst qualitative factors were cited by 44% of the respondents. Table 7 sets out what the state-owned companies considered to be the most important qualitative considerations.

Table 7. Qualitative considerations

Most important qualitative considerations	%
Political influences	0%
Environmental factors	29%
Service delivery considerations	29%
Employment creation	7%
Government regulations	28%
Other	7%
	100%

Environmental factors, service delivery considerations and government regulations received an equal rating of 29%.

Some of the respondents leave a significant footprint on the environment, such as considerable levels of carbon dioxide (CO₂) emissions and the consumption of scarce natural resources such as water. It is, therefore, not surprising that environmental factors are an important consideration. The significant rating given to this consideration is also a reflection of the pressure that financiers of some of these projects have brought to bear on these

state-owned companies. Some conditions imposed as part of the funding agreements stipulate that considerations of the environment should be given a high priority, and this should be reflected in the technologies used in the projects.

There has been a strong focus on service delivery in the country, with the sentiment that not enough has been done to improve the lives of many in the lower living standard measure (LSM) groups, as is manifested in failing and dilapidated infrastructure and capacity limitations. Poor service delivery has indeed resulted in public protests. It is, therefore,

expected that service delivery considerations would be given a significant ranking, given the mandates of the state-owned companies to deliver essential services in South Africa.

Given the levels of poverty and unemployment in South Africa and the priority of government to increase employment, it is surprising that state-owned companies did not rank the employment creation considerations higher. With their relatively large capital budgets, the state-owned companies are in a position to influence levels of employment, not only in the construction of infrastructural projects, but also in the continued operation of these assets. The low priority given by the state-owned companies to "employment creation" is also in glaring contrast to the call by government to create employment opportunities.

In terms of other considerations, the respondents indicated that the continued delivery of their services would sometimes outweigh any

financial considerations to the point that they would be justified in investing in and operating projects at a loss if they had to. Considering that some of these state-owned companies are monopolies and suppliers of last resort, this rationale is understandable, because the specific sector and its service delivery capacity could collapse if they did not provide the service.

Whilst the creation of shareholder wealth may be the overriding consideration in capital budgeting in the private sector, the results from this study indicate that imperatives other than the creation of shareholder wealth play a more significant role in the capital budgeting decisions of state-owned companies.

4.7 Risk considerations in capital budgeting

The respondents were requested to indicate the techniques they used dealing with risk in the capital budgeting process. Table 8 outlines the responses.

Table 8. Risk adjustment techniques

Risk-adjustment techniques	%
Scenario analysis (i.e. base case, worst case, best case forecasts)	38%
Certainty equivalent method	0%
Sensitivity analysis	38%
Simulation analysis (e.g. Monte Carlo Simulation)	12%
Decision-tree Analysis	12%
Other	0%
	100%

All the respondents indicated that they included risk considerations in their capital budgeting process and used more than one technique for risk considerations. Scenario analysis and sensitivity analysis received an equal rating of 38%, while simulation and decision-tree analysis received a lower rating of 12%. Hall and Millard (2010) observed that sensitivity analysis is not a risk-measuring technique, but tests the sensitivity of the project to variables that

may influence the project. The appeal of this technique is attributed to its simplicity and cost-effectiveness. Only two respondents used real options as a secondary technique to deal with risk in the capital budgeting process.

The respondents were also asked which method they used to incorporate risk in the capital budgeting process. Table 9 outlines the responses.

Table 9. Methods to incorporate risk adjustments

Methods to incorporate risk adjustments	%
Risk-adjusted discount rate	20%
Adjustment to cash flows	60%
Certainty equivalent units	0%
Other	20%
	100%

It is clear that the most popular method is the adjustment to cash flows to incorporate risk in the process. Adjustment to the discount rate and Other

methods received a 20% rating each. As far as other methods are concerned, the respondents indicated that they would adjust the technical assumptions of the

project which feed into the capital budgeting considerations, such as the rate of use of the assets or the operating levels of the assets.

The significant use of sensitivity analysis is consistent with the findings of previous South African studies cited in the literature review. However, previous studies found that where respondents did adjust for risk, they preferred an adjustment of the discount rate rather than an adjustment of the cash flows. This contrasts with the findings of the current study.

The empirical findings of this study reveal contrasts with findings of previous studies on the capital budgeting practices of private sector firms. The implications of these differences are discussed in the conclusion to this study.

5. Conclusion and recommendations

The purpose of this study was to determine the capital budgeting techniques employed by selected South African state-owned companies involved in major infrastructure projects. Despite the significant number of studies both locally and internationally on the capital budgeting techniques employed by private entities (and government utilities internationally), there is no evidence of such a study on state-owned companies in the South African context.

In terms of the objectives set out for this study, the results of this study have established that state-owned companies use various techniques for capital budgeting purposes, with relatively little use of discounted cash flow techniques as the primary determinants of capital projects. The NPV and IRR techniques were used by 43% of respondents, and the NPV was slightly more popular than the IRR. The continued use of inferior capital budgeting techniques may be attributed to the ease of calculating and understanding these methods. The substantial weight attached to quantitative considerations (approximately 44%) by state-owned companies could also be a factor that contributed to the use of non-discounted cash flow techniques. WACC emerged as the preferred discount rate for use in the capital budgeting purposes. The CAPM was the most popular technique for determining the cost of equity. In their consideration of risk in projects, state-owned companies preferred to use sensitivity analysis, despite its not strictly being a risk measurement technique.

There are a number of recommendations that could be made on the basis of the results of this study:

Firstly, whilst all the respondents indicated that they were CAs, it is disappointing that only 25% reported that they used the NPV as a primary technique of capital budgeting. This may imply that academics need to emphasise the importance of using the NPV as a primary capital budgeting technique at teaching institutions for current learners and to

discourage the use of inferior techniques such as the PBP.

Secondly, the limited use of new developments in capital budgeting techniques such as real options was disappointing. This is especially true given the nature (major infrastructure) and value of the projects undertaken by state-owned companies. Once again, the responsibility for change may lie with academics who need to foreground these techniques to ensure that learners are familiar with them. Furthermore, for professionals already in the field, professional financial qualification institutions should make learning about new developments in the field of finance a compulsory requirement for continued membership of their institutions.

Thirdly, the use of sensitivity analysis as a risk technique is a matter of common concern among international companies, local companies and state-owned companies. Once again, the intervention of academics and professional qualification institutions is required to promote the replacement of this technique and to encourage the uptake of more accurate techniques such as simulations.

Lastly, the study also points to areas that may present further knowledge gaps in the area of capital budgeting for state-owned companies which require further research.

Further research in capital budgeting techniques could include state-owned companies that are not only involved in major infrastructural projects. This would increase the size of the sample and the number of responses. Whilst capital budgeting practices in private sector firms have been researched extensively over many years, and development trends can be traced, it would be beneficial to observe the trends and developments regarding capital budgeting in state-owned companies over an extended period.

To conclude, the aim of this study was to research the capital budgeting techniques used by selected South African state-owned companies. The results provide useful insight into the techniques used by these companies. At the same time, this study also highlights the possibility of further research in other aspects of capital budgeting by state-owned companies.

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