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Capital budgeting processes for public sector development projects in South Africa

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Master Thesis Proposal

Capital Budgeting Processes for Public Sector Development Projects in South Africa

Submitted to:

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ABSTRACT

Each Organization should have a capital budgeting process in place regardless of whether it is a private entity or a public sector entity. The primary force on the public sector entities is the delivery of public goods and one way of achieving this is through the implementation of massive development projects. With the current South African public sector infrastructure projects in execution, there has been massive cost and time overruns experienced. One of the possible causes of these cost overruns may be due to lack of or inadequate cost and benefit projections and management of the overall investment from identification stage to post implementation stage.

A qualitative research was done where interviews were held with key stakeholders involved with capital investment authorizations and management in the South African State Owned Entities (SOE) to find out what capital budgeting processes are followed by the SOEs.

Despite the use of capital budgeting processes within the public sector entities, there are differences in the application for each stage of the process i.e., identification, selection, authorization, implementation & control and post audit stages. The problems range from political interference, lack of detailed planning of the project due to urgency of projects, implementation of project before the readiness assessments are done and poor monitoring by the public offices during implementation and post completion of capital investment projects. The lack of Supplier Management processes in the State Owned Entities was also highlighted as a gap where poor performing contractors find themselves back into the system while good performing contractors are not utilized more often and used to develop small and new contractors.

This paper investigates the capital budgeting processes that are utilized by the State Owned Entities for the public sector development projects in South Africa.

DECLARATION

I, Sefishi Monakgisi declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management (Finance and Investments) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Thabiso Hilda Sefishi Monakgisi

Signed at ……

On the …….. day of …… 20…..

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I wish to express my appreciation to Dr. Odongo Kodongo, my supervisor who supported me throughout the process and provided the encouragement and motivation during the research. To my Husband and children for the tolerance and support through the research period and everyone that participated in this research and provided me time for the interviews.

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CHAPTER 1. INTRODUCTION

1.1 Context of the study

An investment is the allocation and substantial consumption of resources, material and human in addition to financial one (Avram *et al*, 2009). It is therefore important to utilize the resources on activities that will add value to the entity's current position. Many investments are however not only aimed at increasing the stakeholder's value but at adding value to the communities and the economy. Poor investment decision can cause major loss to the investing economic entity and its stakeholders (Egbide, Uwalomwa & Agbude, 2013).

The South African Government is mandated to provide the best possible services to communities in order to eliminate poverty and create a better life for all (Republic of South Africa, 2012). In addition, there needs to be activities that help the economy of the country to grow. These include infrastructure development projects. The Minister of Finance Pravin Gordon announced in his 2013 budget speech that the Government will invest R837 billion in the building of new and existing infrastructure that will improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification.

"There are currently 18 Strategic Investment Plans (SPI) developed by the Presidential Infrastructure Coordination Committee (PICC). Among these are electricity generation, transmission & distribution infrastructure; integrated municipal and public transport infrastructure; health & education facilities and water & sanitation infrastructure. While there is focus on these SPIs, It has been observed that most of the infrastructure projects in South Africa experience increased costs and time overruns. This is demonstrated in Table 1.

Project	Initial Budget (R bil)	Estimated* or final Cost (R bil)	% over budget
Gautrain	25.1	30.5	21
Kusile*	90	121*	34
Medupi*	33.6	105*	213
Gauteng Toll Roads	6.3	90	1329
Transnet New Multi Product Pipeline*	11.1	23.4*	111
OR Tambo	5.2	8.5	64
FIFA Stadiums	8.1	18.4	126

Table 1: Project cost overruns in South Africa

One of the possible causes of these cost overruns may be due to lack of or inadequate cost and benefit projections. According to Nunn (1990), a cost-benefit technique, to calculate the return on capital facilities is important for the selection of the most appropriate project in public infrastructure budgeting. Public sector projects yield benefits such as transformation of landscape, job creation, basic services delivery to the communities and supporting the integration of African economies (Republic of South Africa, 2012). Chan (2004) adds that while the costing is clear, it is not easy to define the benefits of capital projects in the public sector. It is therefore important for capital projects in the public sector to be prioritized based on a relevant criteria. The criteria by which projects are compared is described by Miller (1988) and includes among others, fiscal impacts, safety & health effects, environmental & social effects, amount of uncertainty & risk and community economic effects.

In Finance, the appraisal of investment decisions or proposals that present the possibility of long term benefits to the economic entity in question, and its stakeholders, is known as capital budgeting. This research focuses on the capital budgeting processes on investments that are driven by community needs and government priority in South Africa. The primary aim of private sector's primary aim is to maximize profits whereas the public sector operates in a different environment where projects are valued beyond profit maximization but in line with social and economic needs. According to Crawford,

Costello, Pollack & Bentley (2003), the complexity and many reporting layers in the public sector result in possibilities of actions being valued differently by stakeholders. Project time and cost overruns within the public sector may also be as a result of misrepresentation of cost and benefit projections that are due to political influence and the pressures to get the project started. Some of the cost and benefits of public sector projects in South Africa are discussed next:

a. Gauteng Re-signalling project

Cost: USD1 billion

Benefits:

- Flexibility & decision making in operating
- Improved statistical information on train reliability & punctuality
- Headway distance between successive trains will be reduced from 15 to 3 minutes.
- More trains can be run and more people carried on existing lines

b. Westcor

Cost: $US 8 Billion

Benefits:

- Job creation in the five countries during and after construction works.
- Income to WESTCOR SADC
- Reduction in carbon emission
- Economic growth due to increased availability of electricity supply
- Reduced power deficit leading to economic growth
- Minimization of carbon emissions
- Increased access to electricity for the people of Southern Africa
- Minimum environmental, climate change and social impact
- Positive contribution to renewable and sustainable energy

c. **Medupi Power Station**

Cost: R33.6 Billion

Benefits:

- Infrastructure development in Lephalale (995 houses built)
- 2.2km D1675 road upgraded, Kuipersbult road and Nelson Mandela road expansion
- Skills development and student training
- Increase in job creation
- Increase in GDP in Lephalale

According to Singh, Jain and Yadav (2012, p. 96), “An opportune investment can yield spectacular results in terms of profits but an ill-advised and incorrect decisions can endanger the very survival of the business”.

1.2 Problem statement

According to the Development Bank of Southern Africa (2012), the choice between several infrastructure development options requires proper cost-benefit analysis. Such an analysis eases the directing of investments to activities that result in the greatest (social) benefit. Failure to do this results in suboptimal allocation of national resources. Proper analysis of costs and benefits of proposed public sector, like private sector, investments requires the application of scientific capital budgeting appraisal techniques.

Direct and indirect linkages between demand for infrastructure capital and policies used in the public sector to meet this demand sometimes go beyond the normative plea for rational capital budgeting (Nunn, 1990: 339). According to Chan (2004), the adoption of capital budgeting techniques by municipal governments is limited and this may be due to lack of profit objective in the public sector. In the USA, a survey conducted by Miller (1988) found that formal procedures for the assessment and prioritization of capital proposals were employed by city officials.

Studies have not been done for the South African public sector projects, to determine the capital budgeting process for public sector development projects and whether the

appraisal process used is consistent with the standard stakeholder value-addition techniques typically employed in private sector investment evaluation. As shown in section1.1, several projects in South Africa under both the public and private sector have suffered massive cost and time overruns. A proper understanding of public sector appraisal process in South Africa would help explain the massive cost and time overruns. This study is an attempt to pioneer the development of knowledge on these issues. The results of this study will help draw lessons for the public-sector projects appraisal policy.

1.3 Research objectives

Research Objectives

The objectives of this study are to examine methods and principles of capital budgeting by the public sector in South Africa. This will include case studies of major public sector infrastructure projects to assess the applicability of the capital budgeting techniques in an effort to determine whether it is one of the main contributors to project cost and time overruns.

Research Questions

The research questions that this study aims to answer are as follows:

i. Does the South African public sector apply capital budgeting principles for their capital investments?
ii. What private sector methods of capital budgeting are being applied by the public sector?
iii. Does the application/lack of application of the capital budgeting processes contribute to the massive infrastructure project cost overruns

Research Hypotheses

H0: The South African public sector applies the capital budgeting process for its investments appraisals.

H1: The south African Public Sectors does not apply capital budgeting process for its investment appraisals.

1.4 Significance of the study

The objective of this study is to examine the extent to which capital budgeting techniques are utilized in South Africa for public sector development projects. With consideration put on the operating environment of the public sector, lessons can be drawn from the literature reviewed for the public sector investment appraisal policy. The success of every project starts with proper planning and projections; therefore, public sector project managers will benefit from this study. The community will benefit from the study as projects intended for social benefits will be completed on time and on cost. The elimination of cost overruns will enable the use of funds on more development projects which will in turn benefit the economy of South Africa.

1.5 Limitations of the study

Projects assessed will be those implemented by State Owned Companies in the electricity, water, liquid fuel and transportation sectors only.. The basis for selecting only this sector is due to their contribution to the total number of projects between years 2012 – 2020 by the Government.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

According to Nshisso (2008) budgeting is a common and required practice for businesses and public sectors. Capital budgeting is the decision making process that managers use to identify projects that add value to the organization. It provides guidance to organizations in determining the advantages of investing in a project. Chan (2004) describes capital budgeting as “a management tool that allows Government to plan for infrastructure necessary to support and enhance service levels in the next three to five years”. Similarly, Millar (2008) describes capital budgeting as a technical process by which capital investment projects are compared using standard criteria. Brealey, Cooper & Habib (1997) highlights that the criteria used for public sector investment cannot be the same as that of the private sector due to the Government interventions in the economy being motivated by the limitations of the criteria of the private sector.

The interpretation of the project benefits is more complex in the public sector compared to the private sector. While the private sector makes use of the shareholders’ funds to generate returns, the public sector makes use of the community resources such as taxes to generate benefits for the communities. This is supported by Bozeman (1984), when he states that the public sector does not have easy means for determining the cost or benefits of a project and that due to loose definitions, mixed criteria and uncertain measures, capital budgeting in the public sector becomes an odd mixture of economic and political rationality. He further explains that the lack of clear definitions and measures result in the public sectors utilizing procedures and methods used by the private sector and using the private sector criteria to judge outcomes.

Bozeman (1984) listed in his study factors that led to the development of public sector capital budgeting. He highlights firstly the development of official planning commissions and their attention to the development of the physical plan of the city. Second is the influence of the public administration on the local government affairs. Thirdly is the effect of great depression on local government that led to the realization that unplanned

massive public works can lead to bankruptcies and financial crisis and lastly, the World War II that resulted in resources and attention being diverted from maintaining the public facilities and infrastructures. He concludes by saying that the interaction of these factors opened a way for the development and inclusion of a capital planning and budgeting process at the state and local government level.

2.2 Key terms in Capital Budgeting

2.2.1 Public Sector

Graham (2011) lists the following as key features of the Public Sector:

i. Public sector is broad and involves all organizations that receive funding from public sources such as taxes, fees or licences. This include government enterprises
ii. Public sector has multiple goals
iii. Public sector often use private sector to deliver public goods
iv. The public sector is a democratic institution, meaning that all assets created belong to the tax payers and therefore Government need to be transparent and account for all resources used.

2.2.2 Budget

“A legally authorised annual monetized plan that establishes spending limits for the various programs that come out of legislation, policy and organizational intent” (Graham, 2011).

2.2.3 Capital Expenditure

According to Doss (1986, 101), “capital expenditure is the acquisition of any piece of tangible property which meets the minimum established dollar amount”. Capital expenditures have future value compared to operational expenditure which presents benefits of limited durations.

2.2.4 Value

The importance and usefulness of a capital project towards institutional infrastructure, service delivery and overall economic growth among others.

2.2.5 Cost effectiveness

Where benefits are not easily quantified, alternative programs with the same objectives can be compared on cost alone (Moeti, 2000).

2.2.6 Efficiency

Optimal allocation of resources for the benefit of meeting the set mandates of the public sector with minimal waste or loss.

2.2.7 Stakeholders

Parliament, a person, organization, community, political party, funder and/or department that can influence the project and or benefit or be affected by the outcome of the project.

2.3 Importance of Capital Budgeting

Although many public sector projects are aimed at revenue generation and cost saving, the public sector's priority is not to maximize value but rather to allocate the scarce resources in a manner that will maximize the quantity and quality of the public service programs (Kee & Robbins, 1991). The scarcity of resources and infrastructure concerns has brought attention to how capital decisions affect operating expenditure (Bozeman, 1984). Kee & Robbins (1991) further highlight that citizens are continuing to demand more accountability from public sector administrators regarding the utilization of scares resources. Capital budgeting techniques makes it easier to evaluate competing capital investment projects (Chan, 2004). The limitation in funds and high costs of capital projects requires the public sectors to put restrictions on the acceptance and funding of these projects. While capital projects may yield benefits in growth, they come with high risk and irreversible loss that can be detrimental to the public sector and its stakeholders.

Therefore, sound and profitable capital budgeting decisions can have a positive influence on the financial performance of a public sector enterprise (Yadav, 2005).

Pandey (2009) highlights the following as reasons why capital budgeting is important:

i. Capital budgeting provides better management and planning of funds.
ii. The unpredictability of the future creates a risk for the organization and therefore projects are evaluated in terms of risk and return
iii. Investment decisions are often complex and irreversible

The following are benefits of capital budgeting listed by Bozeman (1984):

i. Improved public understanding and knowledge of what the benefits of the public's money are
ii. Legislative decision making will be improved
iii. Politics will be incorporated into the process by giving decision makers choices whose costs and benefits are clearly more defined.
iv. "Future budget will not lose its control feature but will build upon a total systems approach that incorporates the capital budgeting process but not eliminate the concept".
v. More effectiveness of the management control due to established relationships between capital and operating expenses.
vi. Increased agency innovation

According to Jacobs (2009), "good budget execution and procurement will enable timely, within budget completion of projects (assuming good program and project management)".

2.4 Capital budgeting challenges

Schwartz, Corbacho and Kunke (2008), list the capital budgeting challenges as follows:

i. Policy makers lack adequate information regarding the costs and benefits of investment projects and lack of citizen's incentives to support such projects.

ii. Due to the nature of policy making process, small and clearly identifiable groups could have an unequal impact on decisions taken by public authorities
iii. “The provision of the public sector of goods that serve as inputs to the creation of value added together with other production factors among them capital supplied by the private sector, may result in expenditure competition”.

Boothe (1993) explains from his study that capital budgeting in the public sector has a danger of potential loss of accountability which is due to the existence of two separate accounts, one for operational expenditure and one for capital. He explains that this obscures the critical bottom line on which overall accountability is judged. He also found that political accountability would be enhanced if the public were fully aware of the future commitments implied by enlarging the stock of provincial capital (Boothe, 1993). His last finding was that current depreciation charges probably largely offset any reduction in the deficit that come from separating capital spending.

A different set of political interest and political trade-offs that require a different political decision matrix is brought by each project in the public sector (Bozeman, 1984). He further explains that due to the financial and engineering aspects of the project, it becomes a technical decision that is difficult to handle by many resources in the political environment. The impact of this is that political flexibility and decision making process is compromised due to systematizing the technical decision making process. As a result, capital budgeting becomes a wish list.

2.5 Capital Budgeting Process

Capital budgeting is one of the four financial decisions which help in deciding what type of a project to invest in taking into consideration its value, risk and benefits. Each step of planning and budgeting involves establishment of goals by the community, by individual departments, by executives and by the legislature and unlike the private sector, projects in the public sector attract political interest and political transactions that require a political decision matrix (Bozeman, 1984). According to Jacobs (2009), an effective capital budgeting process is one that forms an important section of the overall budgeting system and that a well-designed public financial system supports each aspect of the

system, including capital spending. Capital budgeting involved six phases and these are detailed as follows:

2.5.1 Identification of investment opportunities

The first step in the capital budgeting process is to identify capital investments that are in line with the objectives of the organization. To generate investment project proposals that are in line with the organizations objectives and strategies, an efficient administrative procedure is required (Egbide, Uwalomwa & Agbude, 2013). Pinches (1981) highlights that; "the identification of potential capital projects is directly linked to the governments' policies on regulation, monetary/fiscal incentives and the overall leadership posture of the firm's management". Due to the contribution of these projects to the firm's value, in the context of this study, economic growth, it is important for Managers to constantly search for new methods, processes, plants, products and finally chose which projects to invest in (Belkaoui, 2001). This is important in order to avoid needless analysis (Caleb e*t al*, 2013).

Examples of capital asset procurements by the public sector are expanding the public utility services, improving the public and goods transportation system or purchasing the central computer system (Kee & Robbins, 1991).

2.5.2 Development and evaluation

The profitability and global attractiveness of an investment proposal is analysed and evaluated by using relevant data and detailed information for each alternative (Maccarrone, 1196). He further adds that evaluation techniques depend on the environmental factors and investment characteristics of the organization. The limitation of data and an information system which cannot provide accurate, timely data results in the limitation that only a few alternatives are considered during the development stage (Pinches, 1981). Nunn (1990) support this by stating that city governments can establish information systems that are effective enough to timeously give information regarding the conditions of the infrastructure. This will also indicate when and where maintenance, replacement or expansion may be required. This is concurred by Nshisso (2008) when he did a comparison data between 2 countries; a developing country and a developed

country. He found that the data for the developed country was for year 2007 while the date for the developing country was prior to year 2000 which means that funding required for capital projects in the developing country will be based on inaccurate data.

It is important for periodic audits of the information submitted to be done by operating departments as this will encourage departments to provide meaningful and realistic data (Millar, 1988 pg. 74)". According to Chan (2004), the evaluation of a capital project should include the identification of funding alternatives, debt requirements, cash flow and long term tax implications, reserve funds draws and user rates.

(Flyvbjerg *et al,* 2003) found that major public policy problems exist due to the extensiveness of the misinformation in the planning of transport infrastures projects and its justification for the implementation of such projects. He further highlights that the problem of misinformation is an issue of power and must be dealt with using mechanisms of accountability commonly used in liberal democracies to control power. A similar finding is realized from Millar (1988) where he mentions the availability of data as a serious obstacle and how many operating departments lack the expertise and capacity to generate and analyse sophisticated data systems.

2.5.3 Selection

The selection of capital investment goes hand in hand with the organizations strategy and priorities. This is concurred by Maccarrone (1996, pg. 43) as he states that "the screening of investment proposals which have passed through the identification and evaluations stage might be necessary because of financial and strategic factors". According to Millar (1988), the process of selecting projects for capital investment is one that involves value preferences, policy choices and political action. He further adds that the selection of capital investment can be based on technical, organizational and feasibility issues. All projects should be subjected to a cost benefit analysis (Jacobs, 2009). He further explains that the cost of subjecting the projects to a cost-benefit analysis may be too high in which case; priority should be on larger projects while smaller projects make use of simplified methods. The criteria that can be used for the selection of capital investments as suggested by Millar (1988) and Chan (2004) includes

among others, fiscal impact, Health and safety effects, community economic effects, disruptions caused, implications of deferring projects and amount of uncertainty and risk.

Pagano (1986), highlights the importance of ensuring that strict controls exists over the selection of projects and that this can be attained by establishing rigid project selection criteria and by specifying a precise ordinal ranking of those criteria. He further lists in terms of priority, the criterion that is being used by the Massachusetts as legal compliance, preservation of a facility, improvement in operational efficiency and additions to the state's capital stock. The selection criteria of projects and priorities in the public sector should be established in line with the set goals.

Project with a positive NPV in a publicly held firm should not be held back as this will go against the objecting to maximize wealth (Henderson, 1987).

There are several constraints to the selection of capital projects. Pagano (1986) lists these as

i. Legal issues – "The more flexible the legal constraints, the less need to circumvent them in the nominal capital budgeting process. Legal limits establish broad parameters around revenue constraints".
ii. Financial context – "Although the immediate revenues for capital projects are obtained by incurring debt, the state pays the loan over a number of years from general taxes or user charges.
iii. Intergovernmental aid – "The state may require projects that tend to rely on extra state revenues to be pursued ahead of projects requiring state only funding.
iv. Information constraint – "'when little information that would be able to assist the agency officials to prepare a capital budget or capital improvement plan is available".
v. Spatial constraint – "Countries, regions and districts demands their fair share of projects even if a needs assessment demonstrates a concentration of need in only one area".

According to Brealey, Cooper & Habib (1997), Governments are less equipped to handle the agency problems as compared to the private sector. The impact of this is lower productive efficiency in the public sector. In his study he found that this requires the

government to intervene in encouraging the production of public goods, addressing monopolies by ensuring that price equals the marginal cost of production and the management of externalities. These interventions can be done through taxes, subsidies and regulation (Brealey, Cooper & Habib, 1997).

Millar (1988) found in his study that 6 out of 25 cities made use of a detailed priority criteria while 19 cities uses less detailed processes. In addition, he found that many jurisdictions use the criteria in a haphazard manner. In his conclusion, he indicates the importance of the capital investment selection process in being straightforward, unambiguous and simple in order to prevent the process from becoming a burden.

This capital budgeting phase was found to be the most important phase and the most difficult phase in the public sector (Kee & Robbins, 1991).

2.5.4 Authorization

According to the department of finance (2005), “the Government has a collective responsibility for formulating overall budgetary policy and approves the 5 year rolling multi annual capital investment envelopes”. The Ministers are delegated by the Government to manage capital allocated to their departments. The approval of capital investments is however dependent on the size, benefit and impact of the project. Potter and Diamond (1999), indicates that once a budget is approved by the Parliament, Ministers are authorised to spend money consistent with the legal appropriations for each line item.

“The Sanctioning Authority is normally the Government Minister or Department of public body with sectorial responsibility for implementing Government policy and for providing public financial assistance for capital programmes and projects in the relevant sector” (Department of finance, 2005). It further adds that the Sanctioning Authority is responsible for approving the capital projects to be funded with the public assistance and the conditions under which a project may proceed through the stages of development to ultimately becoming fully operational.

According to Maccarrone (1996), the main purpose of this phase is to check investment attractiveness on the grounds of up to date forecasts and to verify the availability of

budgeted resources. When department heads are given the opportunity and flexibility to run their departments and manage budgets allocated to them, they contribute towards the government effectiveness and efficiency in running the country. This can be managed through the performance evaluations of achieving the departments set goals (Donohue & Downing, 2005).

Donohue & Downing (2005) found in their study that in New Zealand, the authority is delegated to the department heads to shift appropriation mixes without the approval from the legislature. It is however under the condition that the department heads do not exceed the total budget approved by Parliament. His findings are however different for Australia and California where approval is required from the Treasury (Donohue & Downing, 2005). The recommendations, for which investment projects should be realized, should come from the minister of finance to the cabinet and these should be within the available resource envelope (Jacobs, 2009).

2.5.5 Implementation and control

Once the capital investment has been authorised, the implementation phase can start. It involves the management and monitoring of the project to ensure that the execution is within budget, time and complies with the set conditions.

Capital projects should be monitored on a continuous basis and progress reviews on a project should be done and presented to the sanctioning authority (Department of finance, 2005).

The control phase includes the controlling of the budget use in terms of how much, when and what the budget is used for while the project is under execution. This process is crucial as possible risks are able to be picked up before negatively impacting the project's cost and time.

Ministers monitor the effectiveness and efficiency by comparing the actual costs against approved costs and whether the intended benefits are being realised (Donohue & Downing, 2005).

Robinson (2002) highlights that in South Africa; certain departments at national and provincial level have developed good & robust output specifications and measures. Other departments, however, have not taken up the challenge and budget documentation is still the purview of financial managers and capacity to engage in output measurement is weak.

2.5.6 Post auditing

The improvement of future capital projects is influenced by the lessons learnt from the past projects using post audits (Pinches, 1981).

Post audits may include among others a review on how the project performed;

i. Financial performance - This includes the amount spent vs. the approved amount and the reasons that led to the under or over expenditures.

ii. Time performance – The more time it takes to execute a project than the approved duration, the more costs are incurred and late benefit realization

iii. Stakeholder engagement – the success of a project is dependent on how different stakeholders on the project responsible for different activities engage with one another to ensure that the dependencies are well managed.

iv. Benefits realization – It is important to ascertain if intended benefits have been realized.

Pinches (1981) highlights that the relationship between the firms' evaluation structure, incentive systems and capital budgeting cannot be ignored. Good performance should be rewarded and this encourages the success of future investment management.

2.6 Capital Budgeting Techniques

According to Kulatilaka (1985), capital budgeting analysis is used in determining whether benefits from investments in a real asset are worth more than the cost of the asset. There are certain characteristics which a sound investment evaluation criterion should have. According to Pandey (2009), these are:

i. Consideration of all cash flows in order to determine the true profitability of the project
ii. Objectiveness and unambiguity to promote separation of good project from bad project
iii. The ranking of projects should be according to their true value of profitability
iv. Recognition and preference of bigger cash flows and early cash flows to smaller and later cash flows
v. The ability to choose among mutually exclusive projects
vi. Applicability to any conceivable investment project independent of others.

The most suggested capital budgeting techniques are cost of capital, internal rate of return, Net present value, and Payback period and benefit–cost ratio. A study done by Chan (2004) indicates that the use of capital budgeting techniques is limited in the public sector and that this may be due to the lack of profit objective in the government sector.

2.6.1 Cost of capital

Cost of capital eases the evaluation. It defines the minimum amount of cash flows that investment activities must generate to qualify for acceptance by the company. With public finance, it is important to determine the appropriate discount rate or cost of capital as costs are incurred from the onset while the benefits may be realised later (Brealey, Cooper & Habib. 1997). He further concludes the following:

i. “In an open economy, the relevant discount rate for Government projects is the opportunity cost of capital that is the expected return on comparable investments in the capital markets”.

ii. “Risk free projects should be valued by discounting their pre-tax interest rate since the Government receives all tax revenues”.
iii. “The risk premium for the public sector should be the same for the private sector if the pay offs to the projects are spanned by existing traded securities; the presence of complete capital markets lessens the need for the Government to diversify on behalf of citizens”.
iv. “The appropriate discount rate for costs is generally substantially lower for the net cash flows”.

In the study done in Indian public sector enterprises, the methods used to determine the cost of capital were found to be weighted average cost of long term sources of finance (48.72% of the sample), Top management decision (20.51%), marginal cost of additional funds (15.3%) and opportunity cost of funds (12.82%) (Jain & Yadav, 2005). From these findings, Jain & Yadav (2005) suggests that the public sector enterprises be conscious of cost of their finance and should follow the weighted average approach and for public sector enterprises whose securities are listed, should make use of market value instead of book value weights .

2.6.2 Net present value

It is the monetary value by which an activity or project changes the value of the firm. The value may increase or decrease. According to Firer, Ross, Westerfield & Jordan (2012), the Net Present Value method considers time value of money and if an investment results in a positive NPV, it is acceptable, otherwise it should be rejected.

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - CF_0$$

Egbide *et al* (2013) explains that although the NPV has a disadvantage of being complex to understand and use, it also has advantages such as consideration of time value of money and of the entire cash flow stream over the project life. The study done in India by Kee & Robbins (1991) and Jain &Yadav (2005) indicated that the net present value method is the least used method in evaluating capital projects. He further explains that the NPV method is the most appropriate method due to its compatibility with the goal of

maximising the shareholders' value, in the case of the public sector being the Government and because it has a uniform investment rate which can be consistently applied to all capital projects.

2.6.3 Internal rate of Return

Internal rate of return is the rate that equates the present value of the projects cash flow with the initial investment on the project. If the IRR is greater than the cost of capital, the project can be accepted and rejected if less than the cost of capital (Hillier, Ross, Westerfield, Jaffe, Jordan, 2013)

According to Kulatilaka (1985), if the opportunity cost exceeds the IRR, the project should be rejected, otherwise it should be accepted.

Results from the study done by Jain and Yadav (2005) indicates that the most popular techniques utilized by India's public Sector Enterprises is the Internal rate of return, followed by the payback period and then the accounting rate of return.

2.6.4 Payback period method

The payback period method calculates how soon the cash flows expected from the project defrays the cost of the project. Egbide *et al* (2013), highlights that this method ignores the time value of money and that the cut-off period is arbitrary. Brunzell, Liljeblom & Vaihekoski (2013, pg. 91), suggest that the payback period may be used more where there is political risk involved.

In his study, Chan (2004) found that payback period is a dominating technique used by the Canadian municipal governments. He further explains that this may be due to the fact that the municipal administrator are more concerned with the recovery of their investments as the access to the public markets for funding is limited while there is increasing pressure for results and accountability.

Kee & Robbins (1991, pp 293) explains that "corporate managers utilize payback to supplement profit-oriented models, while governmental managers tend to employ the payback method to supplement qualitatively-oriented models". According to Egbide,

Uwalomwa & Agbude (2013), Chan (2004) the payback period method is preferred due to its simplicity in calculation, its use of readily available accounting data and presentation of the analysed data that is simple for many users to understand and due to it being the least affected by uncertainty as it focusses on short term and on liquidity. Chan (2004) further adds that the preference of the payback period by the public sector may be due to the lack of access of the public markets for funding and increasing pressure for results and accountability.

2.6.5 Benefits – cost ratio

Kee & Robbins (1991) describes this model as the one that relates investment potential benefits with its associated costs and that its frequent application ratio relative to the NPV and IRR may be as a result of its unique ability to incorporate qualitative attributes of an investment. In their study they found that the benefit – cost ratio and non-quantitative evaluations are the most frequently used techniques in the public sector. Therefore, an investment with more benefits at the same or less cost would be selected. According to Chan (2004), an analysis of whether a capital projects benefits outweighs its cost is still lacking. He further adds that although cost tends to be fairly clear, it is difficult to define benefits of capital projects in the public sector.

The decision rule is to accept project's whose BCR is greater than 1. Although the BCR method is similar to a large extend to NPV method, the main difference is that the BCR methods measures the efficiency of the project while the NPV method measure the size of the net benefit which is measure using the currency (Rand). According to Smith (1969) this explains the widespread use of BCR in the public sector. Adewele & Olayi (2004) found that the majority in the Kwara state Nigeria prefer the use of benefit – cost ratio and payback period techniques compared to IRR and NPV. Possible reasons for this may be due to the simplicity, versatility and flexibility of the BCR and PBP techniques.

Morgenroth (2011) concludes in his study that according to evidence, the expected costs and benefits of projects do not go according to plan and that estimates are subjected to systematic preference which appears to be common.

Cost benefit analysis

To ensure that the resource allocation on capital investments meet the intended benefits for the community and economic welfare, a cost benefit analysis is done. The advantages of a cost benefit analysis are:

i. It provides a consistent approach to a wide range of government projects
ii. The discounting techniques that are used to reduce money outlays at different times to true comparability have become generally understood
iii. The concept of economic welfare provides an alternative basis for the appraisal of government projects.

2.7 Capital Budgeting Considerations

Nunn (1990) highlights the complexity of capital budgeting process in the public sector as it being structured by formal and informal government policies while at the same time it is driven by internal and external demands. One important consideration is that public sectors are mandated to make investments needed for service delivery. According to Brigham & Pettway (1973), Inflation, prices set my regulators, operating costs & profits are factors to be considered for a utility company.

There are concerns about the applicability of capital budgeting techniques in municipal Governments (Chan 2004). It is important to analyse the likelihood that an investment will yield less returns than expected. Capital asset investment decisions are subject to consideration of risk due to the irreversible loss, the fact that resources are committed for long periods and that the measurement of the asset's cost and benefits are not always easy (Kee & Robbins, 1991). They also find that political factors contribute 41% towards reasons why public sectors do not use the NPV and IRR method. Brookfield (1995) supports this by indicating that the uncertainty of the future and failure of project appraisal techniques in recognizing these uncertainties will almost certainly lead to incorrect conclusions and erroneous recommendations. Holmen & Pramborg (2009) conclude that unsystematic and country-specific political risks are important in an imperfect capital market and causes Manager's to use simple rule of thumb for capital budgeting decisions due to the difficulty in estimating the risk.

According to Nunn (1990), although the initiation of infrastructure projects may be done by city officials, it is the voters that do the ratification of the project. Schubert & Barenbaum (2007) lists how public sector generally differs from the private sector:

i. The nature of its obligation and the democratic process; this requires the public sector to carefully analyse the potential revenue embedded in non-revenue generating capital assets.
ii. In the public sector physical flexibility and political flexibility are not identical concepts and therefore the public sector needs to recognise how politics may impinge on the value of embedded options.
iii. Public sector manager are fighting for capital resources and as a result will tend to overbuild that to wait. This is due to a use it or lose it environment in the public sector. This does not promote flexibility and flexibility adds value to capital projects.

Risk/Uncertainty

According to Jain & Yadav (2005, pp. 44), “the effective handling of risk is an important but complex task in capital budgeting as element of uncertainty in estimates of future cash flows, economic life of project and cost of capital cannot be completely eliminated. Jain & Yadav (2005) found in their study that the approach used by public sector enterprises to incorporate risk is that of sensitivity analysis (59%) followed by shorter payback period (33%) and higher cut off rate (23%).

Schubert & Barenbaum (2007) & Brookfield (1995) highlights that another important method to be used in the public sector is the real options, which allows for the decision makers to formally add the benefit of flexibility to the capital allocation process. Real options are options on real assets rather than on financial assets. Schubert & Barenbaum (2007) further explain that the application of this method in the public sector will improve the efficiency of the project evaluation process.

CHAPTER 3. RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design

The research study was qualitative in nature. The focus was to explore the extent of the application of capital budgeting processes on public sector capital investments or projects using structured interviews, small sample surveys and case study on selected projects done by state-owned entities. According to Blumberg, Cooper & Schindler (2005), a study that is concerned with learning who, what, where, when and how much, is descriptive in nature. The following procedure was followed:

3.2 Data Collection Method

3.2.1 Literature study

Literature study was one on past papers in the private and public sectors in order to gain insight and learn the importance of capital budgeting process and its application to capital investment projects. Information was gathered through various government and state owned entities websites and publications of infrastructure projects in South Africa.

3.2.2 Interviews

Structured interviews were conducted with Investment/Financial Managers, Project Planners, Technical specialists and Project Managers in order to evaluate the extent of the application of capital budgeting processes in the public sector. It was also the aim of the researcher to gain insights of what may be important for successful execution of capital projects with no cost overruns. Interviews were done with stakeholders in Eskom, Rand Water, Transnet, Prasa and City Power.

The limitation in the sampling reduces the data collection period and biasness. This type of study was chosen as it avoids opinions but has the strength to gather facts as the sample was mostly skilled people in that specific field being studied. A structured

questionnaire developed by Henderson & Mukherjee (1987) will be used for the interviews.

3.2.3 Case study

Case studies were on 1 critical project per sector limited to the electricity, transport, liquid fuels and water sectors. The choice of these sectors is based on the number of projects that are under consideration between the years 2012 – 2020. These sectors are the majority contributors to a total of approximately 3 205 projects within the public sector. The projects selected for the case study are chosen due to their intended contribution or benefit to the South African economic growth. As indicated in the figure 1, the top 3 sectors are electricity, transport and Liquid fuels. The water sector was selected on the basis that it is a basic need for the community.

	Project stage								
R billion	Concept	Pre-feasibility	Feasibility	Financing	Detailed design	Tender	Cons-truction	Ongoing prog-rammes[1]	Total
Water	20	–	–	32	–	5	18	–	74
Transport	310	–	78	17	12	88	8	71	583
Electricity	720	268	314	–	95	103	345	101	1 945
Liquid fuels	–	–	211	–	2	–	–	–	213
Education	20	–		40	–	–	–	125	185
Health	–	–	50	29	–	–	–	31	110
Telecommunication	12	–		–	–	–	3	–	15
Human settlement	–	–		78	–	–	–	–	78
Total	**1 082**	**268**	**653**	**195**	**109**	**195**	**374**	**328**	**3 204**
% total expenditure	*33.8%*	*8.4%*	*20.4%*	*6.1%*	*3.4%*	*6.1%*	*11.7%*	*10.2%*	*100.0%*

1. Ongoing programmes include multiple projects at different stages of development, such as universal access to electricity and school building programme

Figure 1: SA mega projects under consideration 2012 - 2020

According to (Blumberg, cooper & Schindler, 2005), case studies compared to other approaches permit the combination of different sources of evidence. The aim was to identify which budgeting technique was utilized for each of these projects and to draw lessons for future development projects. Due to the required in-depth investigation for the case studies, data was from primary sources. Information was also sourced from Government and State owned entities' websites and conversations with key stakeholders on the projects were done.

The following projects formed part of the case study:

a. Energy Sector: Eskom

Eskom supplies 95% of South Africa's Electricity with energy availability factor currently sitting at 75% against 80%. In addition to this, Eskom's contribution to the economy in the financial year 2013/14 includes the electrification of 201 788 customers, and increment in Customer base from 5.0 million to 5.2 million, net maximum generating capacity of 42 GW, new generation of 17.4 GW being built and 46 919 people employed by Eskom. Sustainable asset creation and financial sustainability are two of the three focus areas for Eskom in the financial year 2014/15 with the 3rd focus being operational sustainability.

Medupi Power Station project

Medupi is a Greenfield coal fired power plant project that is located west of Lephalale in the Limpopo province. The power station will be the fourth largest coal plant in the southern hemisphere and the biggest dry cooled station in the world with a planned operation life of 50 years. The power station will result in a total capacity of 4 800 MW. Construction activities started in May 2007 with the first unit expected to start generating power in January 2010 and the last unit planned for commissioning by end of 2014. These commissioning of the units have been delayed and targets not achieved yet. According to fin24 (2013), Eskom suffered a credit rating downgrade by Moody's to Baa3 and the reasons provided are due to Eskom's standalone credit quality to uncertainty over the evolution of Eskom's investment programme and financial profile over the medium term.

Project cost – the initial budget for Medupi project is 33.6 billion. Eskom is expecting the cost to completion of R 105 billion excluding opportunity costs, interest charges and claims by contractors.

Project benefits – One of the main reasons why South Africa's rating has been dropped is due to inadequate capacity of Electricity. Medupi power station will result in a total capacity of 4 800 MW which will in turn improve on the country's economic performance. Since the start of the project, there has been investment in the infrastructure of Lephalale including the building of almost 1000 houses, and the upgrading of the 2.2km road leading to the construction site. In additional to job creation, over 233 learners completed their training since the inception of the project while approximately 368 are still in training. There has further been a huge empowerment of Black Owned Woman suppliers.

b. Transportation Sector

Gauteng signalling upgrade: Prasa (Commuter rail services)

Metrorail is responsible for the transportation of over 2.2 million passengers in South Africa. An amount of 2.9 billion of capital investment was made available in the year 2011 towards rolling stock upgrade and maintenance, infrastructure upgrades and station development. The case study will be based on the Gauteng signalling upgrade programme. According to Prasa, the current fleet renewal project will be a massive task that will require a new signalling system in order to get the maximum value from the new trains. the project involves the signalling of a quarter of Prasa's Gauteng network by 2016, of which the first phase involving 18 stations and the construction of a centralized control centre is expected to be completed in 2015.

Cost – The project estimated cost is ZAR 1 Billion

Benefit – According to Lefebvre (2014), there will be major improvement in the efficiency of the existing railway network and a fail safe operation is guaranteed. The new system will enable the controller to manage traffic flow far more effectively and improve the statistical information on aspects such as train reliability and punctuality. Most importantly for the commuters, more trains can be run and more people carried on existing lines.

c. Liquid Fuel Sector

Transnet New Multi Product Pipeline

The Transnet New Multi Product Pipeline (NMPP) is managed jointly by Transnet capital projects and Transnet pipelines. According to Transnet (2014), NMPP project is the biggest project in Transnet's capital expenditure investment portfolio and one of South Africa's most ambitious engineering and construction projects.

The project was initiated to address the inland security of supply of petroleum products. The existing Durban to Johannesburg pipeline has reached its life span and due to it critical stage, it was necessary to initiate the TNMPP.

Project cost: The approved cost estimate for phase 1 was R 23.4 billion in 2010 which more than doubled from an initial figure if R 9.5 billion while the project completion date was pushed out from 2010 to 2013 with a start date of 2008. (Engineering news, 2013).

Project Benefit: In addition to the project addressing the restrictions to the supply of liquid petroleum fuels, it will also bring socio economic and environmental benefits. NMPP will enable South African economic growth, while reducing road congestion, road maintenance costs and carbon emissions associated with road transportation (Transnet, 2014)

d. Water Sector: Rand Water

Rand Water operation include a pipeline network that is 3 500 km long, two combined pumping and purification stations, four booster pumping station and a number of reservoirs (Rand Water, 2013). According to Rand water, it is ensuring that the water demands of 2020 and beyond will be met by focusing on infrastructure refurbishment and development. Rand waters capital expenditure plan include capital investment of R 9.4 billion for Augmentation, R 6.6 billion for renewal and R 5.8 billion for growth projects for the period of 2013/18.

Zuikerbosch to Palmiet pipeline

This is an Augmentation project to install a new steel pipeline that will provide an opportunity to take the existing lines out of service for renovations and reduce the risk of failure along this route (Rand water, 2013).

Project cost: The estimated cost for the Zuikerbosch to Palmiet pipeline is R1.28 billion

Project benefits: “Augmentation project have the primary purpose of increasing the capacity to meet growth in demand and area of service” (Rand Water, 2013). Rand water further adds that this will have a positive impact on water quality, water supply management and equitable distribution to cross-border communities.

3.3 Data analysis

Data analysis was done using coding and labelling of the data in order to identify similarities and differences from the responses. The coded data was then transferred into a chart for ease of interpretation.

CHAPTER 4. ANALYSIS OF RESULTS

4.1 Introduction

A comprehensive literature review and research methodology was conducted in the previous chapters. In this chapter, analysis of the interviews conducted as well as the case studies were done and summarized.

4.2 Research group

Four of the state owned entities were selected for this study and these are Eskom, Transnet, Prasa and Rand Water. Research groups representing different levels of experience and responsibilities were approached for an interview in order to get an understanding of the processes applied in different state owned entities, understand the capital budgeting process being followed and get their views on the causes of project cost overruns. The participants were selected on the basis of experience in the appraisal and management of capital projects. These are members at Senior and Middle Management level positions in their work environments.

Interview schedules were submitted to 15 identified participants. Interviews were held with only 10 of the 15 participants who accepted the invitation. Only 1 out of the 9 interviews was held telephonically while the rest were held in person. This gives a response rate of 66.6 per cent.

Role	Frequency	Percentage
Senior Managers	3	30%
Project Directors	1	10%
Executive Managers	1	10%
Middle Managers	5	50%
	10	100%

Table 3: Responsibility levels of respondents

Role	Frequency	Percentage
Prasa	1	10%
Eskom	3	30%
Transnet	3	30%
Rand Water	3	30%
Total	10	100%

Table 4: Number of respondents per SOE

4.3 The Interview Results

Investment Appraisal process

All respondents indicated that there is a documented process that is being followed in the appraisal of capital investments. The processes are different in each entity and named differently, however they include the planning, engineering, execution and close-out stages.

Although each entity has a formal documented process, it is not all projects that follows these processes. Emergency projects, such as train derailments and incidents, that require being addressed overnight do not usually follow these documented processes. It was also highlighted that although small projects in terms of value and complexity do follow the documented process, their approval process tends to be expedited.

Legislation

Respondents were asked if the investment appraisal process within their organizations is legislated or specified by the charter/statute under which their organization operates. The table below indicated the responses.

		Percentage of total number of SOEs whose process is legislated.
1	*Investment Appraisal process is legislated*	*75%*
2	*Investment Appraisal process is not legislated*	*25%*

Table 5: Percentage of total number of SOEs whose process is legislated

The legislative frameworks that govern these entities among others are Companies act, the National Environmental Management act and tax legislation. For some of the investments, approval is required from the Minister of Finance and it is a requirement to provide information to the National Treasury through the Department of Enterprises in line with the Public Finance Management Act (PFMA). This is part of the authorization process within the capital budgeting process. As part of the authorization, all investments whose implementation will may have an impact on the prevention of pollution, ecological degradation, waste management, conservation and the impediment of water flow need to be authorized by the Department of Environmental Affairs and the Department of Water Affairs respectively.

In addition Eskom is regulated by the National Energy Regulator of South Africa (NERSA). NERSA's objectives are to ensure efficient, effective, sustainable operation of the power supply infrastructure in South Africa, issue licenses for the operations of the generation, transmission and distribution facilities, determine and approve electricity prices and tariffs and conditions under which electricity may be sold. There is an allowed rate of return that is set by the regulator which should not be exceeded by the entity.

When asked if the process should be legislated, 22% of the respondents felt that South Africa ostensibly has several other legislations that govern capital budgeting in the public sector and delay the implementation of capital projects. These include the environmental authorizations and authorizations by the department of water affairs. Before any implementation can take place, these approvals must be in place but take a long time to get approved which tends to delay the progress of the capital projects.

Identification of projects

Table 6 indicates who identifies the capital projects in the State Owned Entities.

		Percentage in terms of where/who identifies capital investment projects within the selected SOE
1.	Operational stakeholders within the organisation	62.5%
2.	Customers	12.5%
3.	Top Management	0.0%
4.	Economic Growth (Need)	62.5%

Table 6: Capital investment identification

It can be noted for the table above that majority of the capital projects are identified by firstly, the operational departments that operates and/or maintains the assets within the organization. This includes replacement of aged assets and improvement of operations. Secondly, the identification is based on economic growth through forecasts done by the planning departments. Economic growth forecasts, usually 5 years, are done and based on these, documents such as Market Demand Strategies (MDS), Master Development Plans (MDP) and Annual Infrastructure Development Report (AIDR) are documented which influence the selection of capital investment projects within the organization.

Respondents were asked about the level of the public involvement in the identification of projects. The public was highlighted to be involved more on investment projects including provision of Electricity and Water than those in the transportation sector. The nature of involvement is through the public participation forums where the public is involved before the implementation process can kick off which are set up by the entities themselves. There is little if no public office involvement during this process other than the involvement of the councilors in the respective areas. This is more on a micro level, during Environmental Impact Assessments (EIA). In the case of Eskom, public engagements are done during the Multiyear Price Determination (MYPD 3). This is arranged and held by the National Energy Regulator of South Africa (NERSA). Within the Transportation sector, the public is only involved where the selected infrastructure route will affect the community/customers, resulting in consultation by the entity prior to commencement of project.

Projects selection criteria

		Percentage of the total respondents indicating the selection criteria
1.	Technical	37.5%
2.	Cost	75.0%
3.	Environment	75.0%
4.	Safety	75.0%
5.	Support MDS/MDP	75.0%
7.	Compliance to Legislation	75.0%
8.	Project duration	12.5%

Table 7: Capital investment selection criteria

Table 7 indicates that the selection criteria for capital investments is more based on whether the organisation is able to fund it, whether it supports the Market Demand Strategy, Master Development Plan or Annual Infrastructure Development Report (AIDR), improvement on safety, environmental compliance and other legislations. While cost carry 75% weight as a criteria for the selection of the project, the intended benefits of the project are also highly considered, regardless of how long the project will take. It was also noted that regardless of whether the project will or will not benefit the organization, support the demand strategy, or have costs available, it will be approved if it will assist with compliance to legislation.

Capital budgeting techniques

Table 8 indicates that the most utilized technique within State Owned Entities is IRR; NPV the Payback period and Hurdle rate tie in the second position. PEM (Project evaluation Model) and economic evaluation technique follow and are mostly utilized within Eskom and Transnet. It should be noted that none of the SOEs utilize only one technique, however it was picked up that mostly 1, 2 or 3 techniques are utilized by SOEs.

		Percentage of respondents in support of the capital budgeting technique used
1	NPV	37.5%
2	IRR	62.5%
3	Payback Period	37.5%
4	Hurdle Rate	37.5%
5	PEM	25.0%
6	Economic Evaluation	25.0%

Table 8: Capital Budgeting Technique

When asked if the evaluation techniques' are consistently used to evaluate capital investments, respondents explained that in addition to emergency projects, ministerial directives and political pressures are reasons why certain capital investments do not go through the evaluation criteria making use of any of these techniques.

It is however important to note that these techniques are legislated by Parliament.

Public Office involvement

Respondents were asked which public office is involved with the authorization of investment projects once they have gone through the selection stage. Not all of the SOE are required to have approvals from the public office due to the fact that some of them internally fund their capital investments. It is to be noted however that with Eskom, the Department of Energy is involved for all electrification projects while the minister approves capital investments of more than 500 Million. In the case of Transnet, the Department of Enterprises is involved in approving projects where funding is required from the government. The Minister of Finance also approves Transnet 10 year capital plan, which is reviewed annually. The Rail Safety Regulator ensures that all measures have been put in place in order to comply with safety during the execution of rail capital projects. The lack of involvement of any public sector may lead to lack of monitoring and auditing to ensure that the SOE is not the player and the referee and that the SOEs are made to account for any overruns experienced on capital investments. The involvement of the public office will also assist in ascertaining if intended benefits have been realized and in this way acting in the best interest of the public.

Control mechanisms (Cost overruns)

		Percentage of responses on the control mechanism for cost overruns
1	SAP System	87.5%
2	Cash Flow analysis	50.0%
3	Primavera system	50.0%
4	Scheduling Management	37.5%
5	Contract Admin	25.0%
6	Project Reviews	25.0%
7	Reporting Mechanism	12.5%

Table 9: Cost overruns control mechanism

The SAP system was highlighted to be he common system that is being used by the utilities in managing project cost overruns. Only the amount that has been approved by the investment committee gets loaded onto the SAP system and cannot be overspent. Where there is a need for additional funds, these have to be motivated for and presented back to the investment committee for approval. Once approved, the additional funds can be loaded on the Sap system. The next commonly used mechanism is the cash flow analysis and the Primavera System. It was however noted that in some utilities, the Primavera system is being used only for Mega projects and not for all projects. The Management of approved project schedules is also being used by less than a quarter of the sampled utilities as a control measure for minimizing costs overruns. Perceived causes of these cost overruns and measures to avoid cost overruns of capital projects are discussed on page 41 and 43 respectively. Respondents were asked if within their organization time and cost overruns were being investigated. The table below gives a summary of the response.

		Percentage of respondents	
		No	Yes
1.	The organization investigates the causes of cost and time overruns	0%	100%

According to the responses, the monitoring of the projects to ensure that there no cost overruns are being done by the project managers who then present the findings to the

Project Directors, General Manager, Chief Executive or to the Minister of Finance' office depending on the level the project was approved at.

Contractor Management Control mechanisms

		Percentage of responses on the control mechanism for Contractors
1	Scheduling management	12.5%
2	NEC 3	50.0%
3	Primavera System	12.5%
4	Contractor performance management	12.5%

Table 10: Contractor Management control mechanism

In terms of the control put in place to manage contractors in ensuring that there is adherence to the approved timelines, penalties are applied where the contractor does not perform according to contractual obligations. NEC 3 is the common used measure by the utilities in managing contractors. The monitoring is also done by the Project Managers and findings are presented within the project teams for lessons learnt or to the Project Director, General Manager or Chief Executive depending on the level that the project was approved at. Only 12.5% of the respondents indicated that the findings get presented to the Bid Evaluation Committee (BEC) so that they can be considered during the next contract awarding. Although the controls used support the principle of implementation of control, 50% of the focus is on managing the contract while equal focus should be awarded to monitoring of time, cost and quality during the execution of the project. If this is done, gaps can be identified before they create time and cost overruns.

Relationship between capital budgeting process & cost overruns

The respondents were asked if they believe a relationship exists between capital budgeting process and cost overruns. Only 87.5% of the respondents indicated that the relationship does exist.

Percentage of respondents

	No	Yes
Is there a relationship between capital budgeting and cost overruns	12.5%	87.5%

	Reasons why the relationship exists	
1	Poor Planning	37.5%
2	Inaccurate scope, cost and scheduling	50.0%

The need for the allocation of adequate time during the planning stage of the projects was highlighted. The concern raised by 37.5% of the respondents was that we often spend too little time planning the projects and rush them into execution. This leads to costly changes being made at execution stage, thus resulting in costs overruns. Other causes were highlighted as underestimation of costs at initial stages of the project and time overruns. 4 out of 8 respondents indicated that inaccurate scope, cost and schedule gets approved by the investment committees and this leads to changes being made at execution stage and leading to longer execution of the projects. This is as a result of projects being initiated and planned in wrong departments/committees.

The above, summed up as project planning stage can be linked back to the authorization stage of the capital budgeting process, where once a project has been identified, selected and authorized, expenditure on the project can be spent. At the planning stage the following questions should be answered as accurate as possible.

i. What is the intended benefit of the project?
ii. What is the risk is the project is not realized?
iii. For how long can the Organization manage the risk? This should not result in inadequate execution timelines being committed to the project
iv. What scope is required to eliminate the risk?
v. How long and how much will it cost the organization to execute the scope?
vi. Does the organization have enough resources to implement the capital investment within the identified timelines and cost?

The authorizing committees/bodies should have the confidence that these questions were adequately addressed before approving any investment.

The relationship can also be linked between the control and implementation stages of the capital budgeting process and execution stage of the project. If no adequate controls are put in place to monitor any potential causes of project delays during construction/execution stage, then the cost overruns are unavoidable.

Perceived causes of cost overruns in the South African public sector projects

		Percentage of the respondent stating that the causes of cost overruns are:
1	Poor Planning (Design & Implementation plan)	62.5%
3	Lack of Skills (project management, contracts management, Quantity surveying & construction supervision)	25.0%
4	Lack of contractor competency	25.0%
5	Unavailability of resources	25.0%
2	Legislation changes	12.5%
6	Fraud	12.5%
7	Public participation	12.5%
8	Legislation changes	12.5%
9	Project Management methodologies	12.5%
10	Underutilization of automated systems (SAP, Primavera)	12.5%
11	Political Pressures	12.5%

Table 11: Perceived causes of project cost overruns

The most serious perceived cause of cost overruns is poor project planning. There is a Planning department in all these entities which is sorely responsible for raising capital projects. Page 36 details how these projects are identified while page 40 and 41 explains what is involved during project planning and the relationship it has with capital budgeting respectively. There was no other factor that was considered to be more serious. The rest of the highlighted causes were below 30% with Lack of skills (Cost Engineering, Quantity Surveyors, Planners, and Project Management), lack of contractor competency and unavailability of resources being the next highlighted cause.

Post Audits of capital projects

The table below shows the percentage of state owned entities that conduct post audits on capital projects. All SOE conduct post audits.

	Percentage of SOEs that conduct post audits	
	No	Yes
Post Audits of capital projects	0%	100%

According to the respondents, post audits are conducted by Project Managers. Only 25% of the respondents indicated that the post audits are being done by finance department while 25% of the respondents indicated that the post audits are done by the planning department. Commonly so among the SOEs, the findings from the post audits are presented back to the investment committee. This includes presentation of benefits realization.

It was noted that only 1 SOE out 4 have a reward system in place for well performing projects that meet the approved scope, cost and timelines. These rewards are however non-monetary and awarded to the entire project team. The rest of the SOEs do not have project specific reward systems in place.

Investment appraisal for public enterprises and private entities

The respondents were asked if the public sector investments should be managed the same way as the private sector. The table below indicates the percentage of responses.

	Percentage of respondents in support of the same management of capital project.
Yes	75.0%
No	25.0%

The following are reasons provided why the management of the capital projects in the public sector should be the same as the private sector:

a. In the private sector, the survival of the organisation is based on the successful execution of the project while the public sector utilities always have the government to bail them out when things get tough.
b. The private sector has a culture of urgency, which is lacking in the public sector due to lack of monitoring by external stakeholders to the utilities (Public offices).
c. The difference between the private sector and the public sector is the shareholding and therefore the process should not be different

d. Private sector organizations are well managed and therefore public sectors should adopt the private sector processes

The following are reasons provided why the management of the capital projects in the public sector should not be the same as the private sector

a. Tariffs are regulated and this makes it difficult for SOEs to set their profit levels. According to Brigham and Pettway (1973, pg. 13), the calculated utility rates are too low to return the rate of return on investment to the target level".
b. The drivers for the public sector are different from the private sector. Public sectors are driven by the delivery of public good as compared to private sectors.

Suggestions to improve capital project appraisal in SA Public Sector

The following suggestions were given by the respondents in no particular order on how capital investment appraisal process can be improved in the South African Public Sector:

- The value chain in terms of legislation and the requirements for execution should be looked at and an agreement on the scheduling of deliverables should be formalized between SOE and the Government to shorten the approval process of Water Use Licence Authorizations (WULA), Servitudes and wayleaves (Approvals to start construction where there are already services running like water pipes, telephone lines, power cables etc.).
- Project readiness assessment should be done before embarking on a project. This is important to ensure that the designs supports the need of the project and that the implementation plan of the design is clear with holding points for monitoring and control purposes.
- Thorough planning to be done prior to approval of the project in order to avoid additional scope being added to the project while the project is already in construction. This is referred to as scope creep.
- Performance and rewards should be linked for projects in order to create a culture of good projects performance which will result in reduced cost and time overruns.

- Labour market should be managed very closely to avoid delays on the projects that are on the ground. If well closely managed, assumed impact analysis can be done timeously and action plans put in place in advance.
- Skilled resources should be assigned to projects for costing of activities, coordination of activities, design 7 constructions and supervision of construction activities.
- Right people with the correct qualifications to deliver on specific tasks should be selected and utilized on projects.
- Transparency should be promoted on projects where gaps, challenges, audit results are comprehensively shared and corrective/preventive actions implemented and monitored.
- Funding of projects should be based on proper forecasting and investment committees should be demonstrated of this. This means how and when the requested cost is going to be utilized should be clear and specific during presentation for authorizing of capital investments and investment committees should avoid approving investments which do not have proper forecasting. When this is done correctly, it becomes easier to put control measures in place to monitor cost overruns.
- Project management methodology (no policy) should be developed. This will promote consistent approach and management of capital projects within the public sectors and create a positive culture of project management, monitoring and control.
- Automated tools such as SAP and Primavera should be promoted as support tools for human resources assigned to projects. This mostly assists with the administration of projects so that resources can spend more time on the ground to ensure no unnecessary delays are experienced during construction.
- There should be reduced political interference as SOEs tends to react based on pressures from the Government.
- There should be more focus on skills improvement. This includes contractor development programmes and individual development plans for internal resources involved in capital investments)
- Market changes to be well managed to avoid negative impact on projects. I.e. strikes.

What came out was the lack of Supplier Management processes in the SOEs. Contractor/Supplier performance measurement systems are not in place in these SOEs and as a result, poor performing contractors find themselves back into the system while good performing contractors are not utilized more often and used to develop small and new contractors.

Political pressures should not only be when a certain project is required but also on enforcing accountability and promoting good governance and performance on capital investments. If public offices get more involved during and post completion of projects, this will be achieved.

Details and an understanding of how each project contributes to the strategic direction of the organization and of the economy are critical for all resources working on the project. Poor understanding of project goals undermines the project implementation. The goal becomes the implementation of the project instead of the intended benefit of the project.

Systems should be put in place to promote transparency of project performance from initiation to close out stages. This will motivate good performing resources and challenge poor performing ones to do better and learn.

4.4 Case Study Analysis

4.4.1 Gauteng re-signalling project

The Prasa re-signalling project was approved via the capital Investment Committee by the Ministry of Treasury.

The Department of Transport was the public office involved with the authorization of the project. The project selection criteria was based on the total cost funding requested, cost benefit analysis and the associated risks if the project is not approved. The projects benefits include; re-routing of services and elimination of bottleneck sections where possible; re-signalling the network using fully bi-directional signalling to increase operational flexibility; increasing signalling headway capacity

The associated risk should the project not be approved includes; the existing system consist mainly of obsolete mechanical and electro-mechanical systems; Safety requirements of railway signalling and the train operations are compromised; Safety and maintenance procedures for signalling installations is compromised and Continued vandalism and theft.

The capital investment appraisal technique used for the re-signalling project include the risk likelihood analysis, supporting the strategic objectives such as providing integrated passenger services in metropolitan and rural areas and financial impact e.g. OPEX for sustaining the new system.

The project was originally approved for a total cost of R 6.7 Billion and completion date of March 2017. The estimated project costs are currently sitting at R 9.9 Billion with the projected completion date of March 2018. The main contributors of these costs and time overruns on the re-signalling project are:

- Not enough time was allocated for the detailed design as well as approval process of the interim solution.
- During commissioning of the interim solution it was discovered that, due to a faulty old cable, additional new cable had to be laid in the same trench, where the new cables had been laid.
- Lead time for material delivery
- Verification and validation of new technology takes longer
- Scope creep due to compensation events
- FOREX challenges

- Mobilisation fees for main contractor

The provision of adequate time on the planning and scoping of the project is critical as discussed in the previous sections of the analysis of results. No matter how urgent the project is, no activity should be compromised as it can lead to undesired delays and increase in costs. The need for the replacement of the existing cable during commissioning indicates the lack of detailed planning on the project including checking the current status of the existing plant. Provision for the upgrade of the existing plant should have been identified upfront during the planning of the project especially where integration of new project and existing plant is unavoidable.

Material lead times should form part of the project schedule and should not result in any project delays if incorporated in the schedule. This indicates that not all critical activities like the delivery of material for part of the project scheduling, which leads to unrealistic project timelines being presented for approval by the authoring bodies. The mobilization fees for the contractor indicates the lack of supervision by skilled personnel to monitor the performance of contractors and any other challenges that contractors any experience and lead to cost escalations.

4.4.2 Eskom Medupi power station project

Medupi project was approved by the Mister of finance, with the involvement of Department of Energy, Public enterprises and Treasury.

The criterion used to select the project was based mainly on support to economic growth, sales growth, the reserve margins and least cost approach. The project's original and estimated cost of completion were not disclosed due to confidentiality in the organization, however the project had 5 cost revision with a 50% increase in cost over a 6 years period.

Medupi was expected to be completed already in March 2014, with the first unit commissioned by September 2011; however the first unit will only be commissioned in June 2015. The total project commissioning date could not be disclosed. The main contributors to Medupi's cost and time overruns are:

- The transformation in the country delayed the project
- Integrated resource Plan was not in place when the project started.
- There were delays in the decision making by shareholders
- Talks on the disposal of a portion of Eskom
- Due to the urgency of the project, not enough time was allocated to the planning of the project
- Challenges were experienced with the structural designs of the boilers
- Non adherence to Eskom procedures
- Poor contractor and subcontractor skill which resulted in poor workmanship
- Lack of integration of supplier packages as compared to the rest of the world

The delays due to the process of transformation in the country clearly indicate the level of political interference on capital projects run by state owned entities. There were talks to dispose a portion of Eskom which affected the project. Impact analysis should be done on initiatives like this and action plans be put in place to avoid interference with activities/projects already at execution/implementation stages.

An integrated resource plan is critical to ensure free flow of project activities and easy management of interdependent activities on a project. It should also be noted that when a project is urgent, it is highly needed that activities be closely managed and planned thoroughly to avoid delays. It should not compromise the planning and quality of execution. This should be the case with ensuring adherence to set procedures, especially occupational Health and Safety procedures.

For a project as big as Medupi, there should be full time resources on site that are skilled and well remunerated to purely focus on the construction supervision. It is often seen that the supervision of construction activities is done by low level employees, who are often demotivated and not well skilled with the scope of work being executed.

4.4.3 Transnet NMPP project

The Transnet NMPP project was approved via the capital investment committee by the Minister of Public works. The department of Public works is the only public department that is involved with the project.

Transnet NMPP was selected using various criteria, which included many non-financial factors such as the existing condition of the Durban Johannesburg Pipeline (DJP), security of supply and increase in capacity due to an expanding Gauteng economy. The project was motivated along investment evaluation techniques; however the main motivation was to ensure security of supply of fuel to the Gauteng region

The project was originally approved for a total cost of R 3 Billion and completion date of December 2012. The estimated project costs are currently sitting at R 25.7 Billion. The 24 inch trunk line has been in operation since 2012, while the completions of the inland and coastal terminals are expected to be completed by September 2015 and March 2016 respectively. The main contributors to these costs and time overruns on the NMPP project are:

- The project was not allocated enough time during the planning stage to ensure that all aspects have been considered and ensure proper project readiness. The planning, design and engineering activities were done in parallel. This impacts negatively in the project as the output of planning should serve as inputs to the design and engineering activities.
- Inclement weather
- Unknown underground conditions (terrains) and soil contamination at the terminal site
- Industrial action (protected and unprotected)
- Theft and vandalism
- Poor contract and contractor management which led to poor workmanship and quality
- Land acquisition challenges

The importance of allocating enough time and resources at planning stage has already been discussed and cannot be over emphasized. Due to uncertainties in weather conditions, this cannot always be predicted although most of the construction work can

be planned for completion before the raining season starts, especially for projects that are being constructed outdoors.
Geotechnical studies should be done on all projects to avoid unnecessary delays due to identified soil and rock conditions that prevent construction progress during execution. As with the weather, industrial strikes cannot always be predicted. Enough security guards and technologies can be implemented to ensure the safe guarding of the equipment during construction.
Land acquisitions should be done before construction takes place and as with the delivery of material, this should be a critical activity that should be included in the project schedule.

4.4.4 Rand Water Zuikerbosch to Palmiet pipeline

The Rand Water Zuikerbosch to Palmiet pipeline project was approved by the entity's capital investment committee which comprises of the most senior level leadership in the organization. The department of water affairs was involved with the authorisation of the project.

The project selection criterion was based on the water demand growth versus supply ratio. In addition to meeting the demand for water supply, the project will provide additional shutdown time for maintenance work on existing infrastructure within the system.

The primary appraisal techniques used on the project are IRR, NPV and Payback period. The project was originally approved for a total cost of R 1.3 Billion and completion date of October 2013. The estimated project costs are currently sitting at R 1.6 Billion with the projected completion date of December 2015, resulting in a delay of 26 month.

The main contributors of these costs and time overruns on the re-signalling project are:

- Delays in obtaining the environmental authorisations
- Delays in obtaining way leave approvals from local authorities
- Delays in obtaining land access agreements
- Delays due to a redesign in-order to optimise pipeline design
- Tender litigation – Work stoppage order
- Scope creeping
- Under performance of Contractors

As with land acquisitions, environmental authorizations can take a while before approval is granted and this activity should be incorporated in the project schedule. It is worth noting for the public office to engage with the Department of Environmental Affairs to obtain standard lead times and fond ways of expediting the approval process. Currently it takes an average of 24 months to obtain environmental authorizations such as Water Use Licence Authorizations (WULA) and servitude approvals.

CHAPTER 5. CONCLUSIONS

5.1 Conclusions

The purpose of the study was to investigate the capital budgeting processes used by South African State Owned entities. It was found that there are cases where the capital budgeting principles are not religiously applied in the SOEs due to a number of reasons. These include the need to execute a project that has been classified as an emergency (to be executed overnight) and projects that are initiated based on political pressures and regarded as urgent. The following conclusions were made from the results of the interviews done with the 4 State Owned Entities;

i. Three of the sampled state owned entities do have a documented capital budgeting process that is legislated with only 1 not being legislated. Only emergency projects and projects regarded as urgent due to political pressures do not follow this process.

ii. The identification of projects is done mainly by the operations departments and the planning departments based on state of the asset and/or economic growth and the need to increase capacity.

iii. State owned entities do have a set of criteria from which capital investment projects are selected for implementation.

iv. All SOEs make use of more than one evaluation technique with IRR being the most utilized technique followed by NPV, payback period and hurdle rate tying in the second position. The techniques used by the State Owned Entities are legislated by Parliament.

v. Different public offices are involved with the authorization of most of the projects, however the involvement during implementation and post completion is lacking.

vi. Controls are in place for the SOEs to ensure that cost overruns are minimal and that contractors are managed during construction. The most utilized controls are computer based software such as SAP for cost controls and NEC contract for the management of contractors. The utilization of physical controls like extensive supervision and progress reporting on projects during execution.

vii. Most of the respondents, 87.5% do believe that there is a relationship between capital budgeting process and cost overruns. In their view this is because when the projects is not planned thoroughly through design and implementation plan to ensure that the projects is ready before construction starts, this can lead to a lot of modifications during construction which leads to time and cost overruns. The importance of control and implementation however was not emphasized as a contributor to many of the project overruns. If enough monitoring is done during the implementation of the project, many gaps can be picked up and addressed before they escalate into massive costs. These factors should be included in the post audits reports to ensure lessons learnt are applied for all future projects.

viii. Post audits are done for all SOEs, but findings are only presented internally to the investment committees. The involvement of the public offices is crucial at this stage to ensure that recommendations, corrective and preventive actions that arise from these audits are implemented and monitored.

5.2 Recommendations

The public sector is increasingly under pressure to deliver public goods, improve on its operations and deliver essential services more efficiently at the least cost to the consumers. In addition, the South African economy is also very much dependent on the performance of these state owned entities.

The following are recommended;

i. More involvement is needed from the public offices during the implementation phase of the capital investment projects. Post audits findings should be presented

to the public offices where the public office ensures that implementation and monitoring of corrective and preventive action plans happens in order to have continual improvement in the management of capital investments.

ii. State Owned entities should invest more time and resources on the supervision of construction work. These should be skilled resources who clearly understand the scope of work and the implementation plan thereof. This way, gaps during construction can be identifies, proactively dealt with before they lead to time and cost overruns.

iii. Projects readiness reports to be compulsory for all capital investment projects to ensure that projects are ready for implementation and minimal if not zero changes are expected during construction.

Further research is recommended on the level of involvement and contribution (negative or positive) by the public offices with capital investment projects that are managed by the State Owned entities.

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ANNEXURE A: INTERVIEW QUESTIONNAIRE

The set of questions listed below were prepared and used during the interview:

- What process does your Organization follow for investment appraisals
- Does your organization consistently follow this process? Why or why not?
- Under what circumstances might your organization ignore or be compelled not to strictly abide by this process?
- Is the investment appraisal process legislated or specified by the charter/statute under which your organization operates?
- If not a statutory requirement, would you recommend that an investment appraisal procedure be legislated, and made mandatory, for public enterprises? Why or why not?
- Briefly describe how capital projects are identified by your organization.
- To what extent is the public (or the public representatives) involved in the identification of capital projects?
- Briefly explain the screening process of these projects once identified?
- What specific capital investment appraisal techniques does your Organization use to evaluate project proposals that have passed the initial screening test?
- Are there situations when your organization has accepted projects that have not satisfied the evaluation criteria?
- What situations might necessitate that scientific evaluation techniques be ignored or side-stepped when making the decision as to whether a given proposed project qualifies for execution?
- Is it a statutory requirement that your organization uses these investment appraisal techniques?
- If not, would you recommend that a legislation be enacted making it mandatory to undertake an objective investment evaluation before their acceptance? Why or why not?
- Which public office (or which level of Government) authorizes projects that have passed the evaluation criteria for execution?
- Briefly describe the control mechanisms, if any, applied after project approval and during execution to ensure that costs incurred do not exceed projected costs?
- Briefly describe the control mechanisms, if any, used to ensure that contractors abide by projected completion times?
- What mechanisms are in place to ensure that cost and time overruns are addressed expeditiously and with minimal costs to the public?
- Does your organization investigate the causes of time and cost variances for each project undertaken?
- How are the results of such investigations used to improve on project appraisal in future?

- What do you believe are the main causes of cost overruns on South Africa's public sector development projects?
- Do you think there is a relationship between capital budgeting process and cost overruns? If so please elaborate on the relationship.
- What happens once the project is completed with execution?
- Do you think that public enterprises should undertake project appraisal the same way as the private sector does? Why or why not?
- Please provide suggestions on the measures that may be put in place to improve capital project appraisal in South Africa's private sector.