GORDON INSTITUTE
OF BUSINESS SCIENCE
University of Pretoria

Financial performance implications of capital budgeting practices in the manufacturing sector

Mzamo Rodney Mgobhozi

11356937

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of **Master of Business Administration**.

7 November 2012

ABSTRACT

Capital budgeting is one of the most crucial organisational tools for executing operational, business and corporate strategy. Manufacturing companies derive their profits from fixed assets that also deteriorate over time. This requires them to invest large amounts of capital to both maintain and expand their asset base. A number of studies both historic and recent produce conflicting results on the relationship between capital budgeting practices and financial performance.

This study sets out to identify the current capital budgeting practices in the manufacturing/capital intensive companies operating in the South African environment, and determine the relationship between the financial performance and capital budgeting practices. The implications of the type of capital expenditure (i.e. maintenance and expansionary) are also discussed.

The study was completed using primary and secondary data. Primary data consisted of capital budgeting practices data in some of the private and state-owned enterprises that was source using a survey questionnaire. The secondary data was sourced from financial statements on the McGregor BFA® database.

The major finding of this research study was that, given the sufficient sub-sector analysis, there is a positive relationship between capital budgeting practices and financial performance. There were no specific individual practices that yielded significantly returns.

Keywords: Capital budgeting practice sophistication, Capital intensiveness, Maintenance and Expansionary capital expenditure, State-owned enterprises, Sub-sector

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

_____

Mzamo Rodney Mgobhozi **07 November 2012**

ACKNOWLEDGEMENTS

I would like to say a big **THANK YOU** to the following people for making this research report possible:

- To my fiancée Angela Makhosazane Monareng for loving and supporting me during the past two years (MBA degree). She has always been supportive of my studies and believed in me.

- My superb supervisor Thea Pieterse CA(SA) for her guidance, encouragement and willingness to assist me (even on Sundays).

- To my line manager Wilma Groenewald (Portfolio and Capital Governance Manager at Sasol Synfuels) for allowing me time-off for study leave and coaching.

- To the financial managers, directors, specialists, colleagues and friends who participated in the research survey. I cannot mention their names due to the confidentiality agreements. Their responses formed a foundation of this research.

- The Lecturers at the Gordon Institute of Business Science for “opening our eyes” to the business world.

- To my friend, study partner and soon to be business partner Sibongiseni Ivan Sibisi and his fiancée Andrea Afrika for accommodating me at his home during the course of the MBA, sharing thoughts and motivating me.

- To my mother Jabulile Sophie Mgobhozi for raising me well, believing in me and always keeping me in her prayers.

- To all my Family and Friends for supporting me and tolerating my anti-social tendencies during the MBA. I’m looking forward to spending more time with you.

CONTENTS

LIST OF EQUATIONS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION TO RESEARCH PROBLEM

1.1. Overview

This chapter introduces the reader to the research topic and discusses the research problem, scope and motivation. The chapter also introduces terms and units that will be later utilised in the research.

1.2. Research Topic

Financial performance implications of capital budgeting practices in the manufacturing sector.

1.3. Research Problem

After the 2008 economic crisis, capital budgeting has been a very sort-out topic by both the academics and industry practitioners, more so in the manufacturing sector which is very capital intensive.

Globalisation resulted in products and markets opening up to new competitors. To meet and exceed investor expectations, firms must formulate strategies that give them above average returns (Ireland, Hoskisson, & Hitt, 2011). For manufacturing firms this means maintaining their current asset base and either increasing their current production base-line or acquiring assets locally or abroad. Firms design their corporate strategies to define their choice of businesses and markets they want to operate in. To create value in these businesses and markets, they commit resources especially capital as long-term investments (Seitz & Ellison, 1999). The potential investments or lack thereof present a risk to the resources committed and the company.

Both industrial and academic capital budgeting specialists have implemented measures and conducted research, respectively, to minimise the risks that come with long-term investments and maximise returns from these investments. Most of the researchers have focused on surveying the appraisal practices, leaving out the strategic and thus financial implications of capital budgeting practices to the company and industry.

1.4. Research Scope

The scope of research is limited to the analysis of the variances and correlation of financial performance analysis of manufacturing/capital intensive companies and the level of sophistication of their capital budget practices. Other factors influencing corporate financial performance are out of scope to this study.

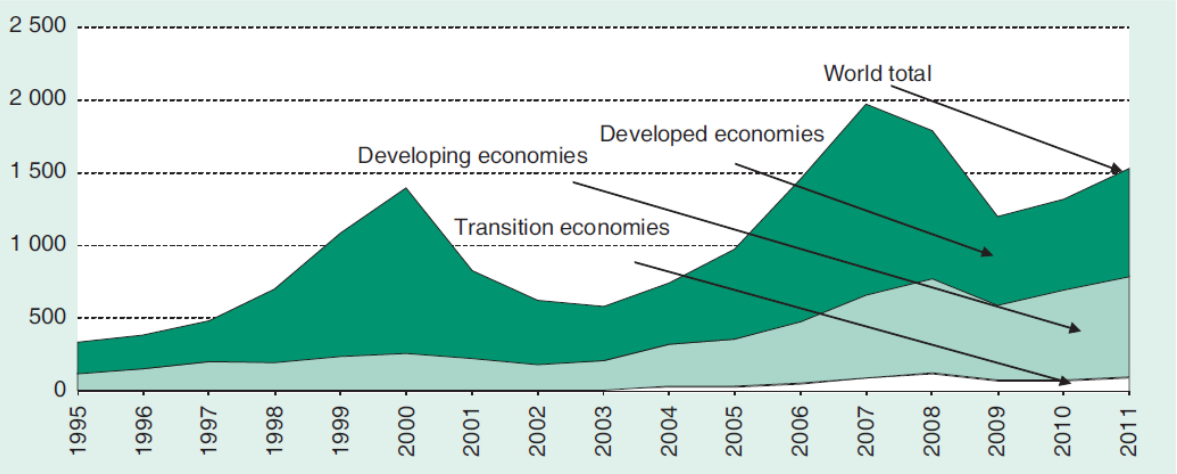
Sophistication in this context refers to the complete approach to capital budgeting by a firm. This means ensuring all the phases of the capital budgeting process are in place, practiced and institutionalised.

1.5. Research Motivation

Developing countries are growing at relatively high rates relative to the developed countries. This may be attributed to rate at which the middle class is growing. A growing middle class means a growing demand for manufactured goods and services. In order to satisfy this growing demand and grow revenues, firms must commit to long-term capital investments. Capital is a scarce resource, and firms must manage the risk that comes with investing large amounts of capital for extended periods of time. Capital budgeting is a process used to allocate these scarce capital resources.

The global foreign direct investments (FDI) flow was drastically reduced as a result of the 2008 world economic crisis as illustrated in **Figure 1** below (UNCTAD, 2012). The impact of the economic crisis was mostly felt by developed countries. A decrease in FDI constitutes a decrease in sources of capital for long-term investments, thus making capital a scarce resource.

Figure 1: Global FDI inflows by group of economies



Source: UNCTAD. (2012). *World investment report 2012: Towards a new generation of investment policies.* Geneva: UNCTAD.

In order to develop national infrastructure and attract foreign direct investment, the government must also spend capital to maintain and expand the current energy, transportation, utilities, information and communication technologies (Enterprises, 2010).

Accurate research that will help improve the theory and practice of capital budgeting, that will subsequently improve the growth of developing countries, is essential.

i. Capital Intensity

Capital intensive companies require substantial amounts of both maintenance and expansionary capital expenditure to sustain their current operations and to expand into other markets, technologies and/or products.

The maintenance capital expenditure is used to maintain the company's fixed aging assets. Frequent failures resulting in production and thus sales reduction will be incurred by companies who do not sufficiently maintain their asset base. The manufacturing sector is capital intensive, requiring large amounts of capital investment long term assets to produce their goods and/or services (Higgins, 2009). Examples of these assets would be reactors, buildings, generators, distillation columns and compressors. The expected life of these assets normally ranges between 30 to 50 years.

ii. Capital Budgeting

This research is motivated by the work of Klammer (1973), when he reviewed the association of capital budgeting techniques back then with the firm's performance. The basis for his research was the perception that firms that utilised sophisticated capital budgeting techniques would eventually make better decisions and thus perform better than their counterparts.

Burns and Walker (2009) motivated by the "twenty year hiatus since the last thorough review of the capital budgeting survey literature" and "past appeals to the financial community by researchers to explore neglected areas of the capital budgeting process." pursued a survey study of capital budgeting practices. Capital budgeting was viewed as a four stage process which entailed:

- Opportunity Identification
- Development
- Selection
- and Control

iii. Capital Budgeting Practice Sophistication

The level of sophistication of capital budgeting practices is based on how closely the company's capital budgeting practices follow the four stage capital budgeting process defined by Burns and Walker (2009).

CHAPTER 2: LITERATURE REVIEW

2.1. Overview

This chapter introduces the historic and current research arguments on capital budgeting and the impact on financial performance. It then covers theories and arguments on the capital budgeting process, corporate financial performance, industry best practices and the capital budgeting practices in the public and private sector.

2.2. The Capital Budgeting Process

2.2.1. Identification

The identification stage comprises strategic planning, risk management and formalising idea proposal systems (Burns & Walker, 2009; Farragher, Kleiman, & Sahu, 2001).

2.2.1.1. Strategic Planning

Strategic planning is an action by senior management of the firm, where they scan the external opportunities and threats, and asses the organisation's internals strengths and weakness (Ireland et al., 2011). They then formulate a corporate vision which guides the strategy formulation and implementation processes. The firm gains a strategic advantage that results in above average returns if the process is successful. This is one of the initial and most important steps in the capital budgeting process. It is expected that all the surveyed companies, whether private or state-owned, utilise strategic planning as part of their capital budgeting process.

2.2.1.2. Risk Management

Capital expenditures are justified based on monetary benefits or potential losses. They are executed to maintain or grow the company's current profits by preventing losses.

In a replace or repair situation, where managers are faced with mutually exclusive options, they have to make the most economical decision in the face of uncertainty or risk.

Environmental, age and process factors lead to the deterioration of assets in the manufacturing chain (Ugarelli & Di Federico, 2010). It is simpler to accurately quantify the benefits of replacing equipment if the deterioration results in bad quality product, increased maintenance costs and frequent downtimes. In the case where equipment or an asset experiences catastrophic failure without any prior production losses, managers have to rely on models such as the life assessment model for optimal timing of the replacement (Ugarelli & Di Federico, 2010). Repairing the asset might also be an economically viable option to replacement. The business objective may be accomplished by selecting the best alternative (Higgins, 2009). Manufacturing companies rely on the effective and efficient operation of their assets to generate revenues. If these assets are maintained poorly, the company would lose its production capacity and subsequent loss of revenues.

2.2.1.3. Formal Idea Proposal and Submission Process

This process is of getting inputs from all levels in the organisation must be a formal, continuous effort and institutionalised by an incentive system that rewards individuals who generate good ideas (Burns & Walker, 2009).

2.2.2. Development of Capital Investments

The development phase is when the investment opportunity ideas are screened and converted to feasible proposals (Burns & Walker, 2009). A survey carried out by Chadwell-Hatfield, Goitein, Horvath, and Webster (1997) revealed that goverment mandated, essential and small projects were generally exempted from financial analysis.

Burns and Walker (2009) discovered that 78% of the surveyed firms utilised standardised computerised systems, forms, models, forecasts and worksheets. This is one of the most important steps of the development phase of capital budgeting as it ensures consistency.

2.2.3. Selection of Capital Investments

The following step is then to evaluate each of the investment opportunities and prioritise, as there are limited capital resources. Organisations will frequently employ discounted cash flow and risk analysis techniques to compare the different investment options

(Higgins, 2009). These are namely net present value (NPV), internal rate of return (IRR), benefit-cost ratio (BCR), payback period, accounting rate of return (ARR), mutually exclusive alternatives and real options (Higgins, 2009). Some organisations even turn to fuzzy logic for intuitively evaluating possibilities during capital budgeting (Collan & Liu, 2003).Burns and Walker (2009) state that this stage is the most prevalent in capital budgeting.

2.2.3.1. Non-discounted Cash Flow Methods

In the context of this research, discounting is the process of adjusting future cash flow (DCF) with an interest rate. The interest rate is determined by the cost of borrowing capital and/ or the risk of pursuing the investment. Non-discounted cash flow valuation methods do not take into consideration the time value of money and the cost of capital, thus the cash flows are not discounted (Shrieves & Wachowics JR., 2001).

i. Pay Back Period (PBP)

Payback period is the time the firm must wait before recovering its original investment from the projected cash flows (Higgins, 2009).

Equation 1: Pay Back Period

$$\mathbf{PBP_{Project\ A}} = \mathbf{years\ before\ recovery} + \frac{\mathbf{unrecovered\ cash\ flow\ at\ beginning\ of\ the\ year}}{\mathbf{cash\ flow\ during\ the\ year}}$$

Source: du Toit, E., Erasmus, P., Kotze, L., Ngwenya, S., Thomas, K., & Viviers, S. (2010). *Corporate finace: A South African perspective.* (G. Els, Ed.) Republic of South Africa: Oxford University Press Southern Africa.

Although PBP is one of the simplest and frequently used valuation methods it suffers from obvious weaknesses (Viviers & Cohen, 2011; Higgins, 2009). Burns and Walker (2009) attribute this preference to the ease of computation and indication of liquidity and risk. In practice, the PBP may still be chosen over more complicated discounted cash flow techniques, when there are two or more mutually exclusive investments with the similar long-term returns (Viviers & Cohen, 2011). The one with the shortest PBP would be chosen since the investment will be recovered sooner (Viviers & Cohen, 2011). The best approach is to use non-discounted techniques as a supplement to discounted cash flow

techniques (Verma, Gupta, & Batra, 2009). By selecting projects with shorter payback period, a firm would increase its free cash flow, and thus not have all or most of its capital tied to long-term investments. If not use as a supplement, the PBP would only indicate when the capital is paid back, and fail to indicate the subsequent cash flows and thus the overall value of the investment.

ii. Accounting Rate of Return (ARR)

Accounting rate of return is one of the most used valuation techniques in spite of its obvious flaws, due to the ease with which it is calculated (Higgins, 2009). Although this method is easy to calculate, it does not take into consideration the time value of money (Firer, Ross, Westerfield, & Jordan, 2009).

Equation 2: Average Rate of Return

$$ARR = \frac{Annual\ average\ cash\ inflow}{Total\ cash\ outflow}$$

Source: Higgins, R. C. (2009). *Analysis for financial management*. New York: Mc Graw Hill.

ARR may be used as a quick initial indicator of the investment's profitability, but is not recommended for use as a decision making criteria.

2.2.3.2. Discounted Cash Flow (DCF) Methods

Even though the non-discounted methods were simpler to compute, compound interest challenges, capital budgeting and valuation requirements have broadened the application of discounted cash flow methods (Shrieves & Wachowics JR., 2001).

i. Net Present Value (NPV)

One of the most popular DCF methods is the NPV (Verma, Gupta, & Batra, 2009). Higgins (2009) describes it as a measurement of how much richer the company is after undertaking and successfully executing an investment. Therefore the criteria for accepting or rejecting investments is that the NPV ≥ 0 or NPV < 0, respectively (Higgins, 2009). The NPV of a capital investment A may be represented as:

Equation 3: Net Present Value of an Investment

$$NPV\ (A) = \sum_{i=0}^{T} \frac{CFi(A)}{(1+r)^i}$$

Source: Troy, A. A. (2011). *Corporate finance demystified* (2nd ed.). New York: Mc Graw Hill.

Where:

- CF - is free cash flow from investment A
- i – is the year
- T – is the total number of years that the investment will generate cash flow
- r – is the discount rate used for investment A

Even though NPV is perceived as the more reliable selection criteria, the passive nature in which the assumptions are made and the NPV calculated are inadequate in the dynamic world (Burns & Walker, 2009; Trigeogis, 2005). Magni (2008) warns that using disequilibrium NPV will lead to non-additivity of two or more investment NPVs, which might result in subsequent arbitrage losses for NPV-minded managers. Selecting investments with the highest NPVs should increase the firm's net worth in the future.

It must be noted that decisions about the input assumptions when computing the NPV are done once with the assumptions that they will remain the same over the investment lifetime. Assumptions such as market demand, pricing, regulations, cost of capital and so on, will change overtime, making the investment less or more favourable.

ii. Internal Rate of Return (IRR)

The IRR was conceived between 1935 and 1936 by economists called Boulding and Keynes respectively (Magni, 2011). The net present value (NPV) of an investment decreases as the discount rate increases (Higgins, 2009). The IRR is the discount rate that reduces the NPV of the investment to zero.

Although IRR is widely used, in making accept or reject decisions, it still has well known shortcomings (Magni, 2011). These are, but not limited to inexistence, incompatibility with NPV and also multiple IRRs for some investments (Hartman & Schafrick, 2004; Hazen, 2003).

Hazen (2003) prescribed a procedural approach for handling the multiple-IRR problem. This method could also be applied to mutually exclusive projects.

iii. Profitability Index (PI)

The profitability index is the present value of all the future cash flows divided by the investment (Firer et al., 2009). Magni (2011) refers to the PI as the "cash inflows minus cash outflows divided by capital invested", which is also referred to as the aggregate return on investment (AROI).

The advantages of the PI is that it is closely related to the NPV, easy to comprehend and may be useful during capital rationing. When comparing mutually exclusive projects the PI may result in incorrect decisions (Firer et al., 2009). The PI is sometimes referred to as the Benefit Cost Ratio (BCR) (Higgins, 2009).

When a decision has to be made on which decision to choose over another, it is crucial that the analyst does not chose the investment with the higher FI, but a lower NPV as this may have high opportunity losses.

The PI or BCR may be calculated as:

Equation 4: Profitability Index

$$PI = \frac{Present\ value\ of\ net\ cash\ flows}{Present\ value\ of\ cash\ outflows}$$

Source: Higgins, R. C. (2009). *Analysis for financial management*. New York: Mc Graw Hill.

Where:-

- Present value of net cash flows = Cash inflows – Cash outflows
- Present value of cash outflows = Present value of invested capital

2.2.3.3. Real Option Valuation (ROV) and Fuzzy Logic

Discounted cash flow methods take the time value of money into consideration, but are static by design (Trigeogis, 2005). This means that the analysts have to make

assumptions that will more probably change overtime. Capital projects of strategic importance will last for duration of up to 60 years or more (Collan & Liu, 2003). It is highly likely that an investment that was profitable when the investment was approved and generates a loss during or after implementation.

Real options method offers flexibility which enables modular and dynamic management actions, as this maximises the value on large investments (Collan & Liu, 2003; Trigeogis, 2005). Due to the dynamic and uncertain nature of the global market place, Trigeogis (2005) suggested that by adopting a ROV approach, the firm will be able to:

- Defer an investment for a better opportunity in the future.
- Implement the investment in stages to reduce the risk.
- Expand the investment if the conditions are more favourable than expected.
- Temporarily shut down and start-up the operations in temporary unfavourable conditions arise.
- Abandon for salvage value of the investment if unfavourable conditions are more permanent.
- To switch inputs or outputs if supplies, markets or policies change.

For ROV to create value for the firm, the managers have to continuously check the investment, monitor market status and movement, develop trigger systems and ensure continuous learning of the biggest threats or opportunities to the trigger variables (Collan & Liu, 2003).

A quantitative analysis that was conducted by Miller (2011) on the active management of real options, observed that value of the ROV opportunity may change over time due to the risk posed by each asset in consideration before the option expires.

A survey study conducted by Block (2007) on Fortune 1,000 companies revealed that even though 85.7% of the respondents think that the decision is a key factor to shareholder wealth maximisation, only 14.3% use ROV. The number one reason for not using ROV was the lack of management support.

ROV may be implemented by intellegent software agents in an agent based capital budgeting decision support system (Collan & Liu, 2003). The advantage of using agents is that they can process both quantitative and qualitative data, they continously recieve inputs, are autonomous, they adopt easily, pro-active and work in the background.

2.2.3.4. Monte-Carlo® Simulation

A multitude of assumptions made when computing discounted or non-discounted cash flows results in a multitude of possible outcomes (Loizou & French, 2012). Loizou and French (2012) prescribe the following three steps to running a Monte Carlo simulation:

- Develop deterministic model for the valuation.
- Identify the variables with uncertainty and estimate probability distributions for each.
- Run the model and determine the range and probability of desired and undesired outcomes.

The disadvantage of using a Monte Carlo simulation is the required probability distribution input, which is not always available (Loizou & French, 2012). The historical data that is used to formulate the probability distributions is not always relevant. The major disadvantage of Monte Carlo simulation is the possible correlation between the independent variables cause positive or negative aggregation of the results.

2.2.3.5. Project Portfolio Management (PPM)

Firms often have a multitude of investments to manage simultaneously. Combinations of these investments are called investment or project portfolios. These complicated portfolios must be evaluated and managed by the decision makers (Vaillancourt, 2011). PPM is the application of heat maps and dashboards that simplify the analysis of portfolios for decision makers.

Muller, Martinsuo, and Blomquist (2008) propose the following techniques to optimise project and portfolio selection:

- Creating strategy tables
- Criterion lists
- Scoring tables
- Visual displays
- Portfolio management framework
- Optimisation frameworks

The key performance indicator in a PPM system must be strategically aligned, in order for the decision makers to select portfolios that are consistent with the corporate strategy (Vaillancourt, 2011). After PPMs are set up, it is empirical that they are team reviewed frequently to ensure strategic fit and relevance (Muller et al., 2008).

2.2.4. Control

The selected investments are implemented as soon as the capital has been approved (Seitz & Ellison, 1999). The project's performance is then monitored based on schedule, cash flow performance and within budget (Neale & Letza, 1996). Project managers are responsible for ensuring that the project is performing as expected.

A post commissioning audit is the last phase of capital budgeting. It is primarily applied as an organisational learning tool (Seitz & Ellison, 1999). This phase is only done after the project has been in beneficial operation for a certain period of time, after teething problems have been resolved (Neale & Letza, 1996).

2.3. Capital Budgeting Application/Practice

2.3.1. Capital Budgeting and Financial Performance

Companies create value by making investments (Seitz & Ellison, 1999), some short term and others long term. Before proceeding with capital investments, a company must first set its goals with respect to which market/s it wants to compete. The company must then

develop a strategy, firstly by analysing the macro-environment for threats and opportunities; and secondly by assessing the companies own strengths and weaknesses. How much capital is available to spend will restrict the number of investments a company can make (Neale & Letza, 1996).

Searching for viable investment opportunities can either arise as a result of creativity within the organisation (Seitz & Ellison, 1999) or a need to improve operations within the organisation. An example of this would be an aging critical asset which poses a risk of production losses to the business.

Both empirical and survey studies have been conducted in the capital budgeting field over the years. Klammer (1973) conducted a survey study to prove a causal relationship between the firm's performance and the sophistication of its capital investment procedures and practices. He surveyed 369 manufacturing firms to determine the level of sophistication of each firm. The unit of measurement for performance was the operating rate of return. Klammer (1973) also created dummy variables for the use or non-use of discounted and non-discounted valuation techniques, profit contribution, firm size, firm's risk and capital intensity of the firm. Regression analysis was then used to formulate a linear relationship between these factors. The result was that the accounting rate of return and discounting variables were found to have a negative performance relationship. One of the performance measurement used by Klammer (1973) was the return on assets, which describes the operating performance and not the effectiveness of the capital investments. Capital budgeting techniques were not as well developed in 1973, thus the analysis by Klammer (1973) is confined to the selection phase of the capital budgeting process.

Farragher, Kleiman, and Sahu (2001) conducted a similar study using the same performance measurement as Klammer (1973), but adjusting for firm size, operating and financial risk and incorporating strategic analysis and other variables. The result was a positive correlation between the level of sophistication of the capital budgeting practices and financial performance. Farragher et al., (2001) included strategic analysis, return/risk goals and cash flow forecasting as additional components of identification and development to the capital budgeting practices analysis. Although it was an improvement from the analysis by Klammer (1973), this analysis had also left out the crucial selection and control related component of capital budgeting which relate to the execution and

management of the capital budget. Companies may be good at the planning phase of capital budgeting, but not be able to execute and manage the long term investments.

The survey study by Block (2007) was only focused on the extent to which Real Option Valuation was being applied in the real world. Burns and Walker (2009) sited the lack of full coverage on all the capital budgeting process, namely identification, development, selection and control. Although it covered all capital budgeting processes, the study did not attempt to formulate a correlation between capital budgeting and financial performance. A South African study into applications of DCFs and theincorporation of risk into the capital budgeting process (Hall & Millard, 2009).

Since Hall and Millard (2009) a number of survey studies, including but not limited to Bennouna, Meridith, and Marchant (2010) and Viviers and Cohen (2011), have surveyed the South African and International application of the capital budgeting process. None of these studies have attempted to quantify the correlation between financial performance and the level of sophistication of capital budgeting practices, using the complete capital budgeting process and reliable performance unit of measurement.

2.3.2. Capital Budgeting and Capital Intensiveness

A study by Olawale, Olumuyiwa and Goerge (2010) concluded that small and thus, less capital intensive companies do not utilise sophisticated capital budgeting practices. One of the finding in this study was that this practice had a negitive influence on the less capital intensive companies. The reason sighted for the lack of application of sophisticated investment appraisal practises is the managers' lack of knowledge of these practices. Research into the capital budgeting practices of the mining companies, which are much more capital intensive, revealed that their managers were "highly qualified" and experienced (Vongai & van der Poll, 2012, pp. 9283). Although the managers' competence has led to the utisation of more sophisticated practices, they have not adapted to the utilisation of real options analysis; which factors in the manager's flexibility in making and during the long term investment.

2.4. Corporate Financial Performance

2.4.1. Average Sales Growth Rate (SGR)

The SGR is the year on year percentage change/increase of the company's revenues over at least two years. The average of the yearly values over a predetermined period of time is called the average sales growth rate.

A company that invests its capital more effectively will increase or maintain their revenue over a predetermine period of time. This is either through maintaining or expanding their asset base and investing in other acquisitions that will increase revenues. The average SGR may also be expressed as the company's average growth rate over a predetermined period of time (Covin, Green, & Slevin, 2006).

The disadvantage of the unit of measurement is that the firms in question may fall into one of the four categories prescribed by the Boston Consulting Group matrix, depending on the market share and market growth (van Assen, van den Berg, & Pietersma, 2009).
The aggregating nature of SRG also omits sales performance variations which might be insightful. SGR may be calculated as:

Equation 5: Sales Growth Rate

$$\boldsymbol{SGR} = \frac{\boldsymbol{Sales}(\boldsymbol{t}) - \boldsymbol{Sale}\ (\boldsymbol{t}-\boldsymbol{1})}{\boldsymbol{Sales}\ (\boldsymbol{t}-\boldsymbol{1})}$$

Where:-

- Sales (t) – represents the current financial year's revenues
- Sales (t -1) – represents the revenues from the previous financial year

The average SGR can then be calculated by taking an average of all the SGRs over the time period of interest.

2.4.2. Return On Invested Capital (ROIC)

The ROIC is a measurement of how effectively the company spends its capital expenditure. It is represented by the net profit after tax divided by interest bearing debt plus owner's equity (Firer et al., 2009).

Return on assets (ROA) is an indication of the firm's operating performance over a predetermined period (Firer et al., 2009). This does not represent how effectively the firm invested its capital, but rather how effectively the assets were operated, and cannot be used as a performance indicator.

Return on equity on the other hand is the measure of how well the shareholders did during a predetermined period (Firer et al., 2009). This measure also does not fully depict the firm's true capital investment performance as it decreases if one firm incures start-up cost to fund its investment and does not take cognicense of the leverage the firm took on to earn it's returns (Higgins, 2009). This may lead to incorrect conclusions about the firm's performance.

A unit of measurement refered to as return on capital employed (ROCE), return on net assets (RONA) or return on invested capital is ideal to measure performance decouples the effect of leverage as experianced in ROE and ROA (Fireret al., 2009, p. 65; Higgins, 2009, p. 56). ROIC is expressed as:

Equation 6: Return on Invested Capital

$$\boldsymbol{ROIC = \frac{EBIT(1 - Tax\ rate)}{Interest\ bearing\ dept + Equity}}$$

Source: Firer, C., Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2009). *Fundamentals of corporate finance* (4th South African Edition ed.). Maidenhead: Mc Graw Hill.

The challenge in using ROIC as a unit of performance is that may differ per sub-sector, since it may be much easier for some sub-sectors to realise the benefits per Rand invested.

2.5. Capital Budgeting in the Public and Private Sector

In this report, a private company refers to for-profit enterprises where the controlling stake is owned individuals, businesses and other independent entities. A state-owned company refers to an enterprise where the controlling stake is owned by the government.

Both private and state-owned enterprises (SOEs) must spend capital to sustain and expand their revenues. Private companies are steered and led by a board of directors,

who look after the investor's long term economic value. In South Africa, the SOEs are steered and led by the Department of Public Enterprises, based on government policies like the New Growth Path and the Industrial Policy Action Plan (Enterprises, 2010). This implies that state-owned enterprises face an additional challenge since they are expected to meet both economic and social goals of the country (Xu, 2010), as compared to private companies which are purely economic driven.

Infrastructure SOEs are entrusted with planning and developing transport, energy, water and information and communication technology (ICT), to support the country's economic development plans. According to the Department of Public Enterprises Strategic Plan 2011-2014, these SOEs have to potential to create a constraint or opportunities within their value chain.

CHAPTER 3: RESEARCH OBJECTIVES

3.1. Overview

This chapter discusses the objectives/proposition and questions posed by the research project. Subsequently, chapters five and six will follow the same sequence as this chapter.

3.2. Research Proposition

This research will be conducted in a sequential four step process. Based on the reviewed literature the research will:

i. Develop an appropriate instrument for ranking the level of sophistication of the companies' capital budgeting practices.

ii. Using the appropriate methods and units of measurement, determine the magnitude and direction of the correlation between corporate financial performance and the level of sophistication of capital budgeting practices for each unit of measurement.

iii. Identify differences in capital budgeting practices between the public and private sector.

iv. Identify capital budgeting practice sophistication differences in less and more capital intensive companies.

v. Identify capital budgeting practices that may improve financial performance in the manufacturing sector.

vi. Determine the correlation between capital expenditure, financial performance and the sophistication of the capital budgeting practices.

3.3. Research Questions

The main research questions this report sets to answer are:

i. How sophisticated are the capital budgeting practices in the South African manufacturing sector, and how does the level of sophistication vary between the companies?

ii. What is the correlation between the sophistication of the capital budgeting practices and the company's financial performance?

iii. Is there a difference in the capital budgeting practices of private and state-owned enterprises/public companies?

iv. Is there a difference in the capital budgeting practices of companies that are more and those that are less capital intensive?

v. What is the correlation between the sophistication of the capital budgeting practices and the type of capital expenditure?

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Overview

This chapter discusses in detail the chosen research approach, population, sample and the collection method. The data analysis methods and reasons for selecting them are also discussed in this chapter.

4.2. Research Methodology

This research adopted a positivism philosophy, as a highly structured approach was used to investigate the correlation capital budgeting practices and corporate financial performance (Saunders & Lewis, 2012). A deductive approach was taken in testing the application and correlation of sophisticated capital budgeting practices and corporate financial performance in the manufacturing industry. A descriptive study approach into the real world application of the capital budgeting process and techniques within the selected industry was achieved by exploring the latest literature on capital budgeting, analysing financial statements of the selected firms and completing surveys. A survey strategy was selected for this study to assess the application of capital budgeting within the selected industry. The selected study was cross-sectional for the primary survey data, but longitudinal for the secondary financial performance data as the secondary data was assessed over a three year period. Performance analysis over a long period was not pursued due to the time limit of the research deliverables and potential impact of the 2008 world economic crisis, which would show declining performance figures for some of the companies and influence the results.

4.3. Research Population

The proposed research population comprised manufacturing firms operating in the Republic of South Africa.

4.4. Unit of Analysis

A unit of analysis is a major entity that is being analysed in the research study (Saunders & Lewis, 2012). Examples of these are individuals, items, groups, companies, countries. This study has two units of analysis, companies and sectors. This research examines the capital budgeting practices within these units of measures.

4.5. Research Sample

A combination of stratified sampling and convenience sampling methods was used to determine the manufacturing and/or capital intensive companies to be surveyed and subsequently acquired and analysed the financial statements, of the companies that participated, for financial performance (Saunders & Lewis, 2012; Shaughnessy, Zechmeister, & Zechmeister, 2012).

The sample was stratified based on capital intensiveness, survey response and the availability of audited financial statements. The sample comprised of 65 private and state-owned manufacturing companies listed on the JSE. These include the following industries, as classified on the JSE listing (Exchange, 2012):

- Oil and Gas – industry code: 0001
- Basic Materials – industry code: 1000
- Industrials – industry code: 2000
- Consumer Goods – industry code: 3000
- Health Care – industry code: 4000
- Telecommunications– industry code: 6000
- and Utilities – industry code: 7000

4.6. Data Collection

Data was collected using two methods, namely surveys and financial statement.

A pilot test on the web based survey was run before the survey requests were sent out, to rectify any potential problems that may arise during the survey completion. This allowed for sufficient time to rectify problems and optimise the survey (Saunders & Lewis, 2012). A web based survey hyperlink was sent by electronic mail to the respondents. A consent letter was attached to the introductory electronic mail, explaining what the research is about and also briefing them on the information privacy plan. An electronic mail was after a week to thank the respondents who have completed the questionnaire and encourage others to complete the questionnaire. The expected response rate for the survey was 46.2%, as it would yield a sample of 30 firms.

The financial statements were sourced primarily from McGregor BFA ® and the company's web site or via direct request for the firms who had responded to the survey questionnaire.

4.6.1. Data Collection Instrument for Financial Performance Indicators

The financial information for each firm was entered into a processing excel file that computed the desired financial performance indicators i.e. Average ROIC, Exponentially smoothed ROICs and Average SGR. These values were averaged from 2009 to 2011, as the instantaneous measurements of the financial indicator may lead to incorrect conclusions due to once-off incidents. This timeline was selected to also showcase how well each company recover from the 2008 economic crisis.

4.6.2. Data Collection Instrument for Capital Budgeting Sophistication Level

An internet based survey was sent to the Chief Financial Officers, Financial Directors, Specialists and/or Other Managers who are involved and knowledgeable in the firm's capital budgeting process. The survey questionnaire mostly had close ended questions and thus only required yes and no responses. Each response was weighted according to perceived level of importance as illustrated in **Table 1**. The questionnaire was based on

the modified format by Burns and Walker (2009); Farragher et al. (2001) and Klammer (1973).

Table 1: Capital Budgeting Practices Questionnaire Scoring

Capital Budgeting Practice	Weighting (%)
Identification Phase	**25**
Strategic Planning	15
Risk Management	5
Formal Idea Proposal and Submission Process	5
Development Phase	**25**
No projects exempted from phase	5
Formal screening process	5
Formal data gathering	5
Standardised models and procedures	5
Information system cash flow forecasts	5
Selection Phase	**25**
Payback period (PBP)	2
Accounting rate of return (ARR)	2
Net present value (NPV)	2
Internal rate of return (IRR/MIRR)	2
Profitability index (PI) or Benefit cost ratio (BCR)	2
WACC is risk adjusted for each project type	2
Real Options and Fuzzy Logic	3
Monte-Carlo® Simulation	5
Project Portfolio Management	5
Control Phase	**25**
Formal project management framework	5
Financial control mechanism	5
Post audits on projects	5
Performance appraisals linked to project	5
Formal CB knowledge management system	5
TOTAL	**100**

4.7. Data Analysis

4.7.1. Corporate Performance Data Analysis

Corporate financial performance data for the past three years was computed from the financial statements of the companies that responded to the survey questionnaire. The performance figures were averaged, exponentially smoothed (smoothing coefficient of 0.1 and 0.5) for the three year, as to give more weight to the current year's results (Klammer, 1973).

4.7.2. Survey Data Analysis

Depending on the survey responses, the weights were added to produce a single figure. Firms were scored between zero and 100%, the latter being very sophisticated. The 50% median was used to segregate non-sophisticated (0 – 50%) and sophisticated (51% to 100%). For future analysis, the mean of the data points was used as the mid-point. For constructing the scatter plot, each surveyed company's capital budgeting practice sophistication level (%) was plotted against each of the identified financial performance indicator on an X-Y axis.

4.8. Research Limitations

4.8.1. Financial Performance Limitation

Analysing financial performance data for only 3 year limited the long term view of the firm's performance. This may result in biased performance results, depending on which firms were more affected by the world economic crisis in 2008.

4.8.2. Survey Limitations

A lack of full representation of the manufacturing industry may yield results that are not valid due to a lack of representation from the whole population. This might be caused by limited access to some of these industry experts. The respondents might also present their firms in a good light, and thus skew the results (Saunders & Lewis, 2012).

The time when the surveys are completed and other external factors might influence the respondent's perception and judgement. To avoid any false responses, the researcher has ensured that the questions are clearly understood and asked in a consistent manner.

CHAPTER 5: RESULTS

5.1. Overview

This chapter presents the actual process and sequence of events through which the results were obtained. The results are then presented in line with the research questions. Two types of data were sourced to answer the research questions, namely primary and secondary data.

5.2. Primary Data

Primary data is data that is observed and recorded by the researcher (Saunders & Lewis, 2012). These data are recorded closer to the event and thus are the closest to the truth (Walliman, 2011). A survey methodology was chosen to collect capital budgeting practices and procedures as primary data. Although this is a more challenging approach, it was chosen due to the lack of publically available data on the capital budgeting processes and practices in companies. More accurate information could have been collected through interviews, but this approach was not selected due to the large number of interviews required to complete the study and availability of the interviewees.

5.2.1. Data Collection

After receiving ethical clearance, an account was established with Survey Monkey ® for primary data collection. The designed survey was then transferred to Survey Monkey ®. Numerous test questionnaires were designed and distributed to colleagues and friends to explore the functionality, optimisation and possible errors or bugs. Data from the test questionnaires was then collected via the different options available to determine the optimum data collection and thus analysis procedure.

The final survey questionnaire was created based on comments and suggestions of colleagues. One of the significant comments from the test surveys sent colleagues was to include an introductory paragraph which introduced the survey participant to the concept and context of capital budgeting process.

To create a clear link between the capital budgeting practices and individual company financial performance, the participant had to state which company they work for. This required the addition of the question “Please type your company name?” to the survey questionnaire. This was set as a compulsory question so that the survey participants would not skip this question.

The other concern that appeared during the survey questionnaire development was the sensitivity of companies to sharing their capital budgeting information with outside parties. Companies execute their corporate and business strategies by committing scarce capital resources to long term investments that will yield returns in the future. Capital budgeting decisions can potentially reveal the companies’ strategy to their competitors. This meant that only high level questions could be asked in the survey questionnaire. Questions such as “What is your company’s weighted average cost of capital?” and “What is your company’s actual internal rate of return?” could therefore not be asked.

The selected data collection method was the survey link that was part of a consent letter, in **Appendix 1**, sent to each of the identified participants.

5.2.2. Data Filtering

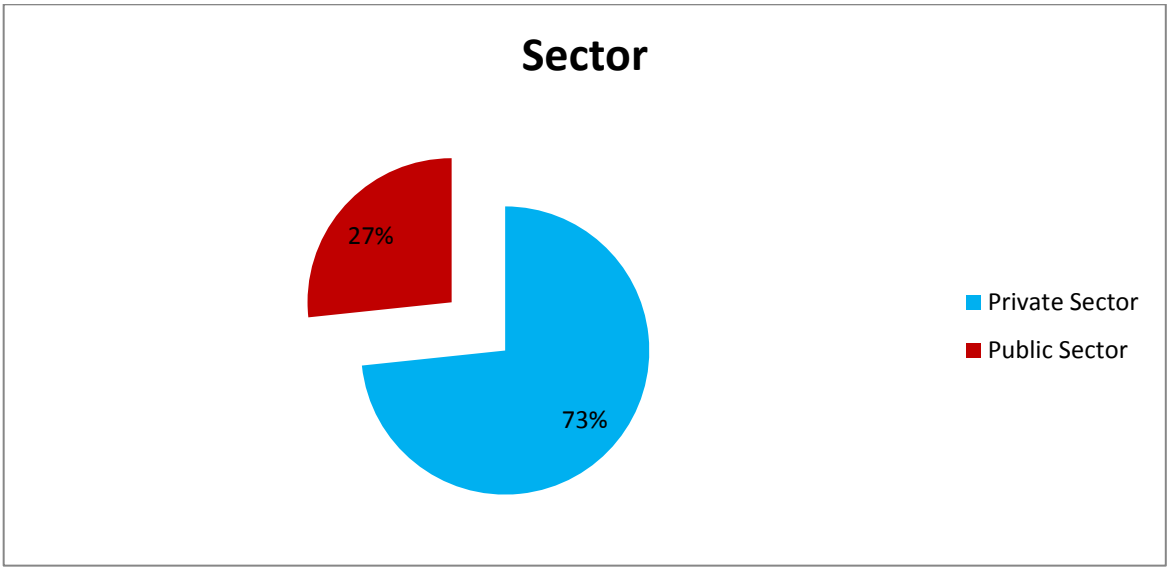
A total of 42 contacts could be established in the 65 companies initially identified. The total number of survey questionnaire responses was 19 compared to the 42 requests sent out electronically. The response rate for this survey study was 45%. Only one of the 19 respondents did not complete the survey questionnaire. The 19 respondents were from 15 different companies.

Two to three responses were received from some of the companies. A few of these responses had conflicting responses to the survey questions. This posed a challenge to the analysis of this data, as there was no way of knowing which response was more accurate. The level of sophistication was calculated for each of the response individually. Responses from the same company were then averaged to give the final level of sophistication of capital budgeting practices.

5.2.3. Descriptive Survey Results

Of these 15 companies, 4 were from the public sector and 11 from the private sector as depicted in **Figure2**.

Figure 2: Survey responses per sector



Out of the 15 companies, four did not have a dedicated capital budgeting department. The majority, namely 75%, of the companies that did not have capital budgeting departments are in the private sector and 25% in the public sector as illustrated in **Figure 3 and 4**.

Figure 3: Formal capital budgeting department

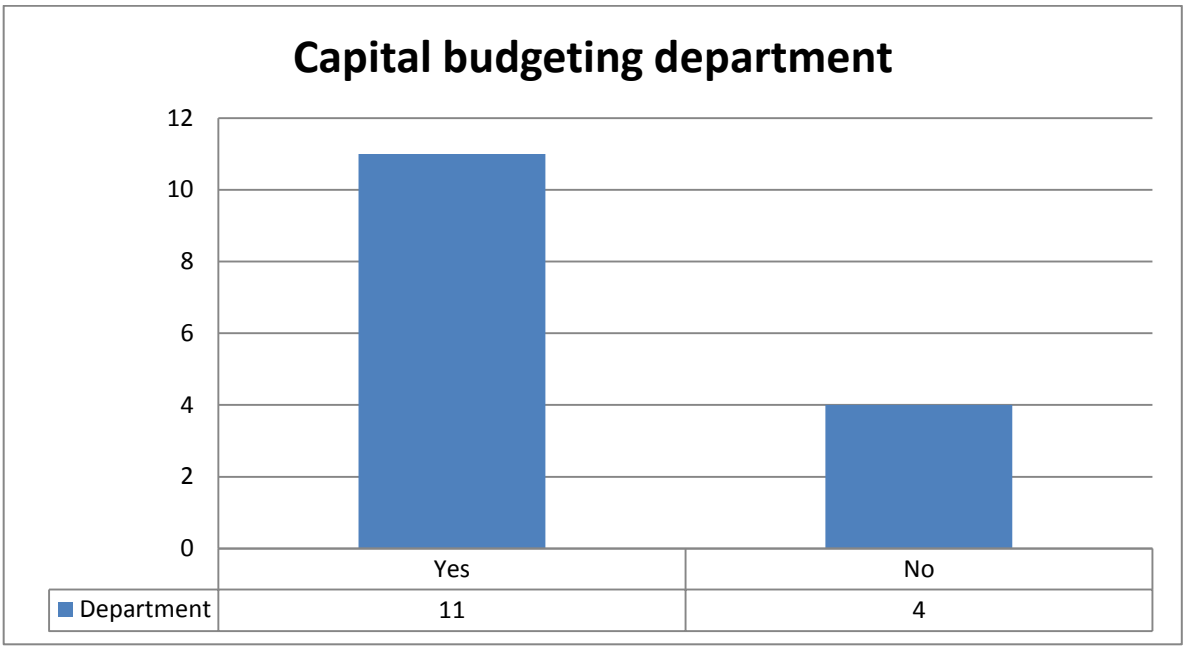
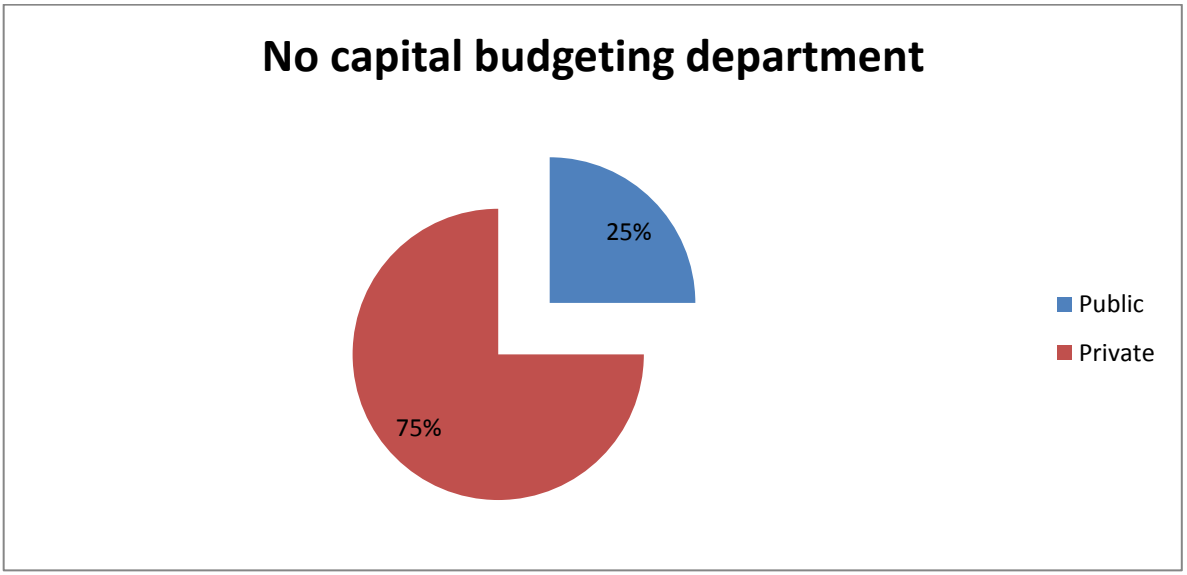
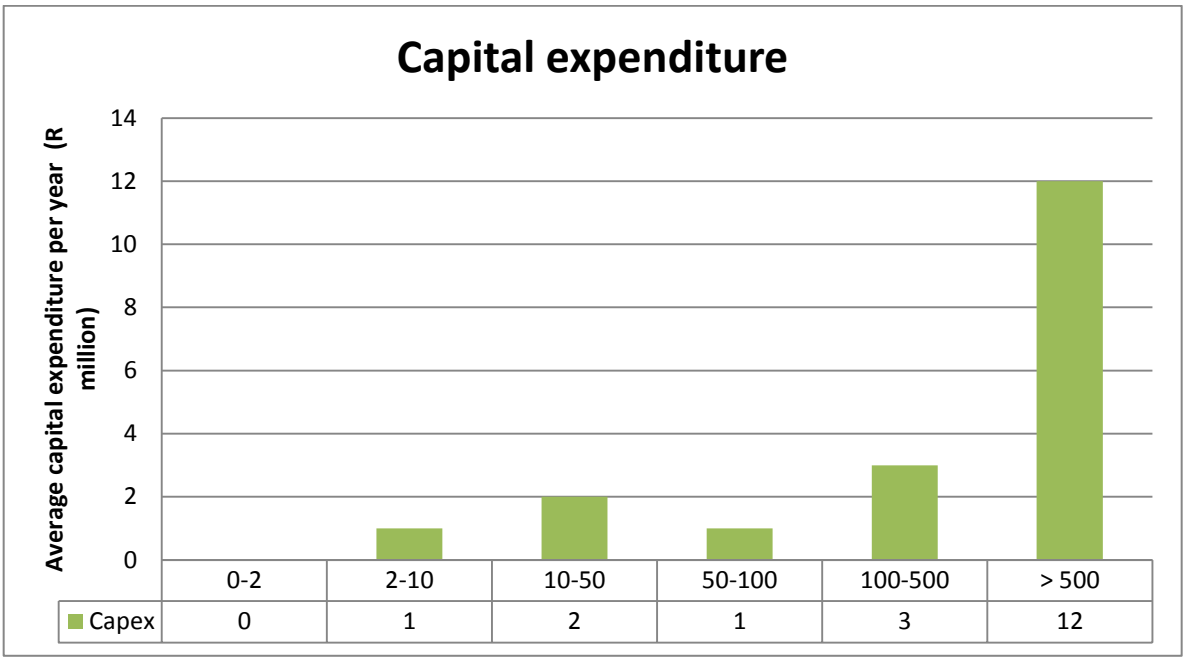


Figure 4: No capital budgeting department per sector



The 19 respondents were then asked to indicate, using a 6 bin scale, how much capital per annum is expended by their companies. This yielded a negative skewed frequency distribution in **Figure 5**, indicating that most of these companies are capital intensive.

Figure 5: Average capital expenditure per year



Both **Figure 6 and 7** illustrate a similar capital expenditure distribution between the Public and Private sectors. The majority of the surveyed companies are capital intensive since the average annual capital expenditure of more than R500 million. The least capital intensive company surveyed had an average annual capital expenditure of between R2 and 10 million.

Figure 6: Public sector capital expenditure distribution

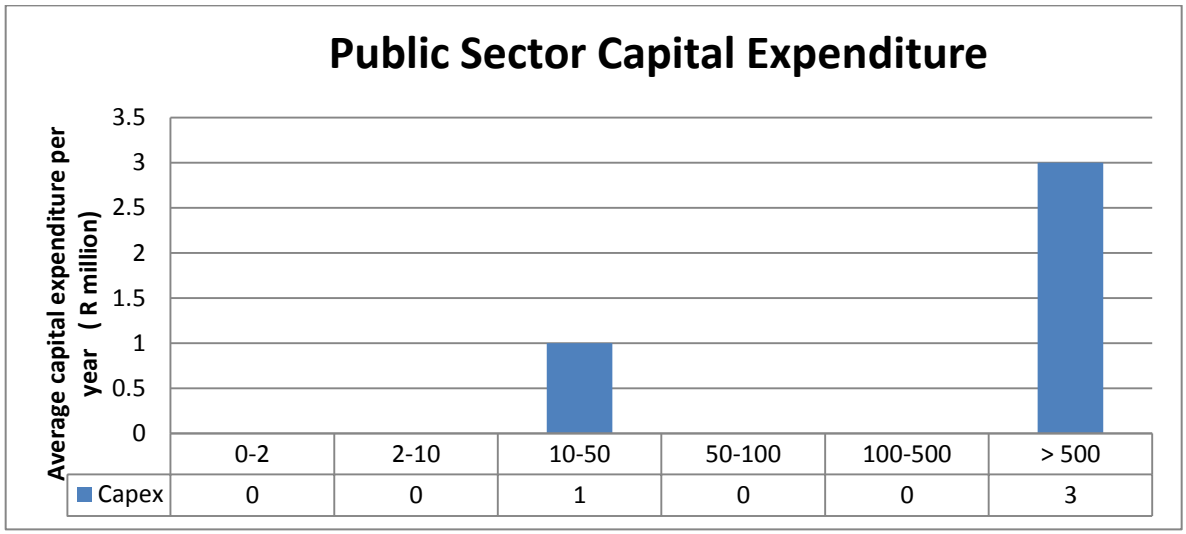
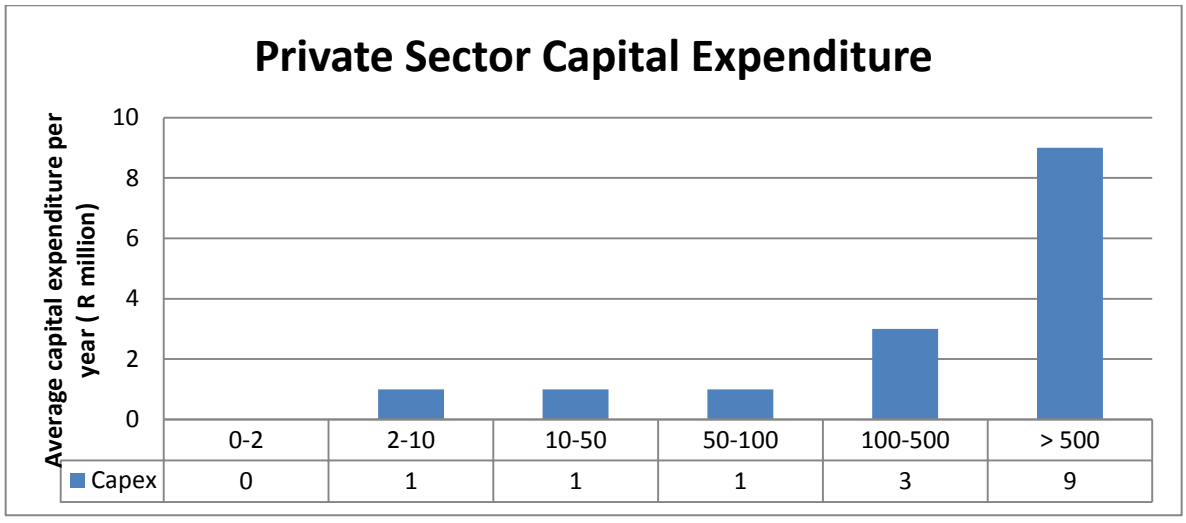


Figure 7: Private sector capital expenditure distribution



5.3. Secondary Data

Secondary data is data that is not originally observed and recorded by the researcher (Saunders & Lewis, 2012). The secondary data sourced was the financial statements of the sample companies. The financial statements included income statements, balance sheets and cash flow statements.

5.3.1. Collection

The financial data was collected using the McGregor BFA ® database. A company search was conducted for all the companies that completed the survey.

5.3.2. Data Filtering

Out of the 15 companies that participated and completed the survey questionnaire, only 14 companies' financial statements were analysed. This was due to the participation of a company that is neither listed nor government owned; thus no financial information was available for analysis. There were also a number of challenges in the analysis of the 14 companies.

Some of the companies' financial statements were not on the McGregor BFA® database. One of these companies' financial statements was represented in Dollars. Using the yearly average Rands/Dollar exchange rates given on the financial statements, the results were converted to Rands for data analysis.

Another financial reporting challenge was due to a change in financial year end of one company, from December to March. Their financial reports were last released in December 2008 before being released again in March 2010. The March 2010 financial results of interest for 2009 were calculated by dividing the 2010 results by 15 months to give the monthly results (assuming a straight line increase from month 1 to 15). The monthly result was then multiplied by 12 months.

5.4. Calculated Capital Expenditure Data

Companies spend capital to either sustain their current operations or to expand as discussed in chapter two. To fully comprehend the nature of capital expenditure (CAPEX) of each company, data was collected from the McGregor BFA® and other financial statements. The challenge, with getting accurate maintenance and expansionary capital expenditure figures, is that not many companies disclose the figures in their yearly results.

The “Fixed Assets Acquired” line item on the McGregor BFA® data was used as the total capital expenditure per year. This figure represents the long term capital investments per annum.

The maintenance capital expenditure was derived from an approximation of depreciation plus amortisation as illustrated in **Equation 7**. This stems from assumption that a sustainable business must spend capital that is at least equivalent to the rate of depreciation and amortisation of its tangible and intangible assets, respectively (Jun, 2009).

Equation 7: Approximation of maintenance CAPEX

$$\boldsymbol{Sustain\ or\ Maintain\ CAPEX \approx Depreciation + Amortisation}$$

Source: Jun, J. (2009, June 19). *Valuation-methods: Old school value*. Retrieved 11 05, 2012, from Old School Value Web site: http://www.oldschoolvalue.com

The expansionary CAPEX was then calculated by subtracting the maintenance CAPEX from the total CAPEX as illustrated in **Equation 8**.

Equation 8: Calculating expansionary capital

$$\boldsymbol{Expansionary\ CAPEX = Total\ CAPEX - Maintenance\ CAPEX}$$

The percentage expansionary and maintenance CAPEX figures were calculated to identify which companies were investing more of their capital on growth and/or sustaining their current operations as illustrated in **Table 2**.

Table 2: Types of capital expenditure

Average total CAPEX per annum (R million)	Average maintenance CAPEX per annum (R million)	Average expansionary CAPEX per annum (R million)	2011 total CAPEX per annum (R million)	Average maintenance CAPEX per annum (%)	Average expansionary CAPEX per annum (%)
1 272.7	1 349.3	(76.7)	1 190.0	106.0%	-6.0%
1 135.5	805.2	330.3	197.1	70.9%	29.1%
6 734.7	4 141.7	2 593.1	6 643.0	61.5%	38.5%
176.3	105.9	70.4	147.6	60.1%	39.9%
7 356.3	3 970.0	3 386.3	4 333.0	54.0%	46.0%
8 931.3	4 473.0	4 458.3	7 504.0	50.1%	49.9%
685.3	315.0	370.3	817.8	46.0%	54.0%
18 756.0	6 577.7	12 178.3	24 488.0	35.1%	64.9%
13 420.7	4 549.7	8 870.9	14 484.8	33.9%	66.1%
21 018.7	5 878.7	15 140.0	23 174.0	28.0%	72.0%
1 533.7	427.3	1 106.4	875.0	27.9%	72.1%
335.2	87.5	247.8	433.0	26.1%	73.9%
45 324.0	6 027.0	39 297.0	44 325.0	13.3%	86.7%
5 498.7	298.0	5 200.7	5 293.0	5.4%	94.6%

5.5. Financial Performance Results

The financial performance of companies that participated in the research survey was computed using four units of measurement, namely the average sales/revenue growth rate (SGR), average return on invested capital (ROIC), and exponentially (at 0.1 and 0.5 factor) smoothed ROIC as shown in **Table 3.**

Table 3: Secondary data results

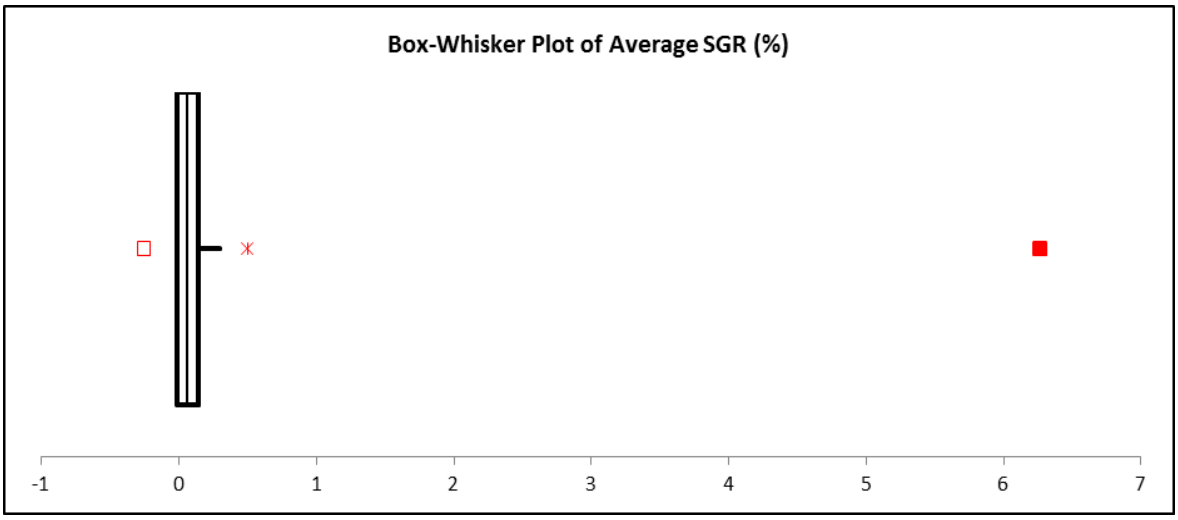
Company Code	Average SGR (%)	Average ROIC (%)	Exponentially Smoothed ROIC – 0.1 Factor (%)	Exponentially Smoothed ROIC – 0.5 Factor (%)
1	11.1	1.8	4.7	3.1
2	18.3	11.6	23.3	15.6
3	5.6	23.9	45.5	27.5
4	-1.2	26.1	46.7	32.5
5	626.4	7.9	12.2	11.2
6	13.8	12.4	21.5	15.3
7	2.6	626.4	29.1	21.0
8	-1.2	24.4	47.8	28.7
9	-25.3	45.2	114.1	65.7
10	6.0	19.6	42.9	26.3
11	7.0	24.3	37.9	30.8
12	29.6	-1.2	0.2	3.0
13	-1.3	6.2	8.7	6.6
14	6.3	5.5	10.2	6.5

5.5.1. Average Sales Growth Rate (SGR)

A box-whisker plot is an instrument that graphically displays a number of central tendency and dispersion characteristics of a data set (Weiers, 2008). It enables the researcher to effortlessly identify the range, skewness, extreme data/outliers, and the symmetric nature of the data.

The box-whisker plot, in **Figure 8**, performed on the SGR data yields a very small interquartile range (IQR) and outliers (mild and strong). The strong outlier is due the exceptional items in 2009 on one of the sampled companies' income statement.

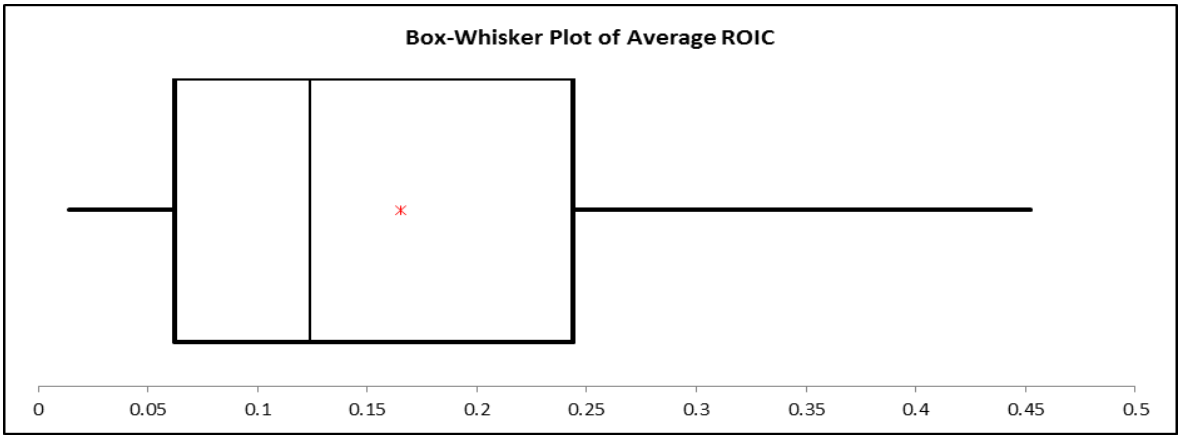
Figure 8: Average sales growth rate box-whisker plot



5.5.2. Average Return on Invested Capital (ROIC)

The box-whisker plot, in **Figure 9**, performed on the average ROIC data yields a well distributed interquartile range (IQR) and no outliers.

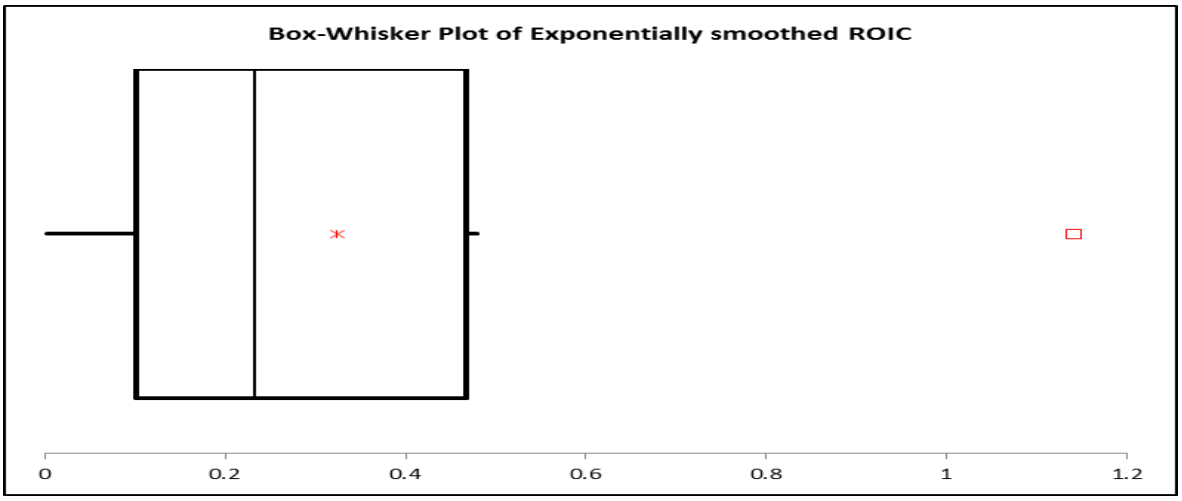
Figure 9: Average return on invested capital box-whisker plot



5.5.3. Exponentially Smoothed Return on Invested Capital – Factor 0,1

Exponentially smoothing the ROIC data by a factor of 0.1 was expected to smooth the data even further, but **Figure 10** illustrated a box-whisker plot with one mild outlier.

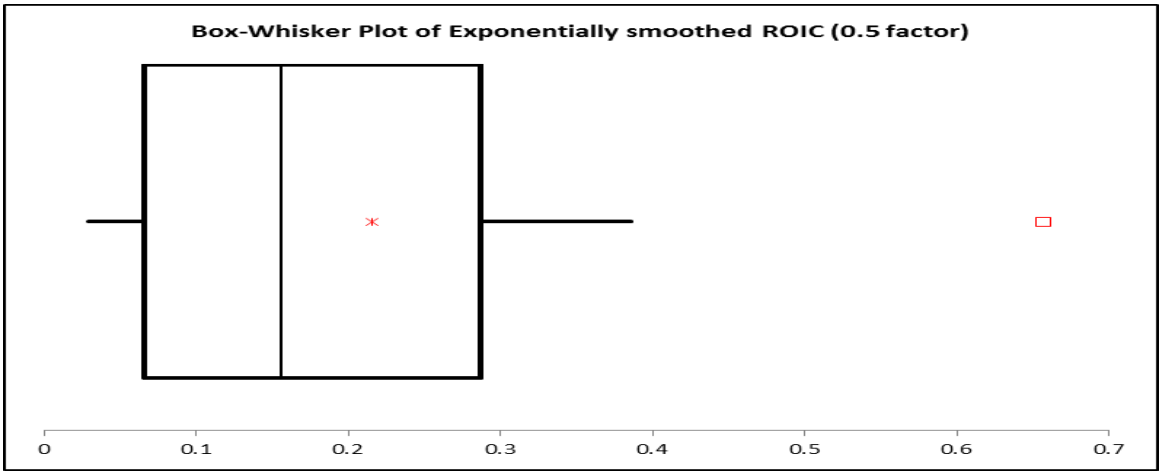
Figure 10: Exponentially smoothed ROIC (0.1 factor) box-whisker plot



5.5.4. Exponentially Smoothed Return on Invested Capital – Factor 0,5

Exponentially smoothing the ROIC data with a smoothing factor of 0.5 has the same effect as factor 0.1, but reduces the data range substantially as illustrated in **Figure 11**.

Figure 11: Exponentially smoothed ROIC (0.5 factor) box-whisker plot



A comparative scale view of the box-whisker plots is illustrated in **Appendix 2**.

5.6. Level of Sophistication of Capital Budgeting Practices

The survey results were analysed and utilised to calculate a level of sophistication for each of the companies that completed the survey questionnaire as shown in **Table 4**. The individual survey questions and responses are illustrated in **Appendix 3**.

Table 4: Capital budgeting practices sophistication results

Company Code	Sector	Capital Budgeting Sophistication (%)
1	Private	75
2	Private	79
3	Private	86
4	Private	76
5	Private	59
6	Private	95
7	Private	76
8	Private	64
9	Public	86
10	Private	84
11	Private	81
12	Public	81
13	Public	81
14	Public	81

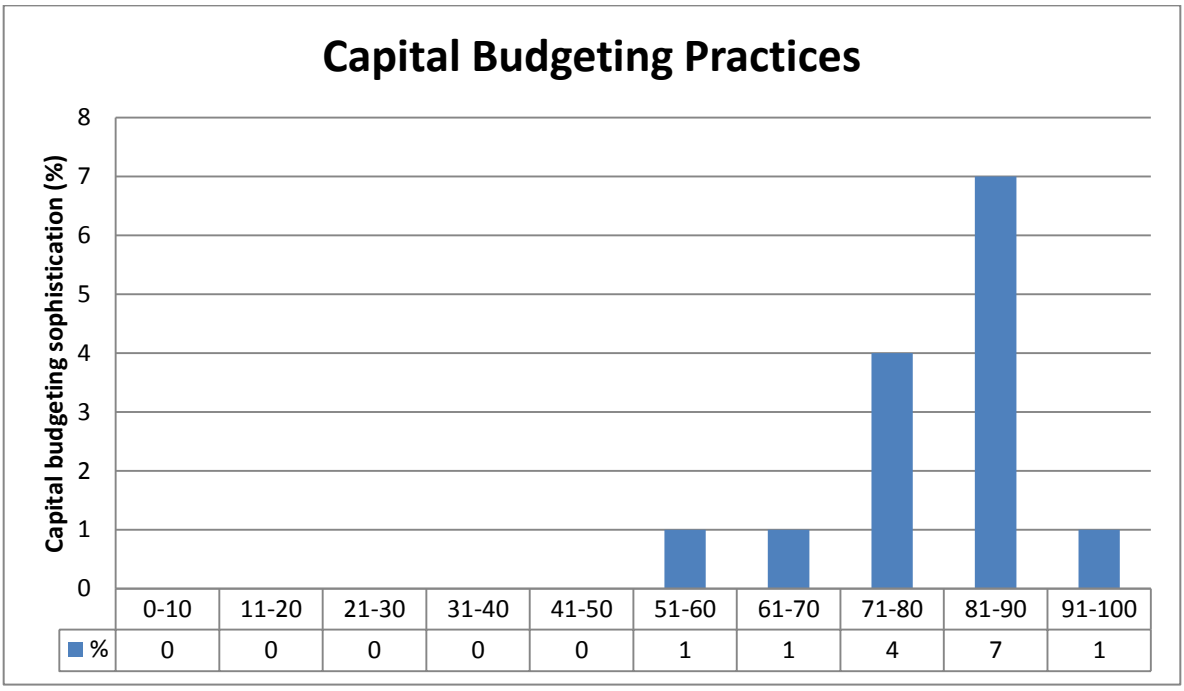
The resulting descriptive statistical analyses of the sophistication level of capital budgeting practices are illustrated in **Table 5.**

Table 5: Descriptive statistics from the level of sophistication of capital budgeting practices

	N	Minimum	Maximum	Mean	Median	Std. Deviation
Capital Budgeting Process	14	59%	95%	79%	81%	9.1%
Valid N (list wise)	14					

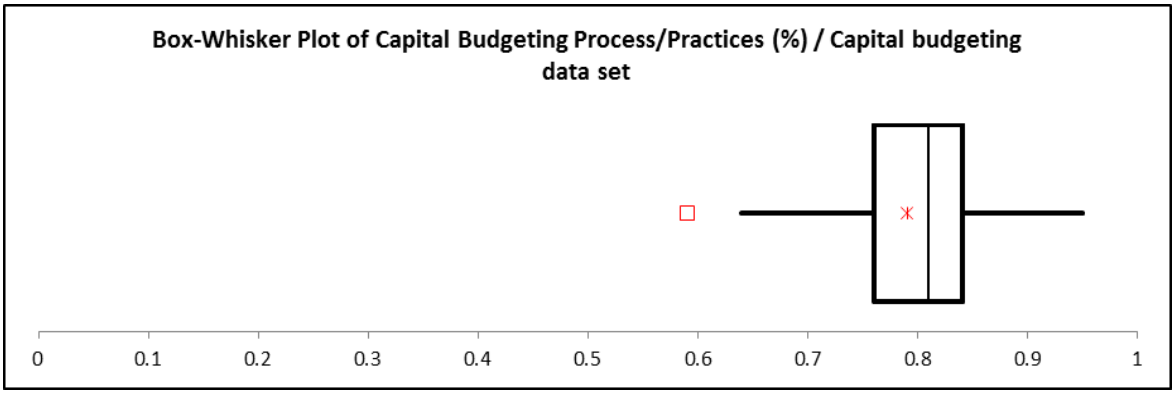
When segmented into 10 bins, the data appeared normal and negative skewed with a skewness of -0.785, as illustrated in **Figure 12.** The variability of the data was low, since it had a range of only 36%.

Figure 12: Capital budgeting sophistication distribution



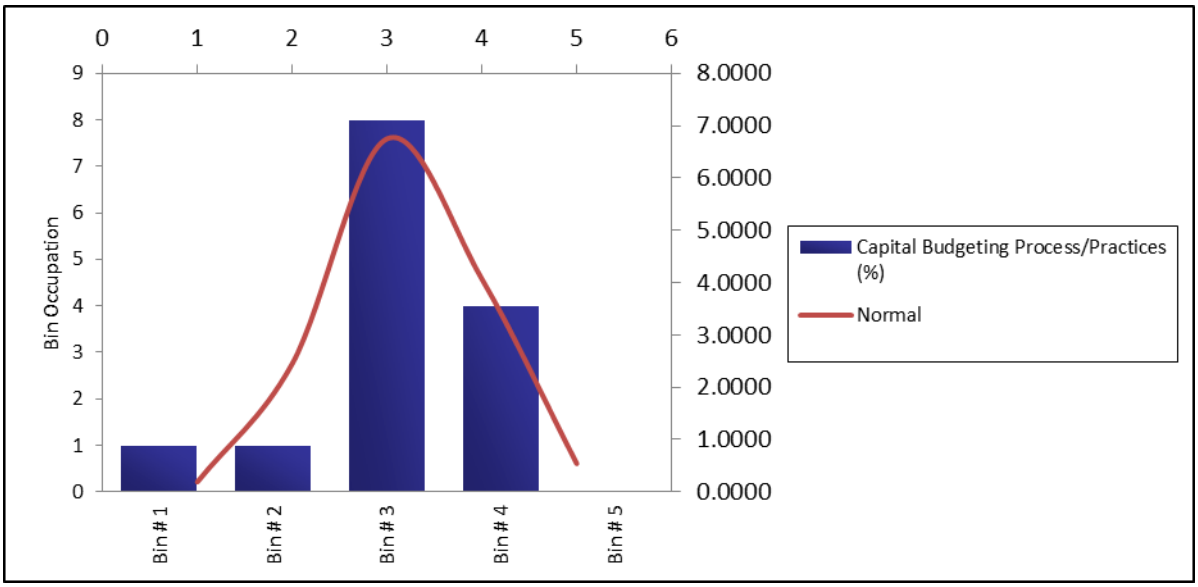
The box-whisker plot in **Figure 13** further revealed an outlier (59%) in the data. This was a mild outlier as the distance to the first quartile was between 1.5 and 3.0 x interquartile range (IQR) (Albright, Winston, & Zappe, 2009).

Figure 13: Capital budgeting sophistication box-whisker plot



A Chi-Square normality test was conducted using StatTools ® to ascertain that the data is normal. The graph in **Figure 14** illustrates the comparison between the observed and expected (normal) data frequencies.

Figure 14: Chi-Square normality test distribution



In **Table 6**, a Chi-Squared statistic of 5.1 represents a small difference between the observed and expected values. The *p-value of 0.079 represents the confidence that, of other samples from the same population, only 8% would exhibit a worse normality than the examined sample. This test is only effective for sample sizes of at least 80 (Albright, Winston, & Zappe, 2009).

Table 6: Chi-Squared normality test

Chi-Square Test	**Capital budgeting data set**
Mean	0.79000
Std Dev	0.09055
Chi-Square Stat.	5.0727
p-Value	*0.0792

Chi-Squared Bins	**Bin Min**	**Bin Max**	**Actual**	**Normal**	**Distance**
Bin # 1	-Inf	0.59000	1	0.1904	3.4424
Bin # 2	0.59000	0.71000	1	2.4485	0.8569
Bin # 3	0.71000	0.83000	8	6.7502	0.2314
Bin # 4	0.83000	0.95000	4	4.0701	0.0012
Bin # 5	0.95000	+Inf	0	0.5407	0.5407

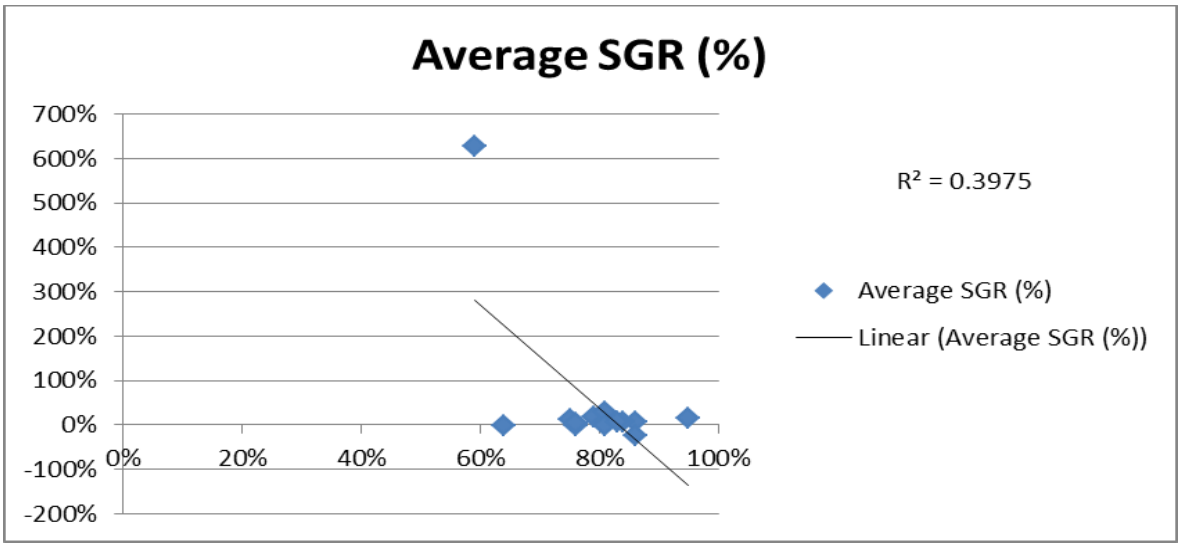
5.7. Correlation between Financial Performance and Sophistication of Capital Budgeting Practices

A correlation analysis was performed between the observed capital budgeting practice sophistication and each one of the selected units of measurement for financial performance. The sign and the R^2 of the correlation were studied. Statistically significant results were not expected, due to the small size of the sample.

5.7.1. Average Sales Growth Rate Correlation

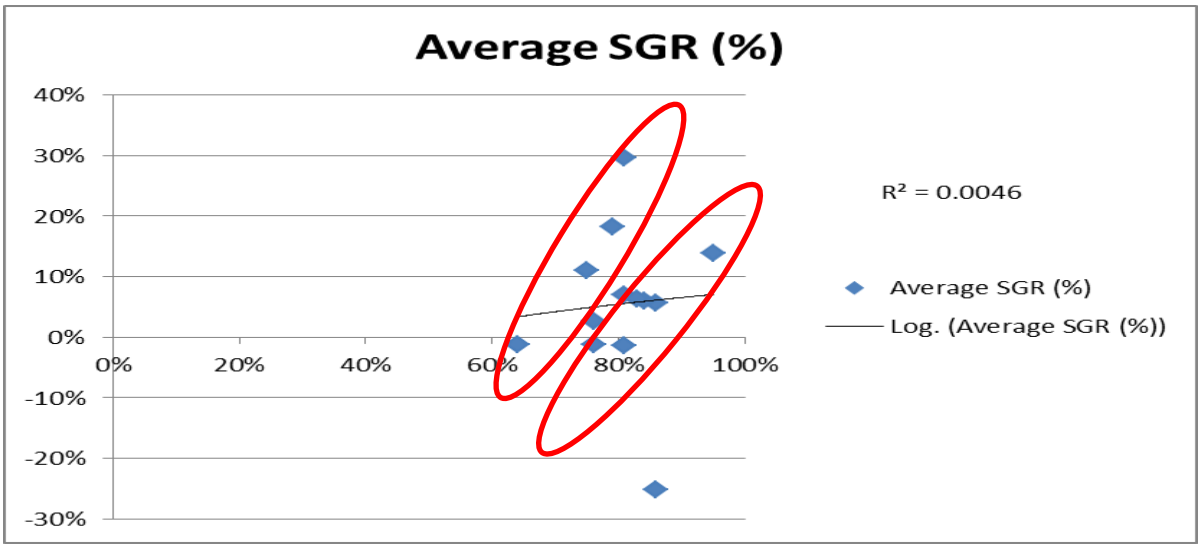
A correlation was performed between the average SGR and capital budgeting practices data. The average SGR outlier was not removed for the first correlation analysis. This resulted in a negative correlation with an $R^2 = 0.40$ as illustrated in **Figure 15**.

Figure 15: Correlation between average SGR and Capital budgeting practices with outlier



The above analysis was repeated, without the outlier. The illustration in **Figure 16** showed a less significant positive correlation with $R^2 = 0.01$. Even though there was no significant correlation, a few trends were observed on the scatter plot on **Figure 16**.

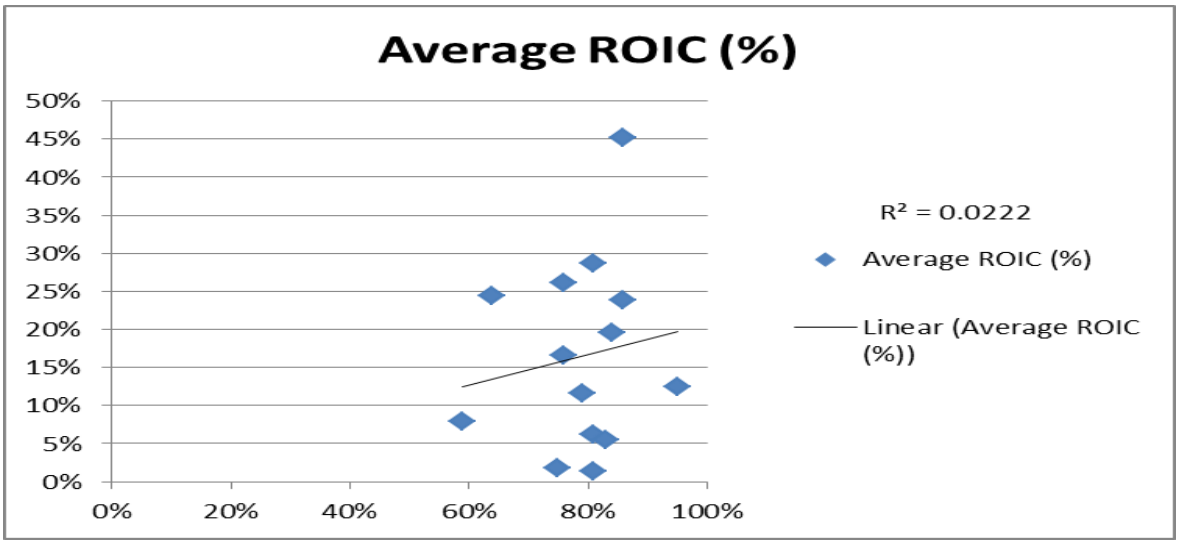
Figure 16: Correlation between average SGR and Capital budgeting practices without outlier



5.7.2. Average Return on Invested Capital (ROIC) Correlation

A correlation was performed between the average ROIC and capital budgeting practices data. The average ROIC did not illustrate any outlier, thus no data was removed from the correlation analysis. This resulted in an insignificant positive correlation with an R^2 = 0.02 as illustrated in **Figure 17**.

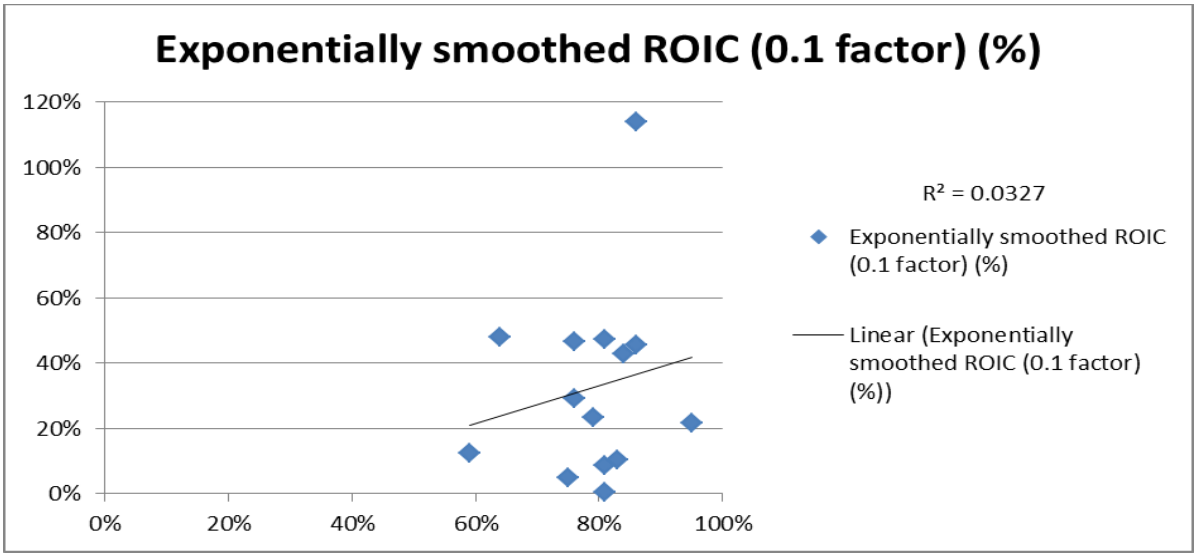
Figure 17: Correlation between average ROIC and Capital budgeting practices



5.7.3. Exponentially Smoothed Return on Invested Capital (ROIC) (0.1 Factor) Correlation

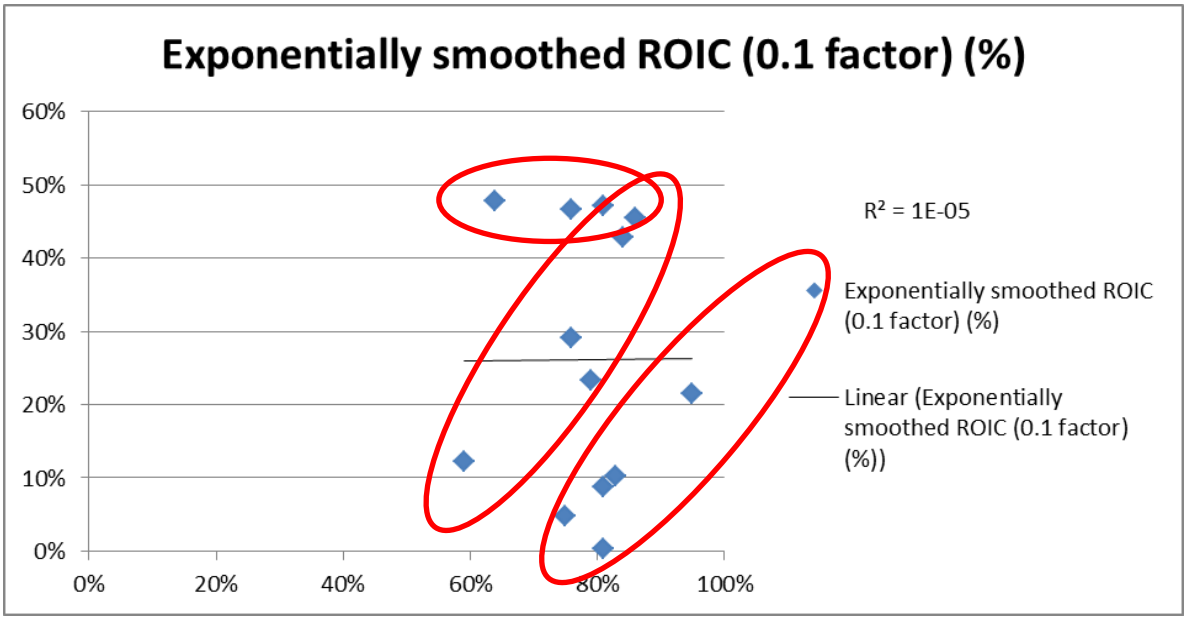
A correlation was tested between the average SGR and capital budgeting practices data. The outlier was not removed for the first correlation analysis. This resulted in an insignificant positive correlation with an R^2 = 0.03 as illustrated in **Figure 18**.

Figure 18: Correlation between exponentially smoothed ROIC (0.1 factor) and Capital budgeting practices with mild outlier



The above analysis was repeated, without the outlier. The illustration in **Figure 19** showed a more insignificant positive correlation with R^2=1E-05 Even though there was no significant correlation, a few trends were observed on the scatter plot on **Figure 19**.

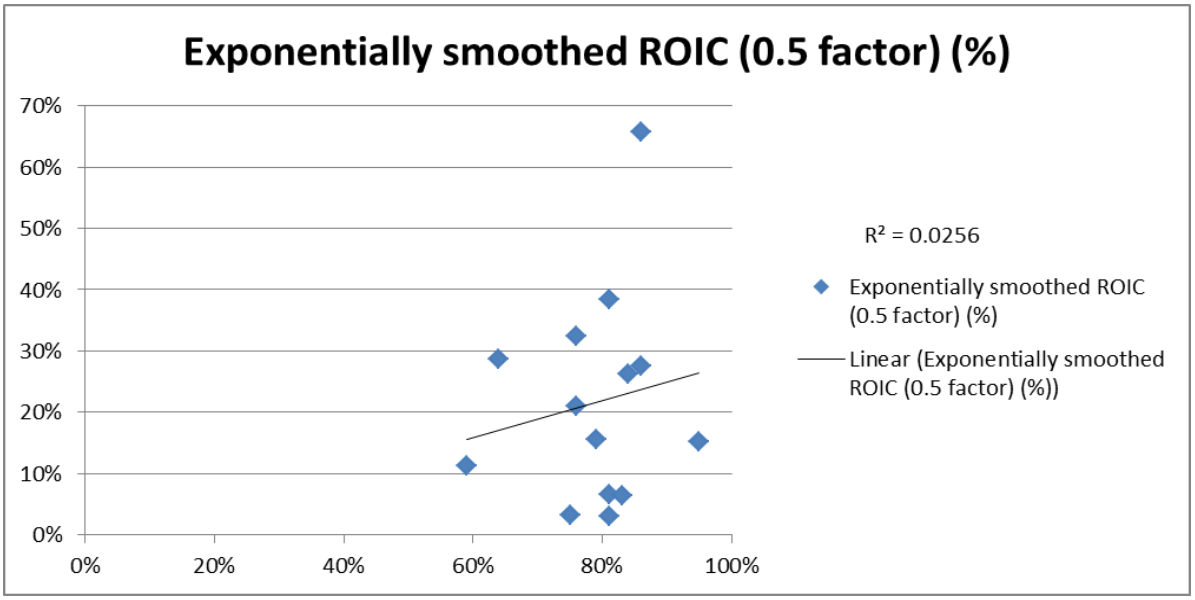
Figure 19: Correlation between exponentially smoothed ROIC (0.1 factor) and Capital budgeting practices without mild outlier



5.7.4. Exponentially Smoothed Return on Invested Capital (ROIC) (0.5 Factor) Correlation

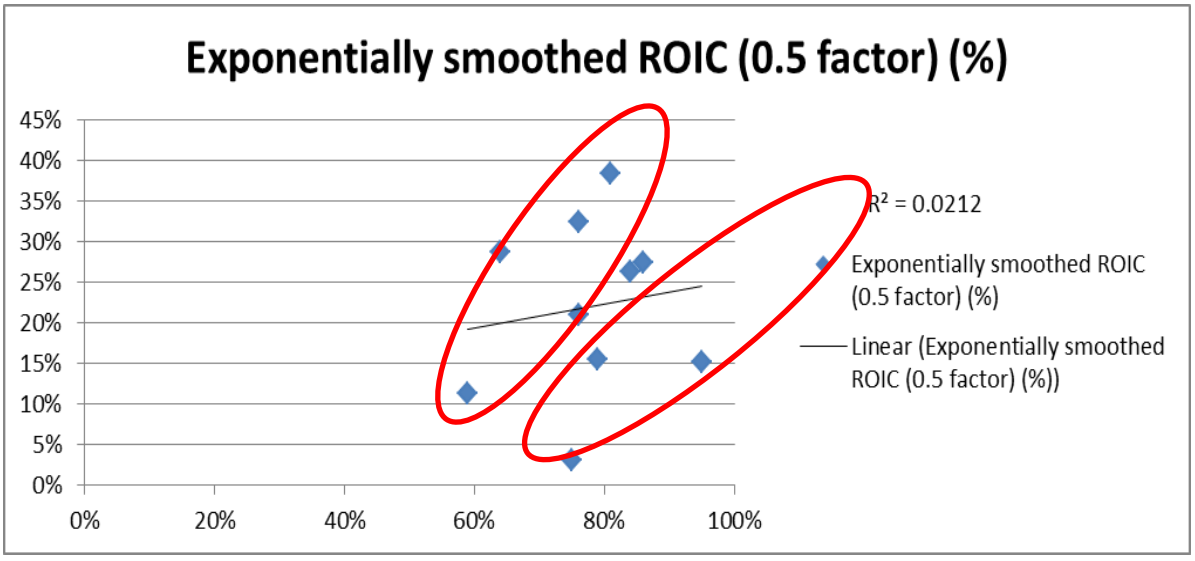
A correlation was tested between the exponentially smoothed ROIC (0.5 factor) and capital budgeting practices data. The outlier was not removed for the first correlation analysis. This resulted in an insignificant positive correlation with an R^2 = 0.03 as illustrated in **Figure 20**.

Figure 20: Correlation between exponentially smoothed ROIC (0.5 factor) and Capital budgeting practices with mild outlier



The above analysis was repeated, without the mild outlier. The illustration in **Figure 21** showed a more insignificant positive correlation with $R^2 = 0.02$. Even though there was no significant correlation, a few trends were also observed on the scatter plot on **Figure 21**.

Figure 21: Correlation between exponentially smoothed ROIC (0.5 factor) and Capital budgeting practices without mild outlier

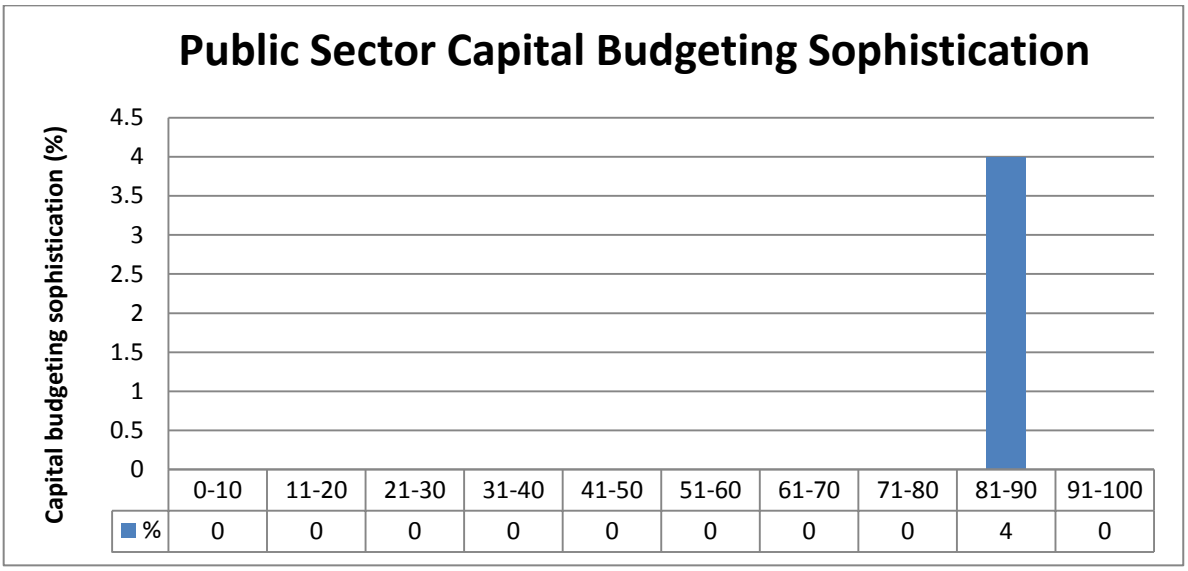


5.8. Capital Budgeting in Public and Private Sector

Only four public/ state-owned enterprises responded to the survey questionnaire as compared to 10 private companies. This meant the sample was even smaller for the public sector.

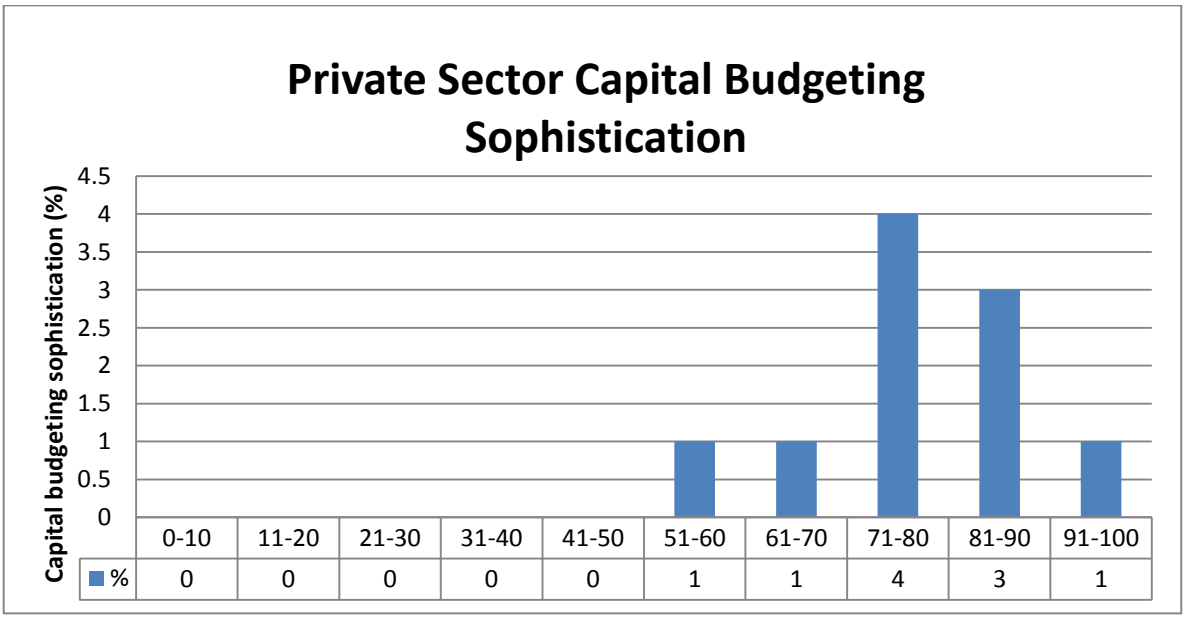
All four state-owned enterprises' capital budgeting practice sophistication was ranked between 81 and 90 % as illustrated in **Figure 22**.

Figure 22: Public sector capital budgeting practices sophistication distribution



Due to the higher number of responses, the capital budgeting practice sophistication rating for private companies was more distributed than the public sector. The lowest rating was 59%, the highest 91% and the frequency plot peaked at 71-80% in **Figure 23**, which immediately looks smaller than the peak in **Figure 22**.

Figure 23: Private sector capital budgeting practices sophistication distribution



To quantify the differences capital budgeting practise sophistication between the public and private sector, an analysis of variance was performed using a non-parametric method called the Mann-Whitney U-test. The null hypothesis that neither means were smaller, could not be rejected even at a p-Value of *0.304 and a significant level of 10% as illustrated in **Table 7**.

Table 7: ANOVA for the difference in capital budgeting practice sophistication between the public and private sector

	Capital Budgeting Process/Practices (%) - Private sector	Capital Budgeting Process/Practices (%) - Public sector
Sample Statistics	**Sector type ANOVA**	**Sector type ANOVA**
Sample Size	10	4
Sample Mean	0.7750	0.82750
Sample Std. Dev.	0.1038	0.02363
Sample Median	0.7750	0.82000
Mann-Whitney Test (General Version)		
Hypotheses		
Null Hypothesis	Neither Dist. Smaller	
Alternative Hypothesis	Either Dist. Smaller	
Ranking Information		
Number of Values in Ranking	14	
Number of Tied Values	7	
Rank Sum for Variable 1 (Test Statistic)	66.5	
Rank Sum for Variable 2	38.5	
p-Value Computation		
Normal Approximation (NA) Used	No	
Ties Present, but Not Corrected For	Yes	
Mean for NA	N/A	
Std. Dev. for NA with Tie Correction	N/A	
z-Statistic for NA with Tie Correction	N/A	
*** p-Value**	0.3037	
Significance Levels		
Null Hypoth. at 10% Significance	Don't Reject	
Null Hypoth. at 5% Significance	Don't Reject	
Null Hypoth. at 1% Significance	Don't Reject	

5.9. Capital Budgeting Practice Differences between More and Less Capital Intensive Companies

To quantify the differences capital budgeting practise sophistication between less and more capital intensive companies, an analysis of variance was performed using a non-parametric method called the Mann-Whitney U-test. The null hypothesis that neither means were smaller, could not be rejected even at a p-Value of *0.959 and a significant level of 10% as illustrated in **Table 8**.

Table 8: ANOVA for the difference in capital budgeting practice sophistication between less and more capital intensive companies

	Capital Budgeting Process/Practices (%) - Lower Capital Expenditure	**Capital Budgeting Process/Practices (%) - Higher Capital Expenditure**
Sample Statistics	**Performance per capital expenditure**	**Performance per capital expenditure**
Sample Size	6	8
Sample Mean	0.83667	0.75500
Sample Std. Dev.	0.07394	0.08976
Sample Median	0.85000	0.80000
Mann-Whitney Test (General Version)		
Hypotheses		
Null Hypothesis	Neither Dist. Smaller	
Alternative Hypothesis	Capital Budgeting Process/Practices (%) - Lower Capital Expenditure Smaller	
Ranking Information		
Number of Values in Ranking	14	
Number of Tied Values	7	
Rank Sum for Variable 1 (Test Statistic)	57.5	
Rank Sum for Variable 2	47.5	
p-Value Computation		
Normal Approximation (NA) Used	No	
Ties Present, but Not Corrected For	Yes	
Mean for NA	N/A	
Std. Dev. for NA with Tie Correction	N/A	
z-Statistic for NA with Tie Correction	N/A	
*** p-Value**	0.9594	
Significance Levels		
Null Hypoth. at 10% Significance	Don't Reject	
Null Hypoth. at 5% Significance	Don't Reject	
Null Hypoth. at 1% Significance	Don't Reject	

5.10. What Specific Capital Budgeting Practices Improve Financial Performance

A non-parametric test was also used to determine any capital budgeting practice that yields significantly higher financial performance.

Several Mann-Whitney U-tests were conducted on all the chosen financial performance variables. The tests did not indicate that WACC adjustment or the other capital budgeting practices significantly improved financial performance.

The study also ventured to determine if there were differences in capital budgeting practices between companies who spend a higher percentage of their capital expenditure (CAPEX) on expansionary investments as compared to sustaining current operations.

Table 9: ANOVA for expansionary capital expenditure between companies that adjust and those who do not adjust WACC

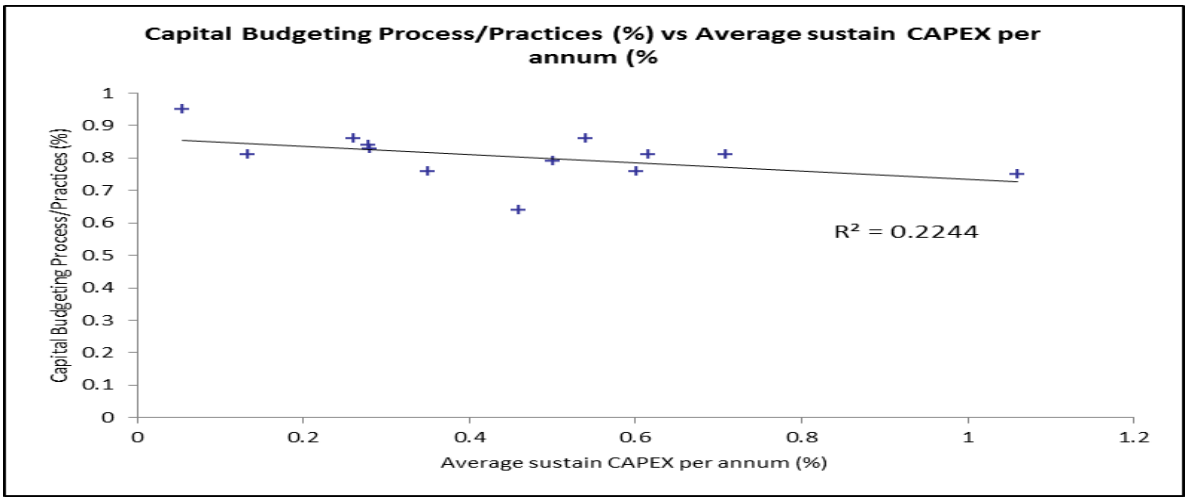
	Average expansionary CAPEX per annum - WACC not adjusted (%)	**Average expansionary CAPEX per annum - WACC adjusted (%)**
Sample Statistics	**Ave Expansionary vs. WACC adjustment ANOVA**	**Ave Expansionary vs. WACC adjustment ANOVA**
Sample Size	6	8
Sample Mean	0.4134	0.6673
Sample Std. Dev.	0.2730	0.1997
Sample Median	0.4697	0.7209
Mann-Whitney Test (General Version)		
Hypotheses		
Null Hypothesis	Neither Dist. Smaller	
Alternative Hypothesis	Average expansionary CAPEX per annum - WACC not adjusted (%) Smaller	
Ranking Information		
Number of Values in Ranking	14	
Number of Tied Values	0	
Rank Sum for Variable 1 (Test Statistic)	31	
Rank Sum for Variable 2	74	
p-Value Computation		
Normal Approximation (NA) Used	No	
Ties Present, but Not Corrected For	No	
Mean for NA	N/A	
Std. Dev. for NA with Tie Correction	N/A	
z-Statistic for NA with Tie Correction	N/A	
*** p-Value**	0.0406	
Significance Levels		
Null Hypoth. at 10% Significance	Reject	
Null Hypoth. at 5% Significance	Reject	
Null Hypoth. at 1% Significance	Don't Reject	

This test rejected the null hypothesis, that neither of the distributions were smaller, at a 5% significance and a p-values of *0.041 as illustrated in **Table 9**. The alternative hypothesis for this test stated that the average expansionary CAPEX percentage would be smaller for those companies who do not adjust their WACC per project.

5.11. Correlation between the Type of Capital Expenditure and Capital Budgeting Sophistication

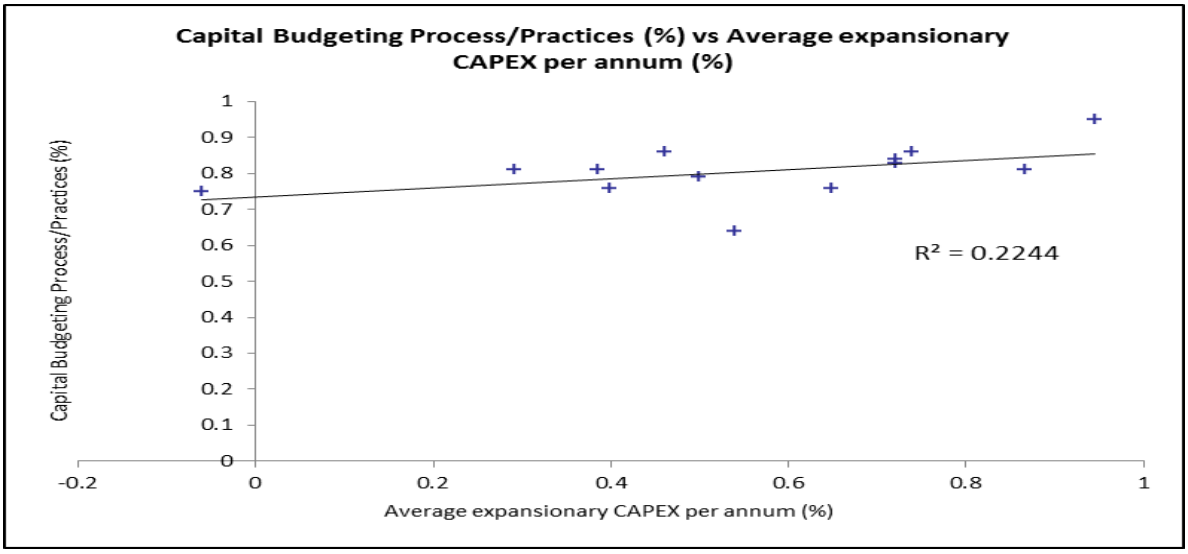
The results illustrated in **Figure 24** indicate a correlation of -0.47 between the level of sophistication of the capital budgeting practices and the average percentage (%) of maintenance capital expenditure (CAPEX). This result illustrated that the higher the % of CAPEX is spent on sustaining the current operations the lower the sophistication of the capital budgeting practices.

Figure 24: Correlation (-0.47) between capital budgeting practise sophistication and the average % maintenance/sustain CAPEX per annum



The opposite results are illustrated in **Figure 25** which indicates a correlation of 0.47 between the level of sophistication of the capital budgeting practices and the average percentage (%) of maintenance capital expenditure (CAPEX). Interpreted, this result illustrates that the higher the % of CAPEX is spent on expanding operations the higher the sophistication of the capital budgeting practices.

Figure 25: Correlation (0.47) between capital budgeting practise sophistication and the average % expansionary CAPEX per annum



Another relatively significant observation, illustrated in **Figure 26**, was made during the correlation analysis. The correlation of 0.51 was indicated between the average SGR and average capital expenditure per annum.

Figure 26: Correlation (0.51) between Average SGR and Average CAPEX per annum

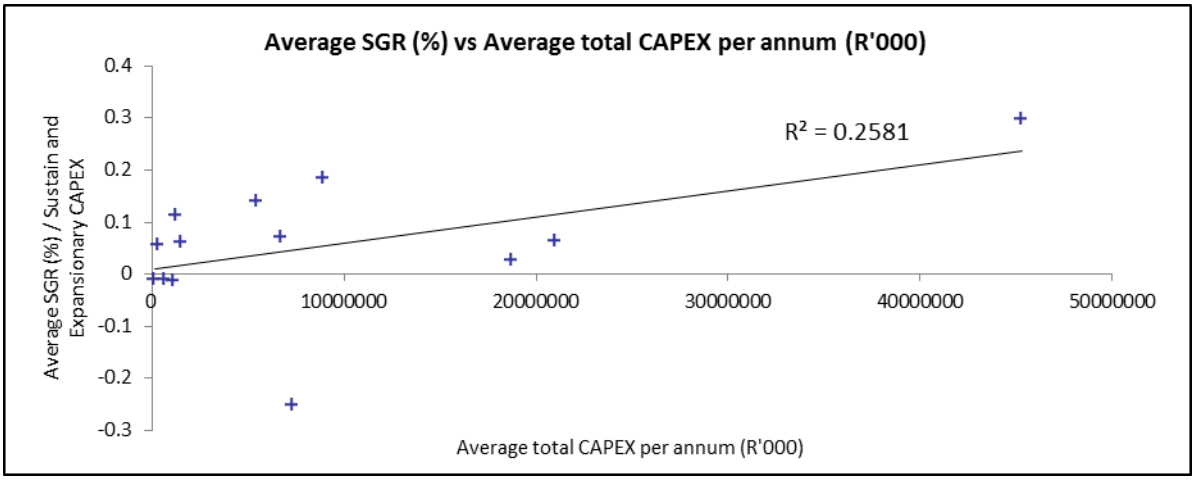
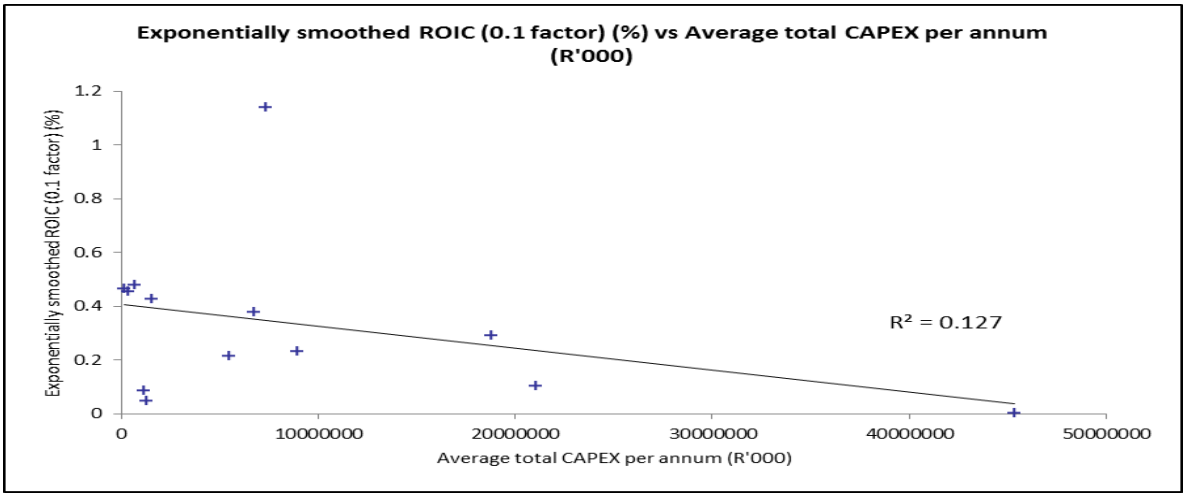


Figure 27: Correlation (-0.36) between exponentially smoothed (factor 0.1) ROIC and Average CAPEX per annum



Although the data resolution was affected by the small sample, there is an indication that companies who invest more of their capital on expansion will tend to have more sophisticated capital budgeting practices. The other observation was the relatively strong correlation between the average SGR and the average CAPEX per annum. Although committing capital to current and expansionary expenditure, it also reduces the company's cashflow, which in term will reduce the ROIC as illustrated in **Figure 27**.

CHAPTER 6: DISCUSSION OF RESULTS

6.1. Overview

This chapter interprets the results found in chapter five, and thus follows a similar structure as chapter five. The results are also compared to the arguments in chapter two. Differences or confirmations between the literature review and the research finding are further discussed.

6.2. Level of Sophistication of Capital Budgeting Practices

The level of sophistication of capital budgeting practices of the surveyed companies discussed in chapter five was relatively high, with the lowest score being above 50%. Due to the small size of the data, a Chi-Squared normality test was performed to ascertain the normality of the data. The p-value of 0.079 validated that only 8% of other random samples would exhibit a worse normality than the current sample. The negative skewness also showed that more of the surveyed companies had relatively sophisticated capital budgeting practices.

The survey results in **Appendix 3** (question 2) illustrate that 68.4% of the surveyed companies have a dedicated capital budgeting department. For some this activity forms part of the finance, projects or engineering function. This result was expected for capital intensive companies, since they spend large amounts of capital to both sustain and expand their business.

In chapter two, the argument is made that strategic planning is the minimum requirement for a functional capital budgeting system. The survey results in **Appendix 3** (question 4) illustrates that all the surveyed companies practice strategic planning and that it forms an input to their capital budgeting process.

At 94.4%, almost all the companies budget for government and legislation requirements. Most of these companies only spend to 0 to 10% of their yearly capital on these requirements. An interesting result was the two companies who stated that 91 to 100 % of their capital investments are government mandatory project as illustrated in **Appendix 3**

(question 8). When investigated further these companies turned out to be infrastructure state-owned enterprises. This result confirms the discussion that the country's infrastructure development pressure is placed, by the government and/or Department of Public Enterprises, on these organisations.

6.3. Correlation between Financial Performance and Sophistication of Capital Budgeting Practices

A correlation analysis, between the level of sophistication of the capital budgeting practices and all the chosen financial performance indicators, was conducted in chapter five. Initially the results showed no significant correlation between these variables, which is inconsistent with the results from previous research discussed in section 2.2. The study by Farragher et al. (2001) resulted in the correlation between the level of sophistication of the capital budgeting practices and financial performance.

After the outlier had been omitted from the average SGR correlation analysis in chapter five there was an insignificant positive correlation with an R^2 of 0.01, which is in agreement with the literature in chapter two. A few visual trends were observed on **Figure 16, 19 and 21** in chapter five, that different groups of companies would yield a significantly correlated relationship.

To investigate this phenomenon further, mining and metals companies were omitted from the sample and the correlations test were performed again. The results showed significant correlations for all the performance measurements as illustrated in **Figure 28, 29, 30 and 31**.

Figure 28: Correlation (0.82) between average SGR and Capital budgeting practices without outlier, metals and mining companies

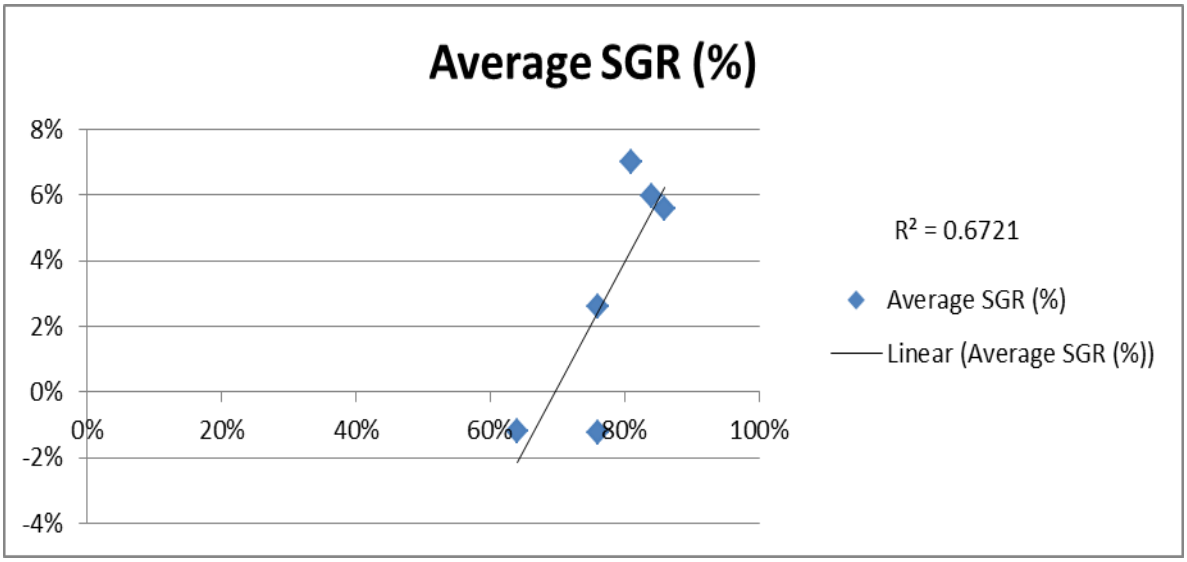


Figure 29: Correlation (0.56) between average ROIC and Capital budgeting practices without outlier, metals and mining companies

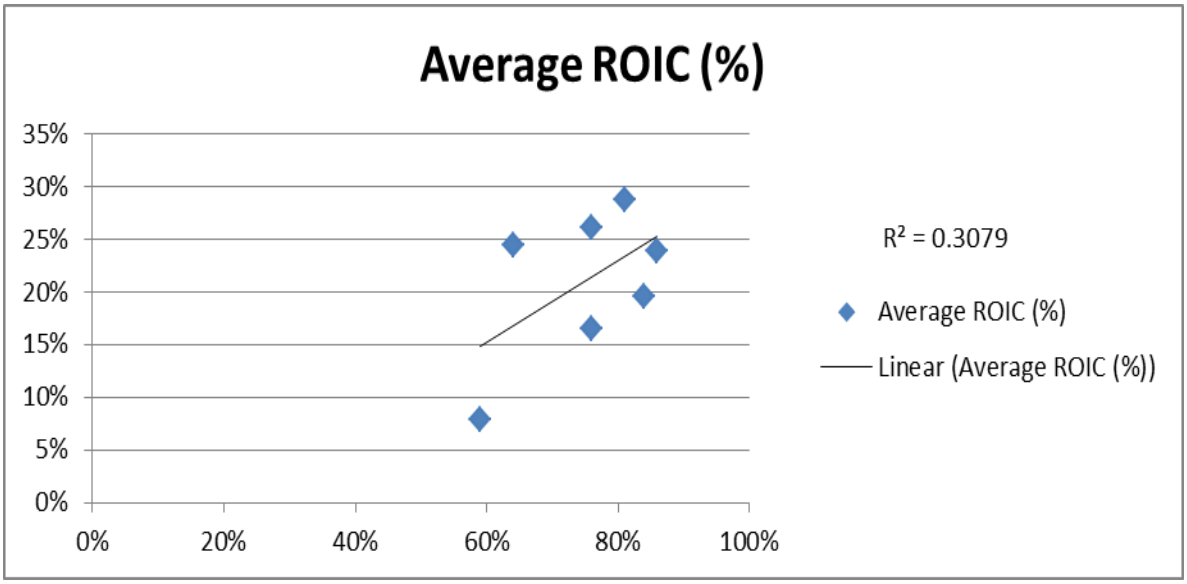


Figure 30: Correlation (0.60) between exponentially smoothed (factor 0.1) ROIC and Capital budgeting practices without outlier, metals and mining companies

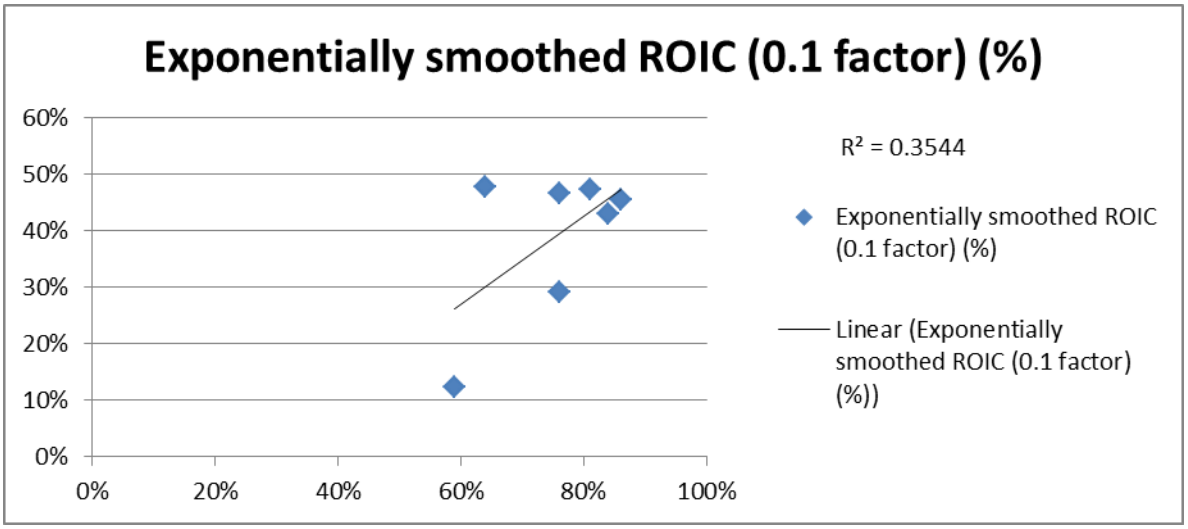
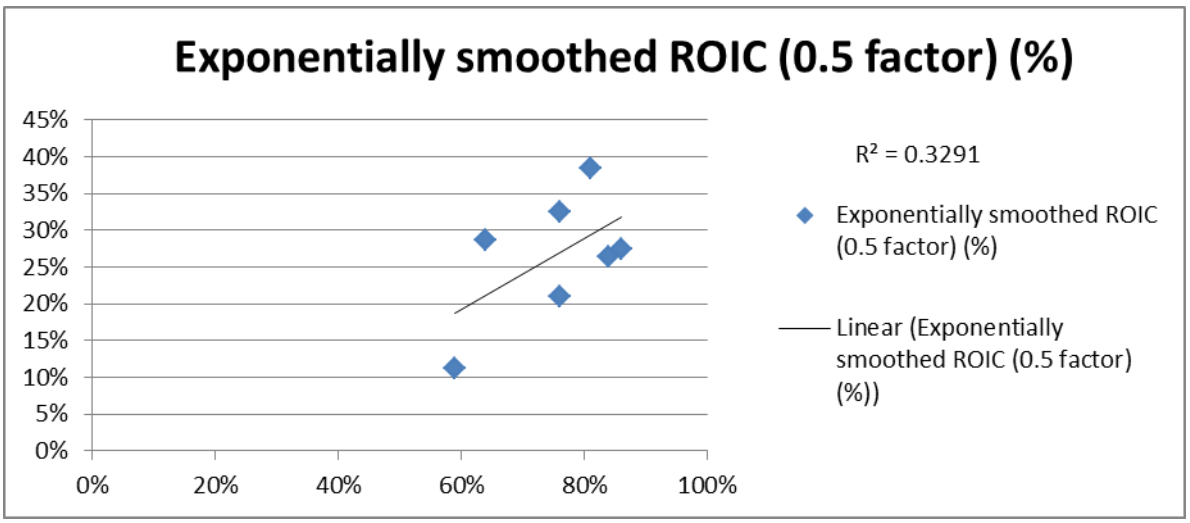


Figure 31: Correlation (0.57) between exponentially smoothed (factor 0.5) ROIC and Capital budgeting practices without outlier, metals and mining companies



This result is then consistent with the findings of Farragher et al. (2001) and thus confirms the findings, that there is a positive correlation between the level of capital budgeting sophistication and the financial performance of a company in the manufacturing and capital intensive sector.

6.4. Capital Budgeting in Public and Private Sector

The argument in section 2.5 implies that the additional social and infrastructure pressures on the state-owned enterprises (SOEs) should result in the utilisation of more sophisticated capital budgeting, to ensure optimal spending of capital. The initial impression as a result from **Figures 22 and 23** is that the SOEs have more sophisticated capital budgeting practices.

The Mann-Whitney test illustrated in **Table 7** was based on a null hypothesis that neither of the sample means was smaller than the other and an alternative hypothesis that either of the sample means was smaller than the other. The alternative hypothesis would imply that there is a significant difference in the level of sophistication of capital budgeting between private and SOEs. Even at a significance level of 10%, the null hypothesis that there is no significance in the level of sophistication of capital budgeting between private and SOEs could not be rejected.

This result implies that even though private and state-owned enterprises are managed, lead and under different types of pressures, there is no significant difference in the level of sophistication of their capital budgeting practices.

6.5. Capital Budgeting Practice Differences between More and Less Capital Intensive Companies

The literature in section 2.3 stated that bigger and more capital intensive companies would exhibit a higher level of sophistication in their capital budgeting practices, due to the competency of their managers (Vongai & van der Poll, 2012). The level of capital budgeting practice sophistication data was separated into two data sets in **Table 8**. The results did not indicate any differences between the capital budgeting practises sophistication of neither more nor less capital intensive companies.

This finding implies that managers of both less and more capital intensive companies are using similar capital budgeting practises, and goes against the findings by Olawale, Olumuyiwa, and Goerge (2010) that smaller and less capital intensive companies do not use sophisticated capital budgeting practices.

The possible reason for the opposing results is that Olawale, Olumuyiwa and Goerge (2010) only investigated the sophistication of the appraisal methods and not the practice of the complete capital budgeting process.

6.6. What Specific Capital Budgeting Practices Improve Financial Performance

In chapter five each of the capital budgeting practices was tested against the companies' financial performance, and there were no capital budgeting practices which resulted in higher financial performance. This may be a result of the small sample and thus, lack of representation.

An analysis of the differences between the companies that adjusted their weighted average cost of capital (WACC) per investment was performed using a non-parametric test in **Table 9**. The significant finding was that the companies that did not adjust WACC per project had a lower expansionary capital expenditure (CAPEX).

There is not much risk with investing the majority of the CAPEX on maintenance projects, thus no additional risk must be factored into the cost of capital. If the investment involves spending capital in other countries, technologies and bigger scales of current technologies, risk must be factored into the cost of capital.

6.7. Correlation between the Type of Capital Expenditure and Capital Budgeting Sophistication

The results illustrated in **Figures 24 and 25** imply that there may be a relationship between the type of capital expenditure and the level of sophistication of the capital budgeting practices. **Figure 24** show a negative correlation between the percentages of sustain/maintenance CAPEX per annum and the capital budget practice sophistication. This implies that companies that spend a higher amount of CAPEX on maintenance have less sophisticated capital budgeting processes.

The direct opposite relationship was implied in **Figure 25** which exhibited a positive relationship between the percentages of expansionary CAPEX per annum and the capital budget practice sophistication.

Due to the higher risk in expansionary investments as compared to maintenance, the companies tend to develop very robust capital budgeting processes to manage the investment risks.

A correlation between the total CAPEX per annum and the financial performance indicators was also tested. The expected result was that companies that invested well in CAPEX would do well in all the proposed financial performance measurements. The results illustrated in **Figures 26 and 27** show that the more CAPEX the higher the sales growth rate (SGR) and the lower the return on invested capital (ROIC). The negative correlation between the CAPEX and ROIC is not aligned with the expected result as the formula in **Equation 6** shows that the ROIC is inversely proportional to the interest bearing debt and owner's equity. Capital is acquired from both debt and equity, thus the higher the CAPEX the higher the denominator of **Equation 6**. This in turn reduces the ROIC.

CHAPTER 7: CONCLUSION

7.1. Overview

This chapter concludes the research report by summarising the findings, discussing limitations, possible areas to research future, and the overall implications of the research findings to academia and industry.

7.2. Summary of Findings

The significant findings in this research were:

- The manufacturing companies in South Africa have, on average, sophisticated capital budgeting practices as discussed in section 6.2.

- If observed from a lower level or sub-sector there is a positive correlation between the level of sophistication of the capital budgeting practices and the financial performance of the company.

- There is no statistically significant difference in the level of sophistication of capital budgeting practices utilised in the private sector and state-owned enterprises.

- Less and more capital intensive companies utilise the similar capital budgeting practices.

- Companies that utilise a bigger percentage of CAPEX for expansionary purposes seem to utilise more sophisticated capital budgeting practices and also adjust the weighted average cost of capital (WACC) for each type of project.

- The research also validated that the amount of CAPEX spent per annum is proportional to the sales growth rate and inversely proportional to the return on invested capital.

7.3. Research Limitations

The following were the research limitations identified:

- The low response rate due to time constraints and companies not disclosing their capital budgeting process information.

- The absence of actual maintenance and expansionary CAPEX figures for each company. This work allow for a more accurate analysis and thus results.

7.4. Suggestions for Future Research

The following suggestions for future research are based on the research findings and limitations.

- The lack of company participation in the survey limited the level of analysis and the data resolution required for the population to be sufficiently represented. This was a result of the time limitation. Future research conducted over a longer period of time can provide a bigger sample that would yield results that are statistically representative of the population.

- This research attempted to analyse the capital budgeting practices as a whole and thus only gave the reader a high level view of the topic. Further research can focus on a single or a few practices to give the reader better resolution of the subject and analysis.

- Executive incentive structures influence what and how decisions are made in the organisation. This research did not venture into this area. Further research can investigate the correlation between the companies' executive incentive structure, capital investment practices and the returns on investments. The King III corporate governance requirements prescribe that the directors' and 3 highest paid executives' incentive structure information must be made publically available in the integrated report (KPMG, 2009).

7.5. Research Implications

7.5.1. Academic Implications

The implication of this research to the academic community is the confirmation of the work by Farragher et al. (2001) that there is a positive correlation between the capital budgeting practice sophistication level and the company's financial performance. This research also implies that this correlation is not only attributed to the size of the organisation, but the type of sub-sector being investigated.

Previous research into the capital budgeting practice and their impact on the company's performance focused only on appraisal methods to determine the level of sophistication of the capital budgeting practices. Future inquiries into this topic should take a holistic approach to the capital budgeting process as discussed in chapter one.

7.5.2. Industry Implications

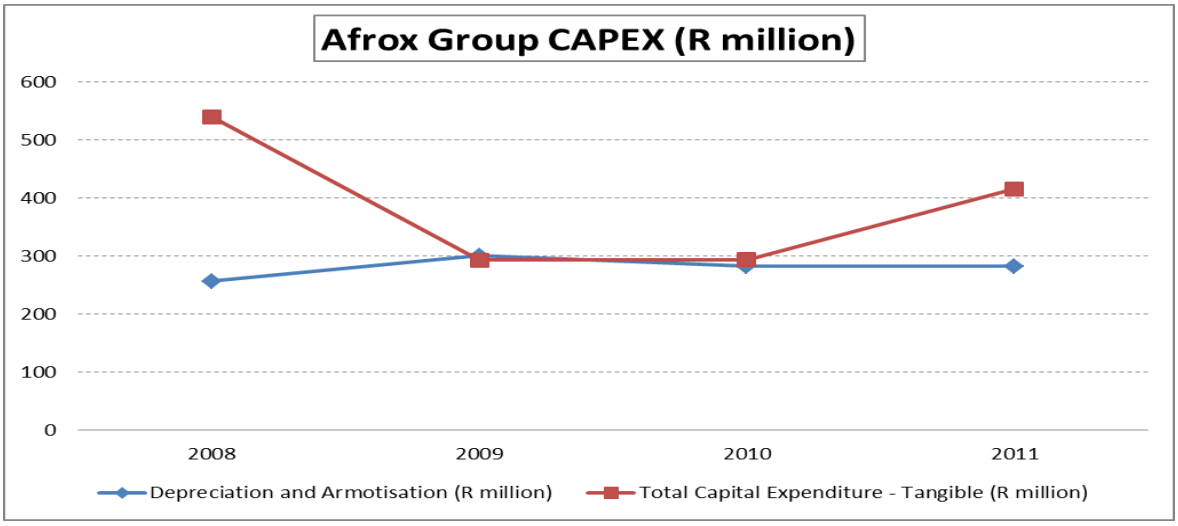
This research presents a number of significant implications to manufacturing sector. One of these implications is that non-sophisticated capital budgeting practices may be utilised when most or all of the capital expenditure (CAPEX) is utilised to maintain the existing asset base. This implies that fewer resources, and thus fixed costs, are required to execute the capital budgeting process. More focus is required on the effectiveness and efficiency of capital budgeting process if the company is spending most of its capital on expansionary investments since they involve more risk.

The weighted average cost of capital adjustment must not only be limited to investments in different countries, due to the different tax rates, cost of debt and equity; it must also be adjusted to factor in the risk of each expansionary project.

Since analysts normally use total cashflow to valuate a business, a growing company will exhibit a smaller cashflow since it is reinvesting most of its cash flows from operations into expansionary growth. If the higher sales growth rate (SGR) associated with expansionary investment is not factored into the valuation proforma model, the company might be undervalued.

On the other hand, executive may under-invest in maintaining and/or expanding the current assets due to the short term nature of their incentive structures. This may bear devastating results for the organisation. An example of this in South Africa is the debacle between Evraz Highveld Steel & Vanadium and Afrox in 2010 (Naidoo, 2011). As a result of equipment failures and subsequent production loses, Afrox could not fulfil its service level agreement with Evraz Highveld Steel & Vanadium and Columbus Steel of providing industrial gas. This resulted in claims amounting to R400 million against Afrox. Managers at Afrox claimed that the production outages were predominantly due to power outages and equipment failure. The R152 million asset was impaired since the customers would not renew their supply contract with Afrox. Further investigation into their 2011 financial statements revealed that there was a sharp reduction in the group's total CAPEX from 2008 to 2009 as illustrated in **Figure 32**.

Figure 32: Afrox CAPEX and depreciation & amortisation trend



In 2009 and 2010, the total CAPEX was less or almost equal to the depreciation and amortisation, which implies that there was an under investment in maintaining and expanding the asset base. The group increased their capital expenditure for 2011 as they reacted to the loss of their supply contracts.

7.6. Concluding Statement

Although this research report provided a glance into how South Africa's manufacturing sector makes the investment decisions and what the subsequent financial implications are; the results from this report may also be applicable in other dynamic and developed markets. International investors may also use the findings and learning from this report to valuate different investment prospects/companies, bases on how and what investment decisions the executive management team makes.

The world economic recession in 2008 forced companies to reconsider their capital expenditure effectiveness and implement additional measures to reduce capital wastage. **Appendix 3** illustrates the current trends in capital budgeting practices such as half of the respondents performing post commissioning audits on 91-100% of their projects/investments, and half the respondents implementing formal knowledge management systems to improve organisational knowledge retention.

The capital budgeting process and practices remains paramount to sustainably delivering abnormally high returns to the company's shareholders.

REFERENCE LIST

Albright, C. S., Winston, W. L., & Zappe, C. J. (2009). *Data analysis and decision making with Microsoft Excel* (Revised 3rd Edition ed.). Mason: SOUTH-WESTERN: Cengage Learning.

Bennouna, K., Meridith, G. G., & Marchant, T. (2010). Improved capital budgeting decision making: Evidence from Canada. *Management Decision, 48*(2), 225-247.

Block, S. (2007). Are "Real Options" actually used in the real world? *The Engineering Economist, 52*(3), 255-267.

Burns, R. M., & Walker, J. (2009). Capital budgeting surveys: The future is now. *Journal of Applied Finance*(1 & 2), 78-90.

Chadwell-Hatfield, P., Goitein, B., Horvath, P., & Webster, A. (1997). Financial criteria, capital budgeting techniques, and risk analysis of manufacturing firms. *Journal of Applied Business Research, 13*(1), 95-104.

Collan, M., & Liu, S. (2003). Fuzzy logic and intelligent agents: Towards the next step of capital budgeting decision support. *Industrial Management and Data Systems*, 410-422.

Covin, J. G., Green, K. M., & Slevin, D. P. (2006). Strategic process effects on the entrepreneurial orientation-sales growth rate relationship. *Entrepreneurship Theory and Practice, 30*(1), 57-81.

du Toit, E., Erasmus, P., Kotze, L., Ngwenya, S., Thomas, K., & Viviers, S. (2010). *Corporate finace: A South African perspective.* (G. Els, Ed.) Republic of South Africa: Oxford University Press Southern Africa.

Enterprises, D. o. (2010). *Department of Public Enterprises strategic plan 2011-2014.* Department of Public Enterprises.

Exchange, J. S. (2012, 04). Johannesburg stock exchange listing. Gauteng.

Farragher, E. J., Kleiman, R. T., & Sahu, A. P. (2001). The association between the use of sophisticated capital budgeting practices and corporate performance. *The Engineering Economist, 46*(4), 300-310.

Firer, C., Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2009). *Fundamentals of corporate finance* (4th South African Edition ed.). Maidenhead: Mc Graw Hill.

Hall, J., & Millard, S. (2009). Capital budgeting practices used by selected listed South Africal firms. *SAJEMS, 13*(1), 85-97.

Hartman, J. C., & Schafrick, I. C. (2004). The relevant internal rate of return. *The Engineering Economist, 49*(2), 139-158.

Hazen, G. B. (2003). A new perspective on multiple internal rates of return. *The Engineering Economist, 48*(1), 31-51.

Higgins, R. C. (2009). *Analysis for financial management.* New York: Mc Graw Hill.

Ireland, D. R., Hoskisson, R. E., & Hitt, M. A. (2011). *The management of strategy: Concepts and cases* (9th Edition ed.). Canada: SOUTH-WESTERN.

Jun, J. (2009, June 19). *Valuation-methods: Old school value*. Retrieved 11 05, 2012, from Old School Value Web site: http://www.oldschoolvalue.com

Klammer, T. (1973, April). The association of capital budgeting techniques with firm performance. *The Accounting Review, 48*(2), pp. 353-364.

KPMG. (2009). *Issues and insights: KPMG.* Retrieved 11 07, 2012, from KPMG Web site : http://www.kpmg.com

Loizou, P., & French, N. (2012). Risk and uncertainty in development: A critical evaluation of using the Monte Carlo simulation method as a decision tool in real estate development projects. *Journal of Property Investment, 30*(2), 198-210.

Magni, C. A. (2008). CAPM-based capital budgeting and nonadditivity. *Journal of Property Investment and Finance, 26*(5), 388-398.

Magni, C. A. (2011). Aggregate return on investment and investment decisions: A cash-flow perspective. *The Engineering Economist, 56*(2), 140-169.

Miller, T. W. (2011). Active management of real options. *The Engineering Economist, 56*(3), 205-230.

Muller, R., Martinsuo, M., & Blomquist. (2008). Project portfolio control and portfolio management performance in different contexts. *Project Management Journal, 39*(3), 28-42.

Naidoo, B. (2011, July 21). *Home: Breaking news: Engineering news*. (M. Webb, Editor) Retrieved November 4, 2012, from Engineering News: http://www.engineeringnews.co.za

Neale, C. W., & Letza, S. (1996). Improving the quality of project appraisal and management: An exercise in organizational learning. *The Learning Organization*, 26-30.

Olawale, F., Olumuyiwa, O., & Goerge, H. (2010, July 4). An investigation into the impact of investment appraisal techniques on the profitability of small manufacturing firms in the Nelson Mandela Bay Municipality Area, South Africa. *African Journal of Business Management, IV*(7), 1274-1280.

Saunders, M., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project.* Harlow: Pearson Education Limited.

Seitz, N., & Ellison, M. (1999). *Capital budgeting and long-term financing decisions.* Orlando: The Dryden Press.

Shaughnessy, J. J., Zechmeister, E. B., & Zechmeister, J. S. (2012). *Research methods in psychology* (9th ed.). New York: Mc Graw Hill.

Shrieves, R. E., & Wachowics JR., J. M. (2001). Free cash flow (FCF), ecomic value added (EVA), and net present value (NPV): A reconciliation of variations of discounted cash flow (DCF) valuation. *The Engineering Economist, 46*(1), 33-52.

Trigeogis, L. (2005). Making use of real options simple: An overview and applications in flexible/modular decision making. *The Engineering Economist, 50*(1), 25-53.

Troy, A. A. (2011). *Corporate finance demystified* (2nd ed.). New York: Mc Graw Hill.

Ugarelli, R., & Di Federico, V. (2010). Optimal scheduling of replacement and rehabilitation in wastewater pipeline networks. *Journal of Water Resources Planning and Management*, 348-356.

UNCTAD. (2012). *World investment report 2012: Towards a new generation of investment policies.* Geneva: UNCTAD.

Vaillancourt, C. (2011). Project portfolio management: Creating dashboards that meet strategic corporate performance targets. *Canadian Manager*, 10-12. Canada: Canadian Institute of Management.

van Assen, M., van den Berg, G., & Pietersma, P. (2009). *Key management models* (2nd Edition ed.). Harlow: Pearson Education Limited.

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

Viviers, S., & Cohen, H. (2011). Perspectives on capital budgeting in the South African motor manufacturing industry. *Meditari Accountancy Research, 19*(1/2), 75-93.

Vongai, M., & van der Poll, H. M. (2012, August 15). A survey of capital budgeting techniques used by listed mining companies in South Africa. *African Journal of Business Management, VII*(32), 9279-9292.

Walliman, N. (2011). *Research methods: The basics.* New York, United States of America: Routledge.

Weiers, R. M. (2008). *Introduction to business statistics* (6th ed.). Mason: Thomson South-Western.

Xu, K. (2010). Research on China's state-owned enterprise capital budgeting. *International Journal of Business and Management*, 217-219.

APPENDICES

Appendix 1: Consent Letter Accompanying e-mail with Survey Link

Dear Sir/Madam,

I am doing research on the approaches to capital budgeting in South African manufacturing and/or capital intensive companies. You are thus asked to participate in a short high level survey (mostly Yes or No questions), which may be accessed through the following link:

https://www.surveymonkey.com/s/GIBSMBAResearch_CapitalBudgetingPractices .

This will improve the understanding of capital budgeting practices and techniques in the South African manufacturing industry. Your participation in this survey is voluntary and you can withdraw any point without penalty. All company data will be kept confidential, and only aggregated results will be published in the academic research report. By completing this survey, you indicate that you voluntarily participate in this research. If you have any concerns, please contact me or my supervisor. Our details are provided below.

Mzamo Rodney Mgobhozi
mgobhomr@yahoo.com
+27 (0)83 319 0820

Thea Pieterse
thea.pieterse@iliad.co.za
+27 (0)82 891 8207

I would appreciate if you would complete the survey by the **7th of September 2012**.

Thank you for your time and consideration. I look forward to your responses and views on the subject!

P.s. Please forward this e-mail to a person who is familiar with the capital budgeting process in your organisation.

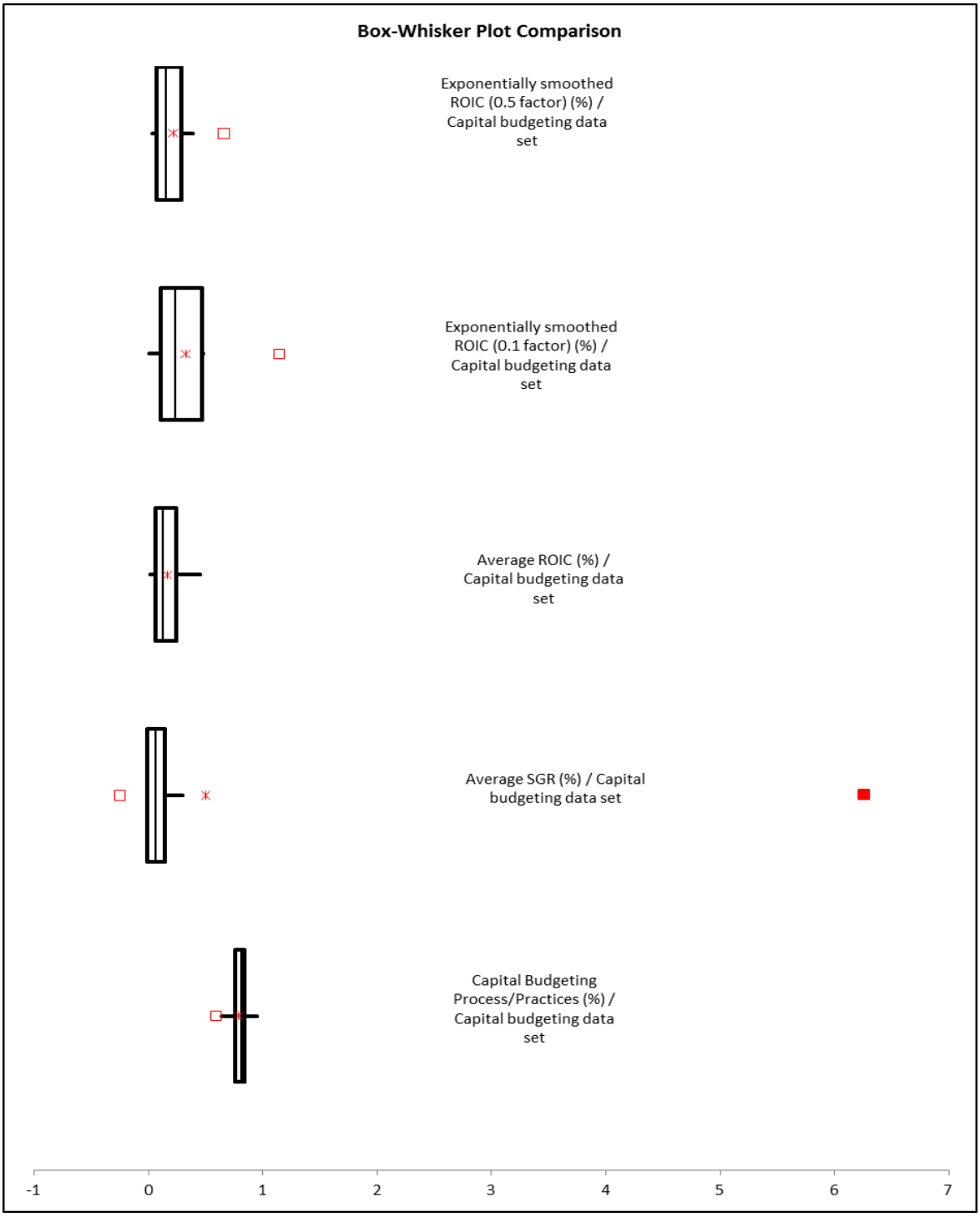
Sincerely,

Mzamo Rodney Mgobhozi

University of Pretoria: Gordon's Institute of Business Science (MBA 11/12)

GORDON INSTITUTE
OF BUSINESS SCIENCE
University of Pretoria

Appendix 2: Primary and Secondary Data Comparative Box-Whisker Plots Summary



Appendix 3: Survey Questionnaire and Response Summary

Response Summary

Total Started Survey: 19
Total Finished Survey: 18 (94.7%)

Select a page to view below or view all pages:

« #2. GIBS MBA Research - Capit... »

PAGE: GIBS MBA RESEARCH - CAPITAL BUDGETING PRACTICES

1. Please type your company name?	Download
	Response Count
Show Responses	19
answered question	**19**

2. Does your company have a capital budgeting department?	Create Chart	Download
	Response Percent	Response Count
Yes	**68.4%**	**13**
No	26.3%	5
Other	5.3%	1
Other (please specify) Show Responses		1
answered question		**19**
skipped question		**0**

3. Please select your firm's average capital project investment value per year (R million)?

Create Chart Download

	Response Percent	Response Count
0-2	0.0%	0
2-10	5.3%	1
10-50	10.5%	2
50-100	5.3%	1
100-500	15.8%	3
>500	**63.2%**	**12**
	Other (please specify)	0
	answered question	**19**
	skipped question	**0**

4. Does strategic planning form an input to the capital budgeting process?

Create Chart Download

	Response Percent	Response Count
Yes	**100.0%**	**18**
No	0.0%	0
Other	0.0%	0
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

5. Does the risk management system/process form an input to the capital budgeting process?

Create Chart Download

	Response Percent	Response Count
Yes	**88.9%**	**16**
No	11.1%	2
Other	0.0%	0
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

6. Is there a formal idea proposal submission process ?

Create Chart Download

	Response Percent	Response Count
Yes	**77.8%**	**14**
No	16.7%	3
Other	5.6%	1
	Other (please specify) Show Responses	1
	answered question	**18**
	skipped question	**1**

7. Do government requirements or legislation form an input to the capital budgeting process? Create Chart Download

	Response Percent	Response Count
Yes	**94.4%**	**17**
No	5.6%	1
Other	5.6%	1
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

8. What percentage of your firm's average capital investment project value are government mandatory projects (%)? Create Chart Download

	Response Percent	Response Count
0-10	**55.6%**	**10**
11-20	0.0%	0
21-30	11.1%	2
31-40	5.6%	1
41-50	0.0%	0
51-60	0.0%	0
61-70	5.6%	1
71-80	11.1%	2
81-90	0.0%	0
91-100	11.1%	2
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

9. Does your firm utilise a formal data gathering process to gather all the data required to develop the investment opportunity?

Create Chart Download

	Response Percent	Response Count
Yes	**77.8%**	**14**
No	16.7%	3
Other	5.6%	1
	Other (please specify) Show Responses	1
	answered question	**18**
	skipped question	**1**

10. Does your firm utilise a formal investment screening process e.g. check for strategic fit?

Create Chart Download

	Response Percent	Response Count
Yes	**94.4%**	**17**
No	0.0%	0
Other	5.6%	1
	Other (please specify) Show Responses	1
	answered question	**18**
	skipped question	**1**

11. Are Standardised models and procedures utilised?

Create Chart Download

	Response Percent	Response Count
Yes	**100.0%**	**18**
No	0.0%	0
Other	0.0%	0
Other (please specify)		0
answered question		**18**
skipped question		**1**

12. Are cash flow forecast generated using history data or project specific estimates?

Create Chart Download

	Response Percent	Response Count
Historical data	11.1%	2
Project specific estimates	38.9%	7
Both	**55.6%**	**10**
Other	0.0%	0
Other (please specify)		0
answered question		**18**
skipped question		**1**

13. Are government mandatory projects exempted from the screening process? Create Chart Download

	Response Percent	Response Count
Yes	0.0%	0
No	**100.0%**	**18**
Other	0.0%	0
Other (please specify)		0
answered question		**18**
skipped question		**1**

14. Are small capital projects exempted from the screening process? Create Chart Download

	Response Percent	Response Count
Yes	16.7%	3
No	**72.2%**	**13**
Other	11.1%	2
Other (please specify) Show Responses		1
answered question		**18**
skipped question		**1**

15. Which non-discounted cash flow methods are used? Create Chart Download

	Response Percent	Response Count
Payback period (PBP)	**61.1%**	**11**
Accounting rate of return (ARR)	38.9%	7
Other	11.1%	2
Other (please specify)		0
answered question		**18**
skipped question		**1**

16. The wieghted average cost of capital (WACC) is risk adjusted for each projet type? Create Chart Download

	Response Percent	Response Count
Yes	**50.0%**	**9**
No	33.3%	6
Other	16.7%	3
Other (please specify) Show Responses		1
answered question		**18**
skipped question		**1**

17. Which discounted valuation methods are used?

Create Chart Download

	Response Percent	Response Count
Net present value (NPV)	83.3%	15
Internal rate of return (IRR/MIRR)	83.3%	15
Profitability index (PI) and/or Benefit cost ratio (BCR)	11.1%	2
Other	5.6%	1
Other (please specify)		0
answered question		**18**
skipped question		**1**

18. Which advanced valuation techniques are used?

Create Chart Download

	Response Percent	Response Count
Real options and/or fuzzy logic valuation	13.3%	2
Monte-Carlo® Simulation (where there is uncertainty in the inputs to valuation)	20.0%	3
Project portfolio management to valuate investment roadmap options	**73.3%**	**11**
Other	6.7%	1
Other (please specify) Show Responses		1
answered question		**15**
skipped question		**4**

19. Is a formal project management framework used? Create Chart Download

	Response Percent	Response Count
Yes	**100.0%**	**18**
No	0.0%	0
Other	0.0%	0
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

20. Are formal cashflow reporting and control processes used? Create Chart Download

	Response Percent	Response Count
Yes	**100.0%**	**18**
No	0.0%	0
Other	0.0%	0
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

21. Are group and individual performance indicators linked to project schedule and cost performance? Create Chart Download

	Response Percent	Response Count
Yes	**77.8%**	**14**
No	16.7%	3
Other	5.6%	1
	Other (please specify)	0
	answered question	**18**
	skipped question	**1**

22. What percentage of projects go through a formal post implementation auditing (%)? Create Chart Download

	Response Percent	Response Count
0-10	11.8%	2
11-20	11.8%	2
21-30	11.8%	2
31-40	5.9%	1
41-50	5.9%	1
51-60	0.0%	0
61-70	0.0%	0
71-80	0.0%	0
81-90	0.0%	0
91-100	**52.9%**	**9**
	Comments Show Responses	5
	answered question	**17**
	skipped question	**2**

23. Is a formal capital budgeting knowledge management system is in place? Create Chart Download

	Response Percent	Response Count
Yes	**47.1%**	8
No	41.2%	7
Other	11.8%	2
	Other (please specify) Show Responses	1
	answered question	**17**
	skipped question	**2**