On the application of management accounting tools in South Africa

A research Report submitted by

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Declaration

I, **Kwirirai Rukowo**, hereby declare that the thesis titled "On the application of management accounting tools in South Africa", submitted to the University of the Witwatersrand under the Faculty of Commerce, Law and Management is the record of the original research done by me under the supervision and guidance of Andres Merino, Associate Professor, School of Accountancy, University of the Witwatersrand. I further declare that no part of the thesis has been submitted elsewhere for the award of any degree, diploma or any other title or recognition.

Kwirirai Rukowo

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Abstract

Contingent theory stipulates that the use and application of management accounting tools varies from country to country and from industry to industry due to the impact of contingent factors. Taking a positivist approach, this study investigated the use of a series of management accounting tools in South Africa. The tools investigated were costing, budgeting, performance evaluation, profitability analysis, investment decision making and strategic management accounting tools. Data was obtained from firms registered with the Johannesburg Chamber of Commerce and Industry (JCCI) as at 30 September 2016 through a questionnaire. The study concluded that all the thirty seven (from the six categories above) management accounting tools were in use in South Africa. Using ordered probit regression analysis each of the 37 tools were analysed to identify the contingent factors that would make their usage in a South African context more likely. The study revealed that twenty seven of the thirty seven management accounting tools could be related to at least one of the contingent factors analysed. Of these contingent factors process diversity, product multiplicity, accounting practitioner education level and use of Just in Time were found to have a positive influence on the usage of management accounting tools in South Africa whenever a relationship was established. Results on the other six contingent factors studied were inconclusive with a combination of both positive and negative influences on the use of management accounting tools in South Africa.

Keywords: management accounting tools, South Africa, contingent factors, investment decision making, strategic management accounting, costing, performance evaluation, budgeting, profitability

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List of abbreviations

ABB	Activity based budgeting
ABC	Activity based costing
AICPA	Association of International Certified Professional Accountants
AMT	Advanced manufacturing technology
ARR	Accounting rate of return
BEP	Breakeven point
BSC	Balanced scorecard
CIMA	Chartered Institute of Management Accountants
DCF	Discounted cash flow
IFAC	International Federation of Accountants
JIT	Just in time
PEU	Perceived environmental uncertainty
SMA	Strategic management accounting
SWOT	Strength, weaknesses, opportunities, threats
TQM	Total quality management

Chapter I – Background

1.1 Introduction

The increasing level of global competition has intensified the challenges faced by managers. In response to these challenges a range of new or modern management accounting tools have been developed to help managers make the right decisions. The new techniques include activity based costing (ABC), the balanced scorecard (BSC) and strategic management accounting (SMA) (CIMA, 2013; Drury & Al-Omiria, 2007; Johnson & Kaplan, 1987; Kaplan & Atkinson, 1998). Langfield-Smith and Chenhall (1998) argue that this is the only way for management accounting to remain relevant in a fast changing business environment. The new management accounting techniques have been designed to support modern technologies and new management processes, such as Total Quality Management (TQM) and Just In Time (JIT) production systems, and to support companies as they try to achieve a competitive advantage in light of increased global competition (Abdel-Kader & Luther, 2008).

Business organisations are confronted with several options as to what management accounting tools would be most effective in responding to their challenging situations (Affes & Ayad, 2014; Al-Mawali, 2015; Chenhall, 2003). An appropriate mix of management accounting tools would be one that best suits an organisation's contextual and operational contingencies (Chenhall, 2003). Such contingencies include among others, the intensity of market competition, perceived environmental uncertainty levels, diversity of operations and technology applied, size and structure of the organisation and type of personnel employed (Abdel-Kader & Luther, 2006b; Al-Mawali, 2015; Dropulic, 2013; Drury & Al-Omiria, 2007).

There have been limited studies on the application of management accounting tools or management accounting practices in South Africa (Fakoya, 2014; Waweru, Hoque, & Uliana, 2005). There are considerable studies on management accounting practices outside South Africa (Abdel-Kader & Luther, 2006b; Affes & Ayad, 2014; Ahmad & Leftesi, 2014; Al-Mawali, 2015; Alleyne & Weeks-Marshal, 2011; Chenhall, 2003; Langfield-Smith & Chenhall, 1998; McNally & Lee, 1980; Montvale, 1994; Sharkar, Sobhan, & Sultana, 2006; Uyar, 2010; Wijewardena & De Zoysa, 1999; Zabri & Ahmad, 2015). These studies reveal diversity in management accounting practices between countries and continents, sectors and organisations and also indicate varying influences of certain contingent factors on the management accounting tools used.

This study used a questionnaire survey to investigate management accounting tools used by South African companies. The study further explored the contingent factors that influence the choice of the management accounting tools employed. These included costing tools, budgeting tools, performance evaluation tools, profitability analysis tools, investment decision making tools and strategic management accounting tools. Understanding management accounting practices and the contingent factors that shape them can assist in ensuring that management accounting remains relevant and that it continues to add value to businesses. In their quest to ensure that management accounting remains relevant and continues to add value the American Institute of Certified Professional Accountants (AICPA) and the Chartered Institute of Management Accountants (CIMA) who jointly formed the Association of International Certified Professional Accountants (AICPA) in 2017 prepared global management accounting principles. The purpose of the principles was to improve decision-making in organisations through the provision of high quality management information and to support organisations in benchmarking against best practice (AICPA, 2017). The present article contributes on the importance attributed to management accounting tools and how these tools are currently supporting organisations in South Africa.

1.2 Statement of the Problem

Globalisation has opened up the local market to international players hence there is need for local companies to adopt best practices if they are to remain competitive. Management accounting practices adopted by South African companies can affect their ability to compete on both the international and domestic arena. The quality of information used for decision making (e.g. on pricing) by South African companies will to a large extent depend on the level of sophistication of the management accounting tools used. It is therefore important to know to what extent South African companies use the range of management accounting tools available and whether they are deriving value from these tools.

1.3 Purpose

The goal of this study was to establish the extent to which management accounting tools are used by South African companies. In addition, the research sought to gain an understanding of the factors influencing the use of the management accounting tools by South African companies. Added to this, it will be beneficial for managers to understand the specific challenges facing companies in South Africa and how these challenges are affecting the adoption of the various tools. Finally, the research aimed to give recommendations on future research regarding management accounting practices in South Africa.

1.4 Research questions

The following research questions were addressed in the study

(i) What management accounting tools are employed by South African companies?

(ii) What level of importance is attached to the various management accounting tools?

(iii) What contingent factors explain the use of the various management accounting tools?

1.5 Significance of the study

The study contributes to the limited academic literature on the use of management accounting tools or practices in South Africa. By investigating the factors that influence management accounting practices, the research also fills the research gap in management accounting literature and provides a basis for further research into management accounting practices.

The research aims to provide insights that could be used by tertiary institutions and accounting bodies (such as the Chartered Institute of Management Accountants (CIMA) and South Africa Institute of Chartered Accountants (SAICA)) on changing industrial needs that will be valuable for future curricula development. Practitioners will benefit from understanding what shapes practice and how they can manage change.

1.6 Assumptions, limitations and delimitations

The research assumed that the respondents' understanding of the questions asked in the questionnaire were in line with that of the researcher, as the reliability of the survey assumes consistency in their responses. In addition the study assumed that respondents answered the questions objectively.

The survey drew responses from companies that were members of the Johannesburg Chamber of Commerce and Industry (JCCI). One of the limitations of the study is that it only drew responses from Johannesburg based companies. Secondly the respondents were not industry specific hence there is scope for further research to identify how specific sectors may be utilising management accounting tools, as sector specific characteristics have not been captured in the analysis carried out.

Chapter II – Literature Review

2.1 Theoretical framework and prior research focus

Research focus in management accounting over the last century has evolved the same way management accounting practices have evolved. Scapens (2006) summarises management accounting researchers' focus into four stages as shown in Table 1.

Table 1: Four stages of research focus

Period	Methodology	Theory	Practical Dimension
1970s	Modelling	Economic	What managers should do?
1980s	Positivism	Contingency	What do managers do?
1990s	Interpretivism	Structuration	Making sense of practice
2000s	Pluralism/Pragmatism	Institutional	Helping practitioners

Source: Scapens 2006

Scapens (2006) explains that the focus for researchers in the 21st century is rather to find explanations for observed management accounting practices using a combination of reasoning and theory so as to support practitioners (Baldvinsdottir, Mitchell, & Norreklit, 2010).

2.1.1 The 1970s

During this period researchers in management accounting adopted an economic approach to management decision making and control (Scapens, 2006). Mathematical models were intended to prescribe what management accounting practitioners should do. This was because academics felt that all relevant theory had been developed by then and what was left was to communicate this to practitioners (Burns, Ezzamel, & Scapens, 2003; Burns & Scapens, 2000; Scapens, 2006).

2.1.2 The 1980s

Scapens (2006) claims it became apparent in the 1980s that researchers had limited knowledge of prevailing management accounting practices. This led researchers to begin conducting fieldwork interviewing both managers and management accountants and conducting in-depth longitudinal case studies aimed at establishing what managers do in practice.

2.1.3 The 1990s

Due to the diversity of management accounting practices observed in the late 1980s and early 1990s, the focus for management accounting research was to understand why such diversity in management accounting practice existed (Scapens, 2006). Focus changed from comparing management accounting practices with conventional prescriptions of economic theory in order to make sense out of the management accounting practices (Scapens, 1994, 2006).

2.1.4 The period 2000 and beyond

Research focus shifted to try to understand management accounting change in light of introduction of new advanced management accounting techniques (Robalo, 2014; Scapens, 1994, 2006). Scapens (2006) focused a lot on longitudinal case studies to explore management accounting change in specific organisations. Research has now taken a multidisciplinary approach with considerable theoretical diversity, with researchers drawing on disciplines as wide ranging as economics, organisation theory, sociology, social theory, politics and anthropology (Burns et al., 2003; Burns & Scapens, 2000; Scapens, 2006). Many different theoretical approaches such as economic theory, contingency theory and institutional theory are being applied (Burns et al., 2003; Scapens, 2006).

2.2 Management accounting development

In order to understand the application of management accounting tools in any organisation or country, it is imperative to understand management accounting development and what shapes management accounting practices (Abdel-Kader & Luther, 2006b; Burns & Vaivio, 2001; Ittner & Larcker, 1998). Kaplan (1984) claimed that virtually all management accounting practices employed by firms today, and explicated in leading cost accounting textbooks, had been developed by 1925 and that there has been little innovation in the design and implementation of cost accounting and management control systems.

There are several reasons why early management accounting practices have been criticised (Johnson & Kaplan, 1987). Management accounting was perceived to have lost relevance as it did not meet the needs of contemporary manufacturing and competitive environments. It focused almost entirely on internal activities with little attention given to external business environments and as such it had become subservient to financial accounting requirements (Kaplan, 1984).

Since then, management accounting has gone through a lot of change with the introduction of new techniques such as activity based costing (ABC), activity based budgeting (ABB), strategic management accounting (SMA) and the balanced scorecard (BSC) (CIMA, 2009; Kaplan & Atkinson, 1998).

The International Federation of Accountants (IFAC) issued a statement in 1998 describing developments in management accounting. The federation identified four sequential stages through which management accounting has developed. The stages are shown in Table 2. It is imperative to understand these stages of development in this study as there is a link between the stage of development and the management accounting tools applied by an entity, industry sector or country (Abdel-Kader & Luther, 2006b).

Table 2: Evolution of the focus of Management Accounting

Stage 1	**Stage 2**	**Stage 3**	**Stage 4**
Cost determination and financial control	Provision of information for management planning and control	Reduction of resource waste in business processes	Creation of value through effective resource use

Source: Adopted and modified from IFAC (1998)

Stage 1 - Cost determination and financial control. According to IFAC this stage represents the period prior to 1950. Focus of management accounting during this era was determination of product cost through the use of labour hours. Manufacturing processes were relatively simple and there was not much competition on the products market. Management was primarily focused on internal matters especially production capacity. Traditional management accounting tools dominated this era (Askrany, 2005; IFAC, 1998).

Stage 2 – Provision of information for management planning and control. Attention between the period 1950-1965 was shifted to the provision of information for planning and control purposes. IFAC sees this as management activity but in a staff role. It involved support to line management through the use of such technologies, decision analysis and responsibility accounting. Management accounting as part of management control systems tended to be reactive, identifying problems and action only when deviations from plans took place (Abdel-Kader & Luther, 2006a, 2006b; IFAC, 1998).

Stage 3 – Reduction of resource waste in business processes. This was brought about by the world recession in the 1970s and increased competition underpinned by a rapid technological development which affected many aspects of the industrial sector. Developments in computers meant that managers could access and process large amounts of data. The design, maintenance and interpretation of information systems became of considerable importance in effective management. This challenge of global competition was met by introducing new management and production techniques and at the same time controlling costs often through reduction of waste in resources used (IFAC, 1998). Management accountants were challenged to provide required information through the use of process analysis and cost management technologies that ensured appropriate information was available to support managers and employees at all levels (IFAC, 1998).

Stage 4 – Creation of value through effective resources use. As the world-wide industry faced considerable uncertainty and unprecedented advances in manufacturing and information processing technologies in the 1990s there was need for management accountants to focus on creation of value through effective use of resources using technologies which examine the drivers of customer value, shareholder value and organisational innovation. The AICPA as the leading professional body for management accountants is focusing its research on how management accounting can continue to create value for business in a Volatile, Uncertain, Complex and Ambiguous (VUCA) environment. Its focus is on how management accountants will remain relevant in an environment where artificial intelligence and block chain technology are taking over (AICPA, 2017; CIMA, 2009, 2013).

2.3 What shapes management accounting?

Prior studies on what shapes management accounting have taken both contingency (Chenhall, 2003; Dropulic, 2013) and institutional approaches (Scapens, 2006) to try explain how management accounting practices evolve over time.

2.3.1 The institutional perspective

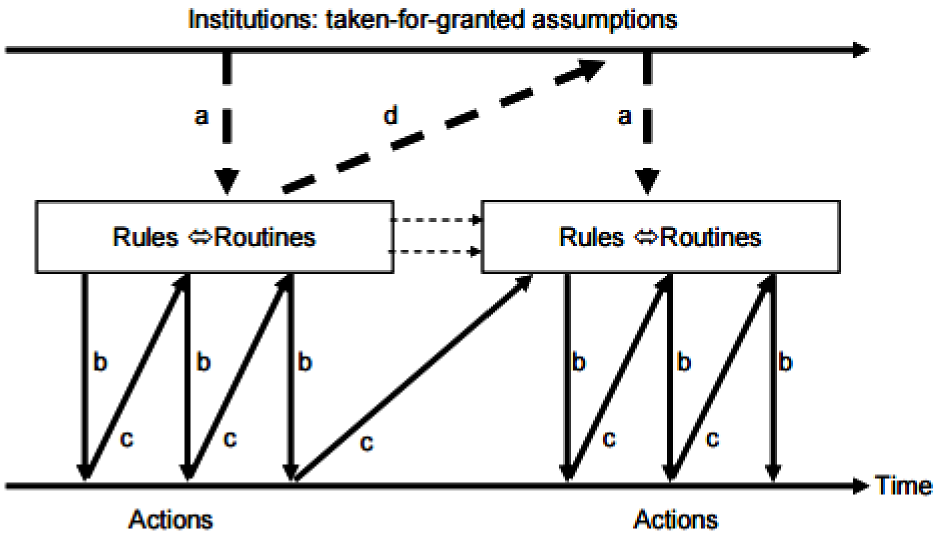
Adopting an institutional approach to understanding how organisations shape management accounting practices and how practices in turn shape organisations, Scapens (2006) splits this institutionalisation into three categories to help explain observed management accounting practices (Robalo, 2014; Wanderley, Miranda, De Meira, & Cullen, 2011). These are New Institutional Economics (NIE), New Institutional Sociology (NIS) and Old Institutional Economics (OIE). According to Scapens (2006) NIE uses reasoning to explain the diversity in form of institutional arrangements for example differences in markets, hierarchies and structures (Abdel-Kader & Luther, 2006b; Drury & Tayles, 1994; Kaplan, 1984). Scapens (2006) concluded that NIE draws attention to the economic factors which help shape the structure of organisations and their management accounting practices thereby helping understand certain aspects of the mish-mash of interrelated influences. There is need to look beyond economics to get a fuller understanding of management accounting practices (Scapens, 2006). New Institutional Economics seeks to explain how organisations seek to legitimise their existence by conforming to certain standards or practices so as to be able to secure resources they need for their continued survival (DiMaggio & Powell, 1983). Such conformance has been classified into different types of isomorphism – coercive, mimetic and normative. Coercive isomorphism occurs due to political regulative influences (Fakoya, 2014). Mimetic isomorphism occurs when organisations seek to copy the practices of other successful organisations and normative isomorphism is when the norms of society and professional bodies influence the practices of organisations (Scapens, 2006).

While NIE and NIS help explain the external environment influence on organisations, Scapens (2006) argues that not all organisations will conform to such pressures and some may be more susceptible to certain pressures rather than to others. This calls for researchers to look within organisations so as to understand management accounting practices of individual organisations (Robalo, 2014; Scapens, 1994, 2006; Wanderley et al., 2011). Old institutional economics seeks to explain how management accounting practices are shaped by circumstances within the organisation itself. It explores the way habits, rules and routines can structure economic activity and how they evolve through time.

According to Scapens (2006) adopting an OIE perspective management accounting rules can be viewed as the rules and routines which shape organisational activity and by studying how rules and routines evolve a better understanding of management accounting change is achieved. Ultimately understanding management accounting change means current management accounting tools can be explained and be in a better position to predict future management accounting tools application (Abdel-Kader & Luther, 2006b).

The Burns and Scapens (2000) framework has gained popularity in explaining the relationship between rules and routines and how these evolve and shape institutions over time (Robalo, 2014). The framework is shown in Figure 1

Figure 1: The Burns and Scapens framework



Source: Burns and Scapens (2000)

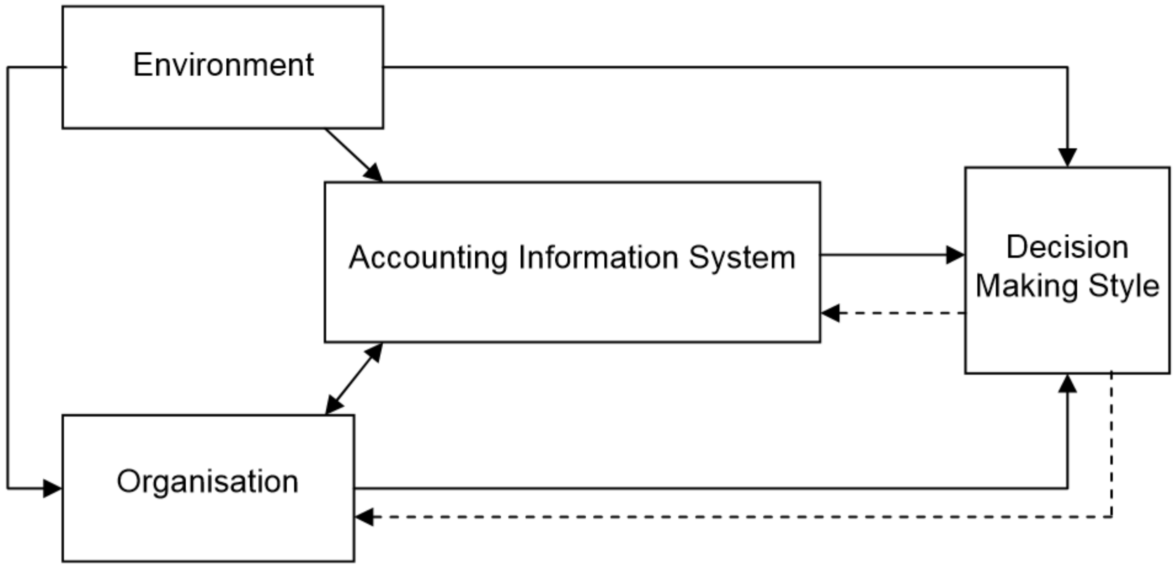
According to the Burns and Scapens framework, there is a link between institutions (institutional realm) and the daily actions carried out by members of the organisation (action realm). The connection between the two realms is made through rules and routines. The institutions influence the action at a specific moment in time (synchronised effect), which explains that the arrows *a* and *b* are represented vertically. The actions of the agents involved in the process of change produce and reproduce institutions over time (diachronic effect) by way of the creation of routines and rules. This effect of actions on the institutions is represented through the oblique arrows *c* and *d*. The processes of change at the institutional level require longer periods of time than the processes of change at the level of action; therefore, the slope of arrow *d* is not as steep as that of arrow *c*. This framework shows management accounting as a set of rules and routines that can be routinised and institutionalised in organisations. While the framework explains how management accounting practices develop and change, the framework has been criticised for only paying attention to organisational internal circumstances (Robalo, 2014; Scapens, 2006).

Scapens (2006) explains that the importance of routinisation and institutionalisation in explaining management accounting practices cannot be underestimated. Company policy is entrenched in such history. He used the anecdote of monkeys to explain why practitioners in some organisations only know *how* it is done and not *why* it is done the way they do.

2.3.2 Contingency perspective

The contingency theory claims there is no universally acceptable model that explains the diversity of management accounting tools use; therefore use depends on contingent factors relevant to the situation (Chenhall, 2003). Designing of management accounting systems should be dependent on firm specific contingencies where environmental, organisational and decision style variables can contribute to understanding such systems (Gordon & Miller, 1976; Mat, 2013). Figure 2 shows the Gordon and Miller's Framework.

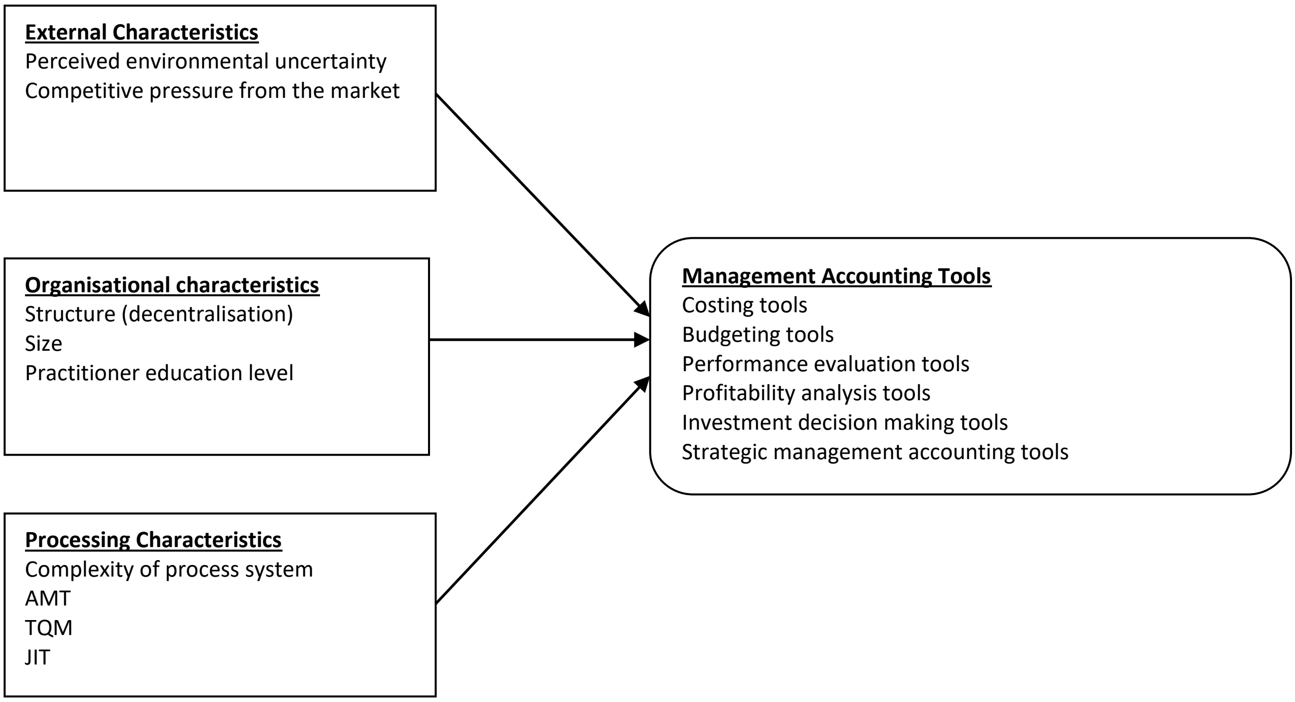
Figure 2: Gordon and Miller's Framework



Source: Gordon & Miller (1976)

Environmental factors are those factors external to the organisation and include dynamism, heterogeneity and degree of differentiation, bureaucratisation, available resources, integration through committee and rules or policies (Gordon & Miller, 1976). Organisations shape management accounting systems and are in turn shaped by the same accounting systems as shown by the double arrow in the Gordon and Miller Framework. Figure 3 shows a conceptualised model classifying the contingent factors into external, organisational and processing characteristics (Abdel-Kader & Luther, 2008).

Figure 3: The Conceptual Model: Factors influencing use of management accounting tools



Source: Adopted (modified) from Abdel-Kader and Luther (2008)

2.3.2.1 External characteristics

Perceived environmental uncertainty: The level of uncertainty faced by an organisation determines the amount and complexity of information required for decision making. The more unpredictable the environment is (customers behaviour, competitor activity, government policy, etc.) the more sophisticated the required management accounting tools have to be (Abdel-Kader & Luther, 2008; Affes & Ayad, 2014; Al-Mawali, 2015). According to Abdel-Kader and Luther (2008) firms that perceive a higher degree of uncertainty tend to use more sophisticated management accounting tools. The degree of perceived environmental uncertainty positively influences the use of the selected management accounting tools.

Competitive pressure from the market: Market competition faced by firms has an impact on an organisation's strategy. Firms faced with intense competition are likely to employ more sophisticated and modern management accounting practices. Zabri and Ahmad (2015) found a positive relationship between the intensity of market competition and the use of certain management accounting tools. Competitive pressure from the market has a positive influence on the use of the selected management accounting tools.

2.3.2.2 Organisational characteristics

Structure (decentralisation): Large and decentralised organisations are characterised by use of more administrative controls and sophisticated management accounting practices (Chenhall, 2003). There is need for provision of integrated information hence such organisations are likely to employ sophisticated management accounting tools. The structure of an organisation has a positive influence on the application of the selected management accounting tools.

Size: The size of a firm can be measured by turnover, number of employees or total assets (Abdel-Kader & Luther, 2008). Larger firms are likely to have adequate resources to support sophisticated processes and management accounting tools as opposed to smaller organisations (Abdel-Kader & Luther, 2008; Affes & Ayad, 2014; Chenhall, 2003; Zabri & Ahmad, 2015). The size of an organisation has a positive influence on the application of the selected management accounting tools.

Practitioner education level: The level of knowledge that management accountants possess is likely to have an impact on the complexity of management accounting tools applied. Practitioners are usually comfortable applying concepts that they are well versed with and have learnt in their formal studies (Fakoya, 2014; Garg, Ghosh, Hudick, & Nowacki, 2003; Graham & Harvey, 2001). This study tests whether the practitioner’s level of education has a positive influence on the application of the selected management accounting tools.

2.3.2.3 Processing characteristics

Complexity of process system, technology, total quality management and just-in-time: Measured by product line diversity, application of advanced manufacturing technology (AMT), manufacturing resource planning (MRP), computer aided design (CAD), numerical control (NC), flexible manufacturing systems (FMS) and computer aided inspection, will impact on the level of management control systems (which management accounting is part of) (Chenhall, 2003). Previous studies have found that the use of technology had significant influence on the use of certain management accounting practices (Abdel-Kader & Luther, 2008; Drury & Al-Omiria, 2007; Garg et al., 2003; Sharkar et al., 2006; Wijewardena & De Zoysa, 1999; Zabri & Ahmad, 2015).

2.4 Evolution of management accounting tools

The last century has seen an unprecedented change in management accounting techniques with some being introduced as solutions to shortcomings of traditional or contemporary management accounting tools (Albright & Lam, 2006; Kaplan & Atkinson, 1998).

2.4.1 Costing tools

The focus of costing has changed from mere cost determination and cost classification and taken a broader view of cost control. Traditionally costing focused on determining product costs for pricing purposes using some arbitrary methods (Drury & Al-Omiria, 2007; Kaplan & Cooper, 1998). Costs were mainly classified into variable and fixed (sometimes called period costs). The increase in competition and demand for accurate product costs has led to the development of modern costing techniques such as ABC and target costing. This has been assisted by the improvement in technology which has made processing of volumes of information faster and easier (Kaplan, 1984; Kaplan & Atkinson, 1998; Sharaf - Addin, Omar, & Sulaiman, 2014).

2.4.2 Budgeting tools

Traditionally budgets were used as benchmark against which success or failure was measured in terms of resource utilisation over a period. Budgeting horizons tended to be longer as environments were stable and more predictable. As the business environment became less predictable and more complex, there was need for new techniques to be introduced to ensure relevance of the budgets (CIMA, 2013). Budgeting then evolved from taking a period and incremental approach to using new techniques such as ABB, zero based budgeting, flexible budgeting and budgeting with what if analysis (CIMA, 2009; Kaplan & Atkinson, 1998).

2.4.3 Performance evaluation tools

Performance evaluation has traditionally focused on financial measures. Increased competition has pushed organisations to look at non-financial measures of performance such as non-financial measures related to customers, employees and operations and innovation (Ittner & Larcker, 1998; Jinga & Dumitru, 2015). Benchmarking has also been introduced as a modern technique as organisations try to gain that competitive advantage (CIMA, 2013).

2.4.4 Profitability analysis tools

Improvements in costing techniques have resulted in better profitability measures being introduced. The ability to establish product costs using ABC has meant that organisations could shift from looking at overall organisational profitability and focus on product or customer profitability (CIMA, 2013; Sharaf - Addin et al., 2014). Improvements in technology have also assisted in coming up with sophisticated and efficient stock models.

2.4.5 Investment decision making tools

The payback method used to be the most popular method of evaluating capital projects (Graham & Harvey, 2001; Kaplan & Atkinson, 1998). In a VUCA world the variables on capital projects become so complicated that the payback period is faced with a lot of inadequacies. As a result, modern capital appraisal techniques that take into account the risk profile of cash flows have been developed. These include discounted cash flow methods and computer simulation (Graham & Harvey, 2001). The 21st century has seen an increase in pressure from environmental activists which has brought another dimension to investment appraisal. Organisations are now being forced to include the social impact of their projects in their investment appraisals (Graham & Harvey, 2001; Jinga & Dumitru, 2015).

2.4.6 Strategic management accounting tools

Strategic management accounting is a fairly new concept in management accounting. SMA tools have been developed in an attempt to ensure management accounting remains relevant (CIMA, 2013; Roslender, 1996). The VUCA world entails that organisations must pay more attention to external factors now than before as they craft their strategies (AICPA, 2017; CIMA, 2013). The range of SMA tools includes forecasting, shareholder value analysis, industry analysis, competitor position analysis, value chain analysis and strength, weaknesses, opportunities and threats (SWOT) analysis (Kaplan & Atkinson, 1998; Langfield-Smith & Chenhall, 1998).

This chapter has reviewed how management accounting practices have evolved over time using both an institutional and a contingent perspective. Contingent factors that influence management accounting tools usage have been explored. Selected management accounting tools have also been explained. This study focuses on how the contingent factors influence usage of the selected management accounting tools in the South African context.

Chapter III – Methodology

3.1 Population and Sample

The research used a positivist approach in testing the following three research questions. RQ1: What management accounting tools are employed by South African companies? RQ2: What level of importance is attached to the various management accounting tools? RQ3: What contingent factors explain the use of the various management accounting tools in the South African context? The data collection aimed at gathering data on management accounting tools usage, their importance to firms in the South African context and the possible factors influencing their application. A survey questionnaire was used to collect the required data.

For the purpose of this study the population was defined as all firms in South Africa. The sample was drawn from firms registered with the Johannesburg Chamber of Commerce and Industry (JCCI) as at 30 September 2016. The researcher obtained a database with 1332 members. Of these 1 142 had telephone numbers and only 995 had email addresses.

3.2 Instruments

The research was based on a comprehensive online questionnaire (copy included in Appendix A) designed to collect the required data from respondents. The questionnaire was designed using Survey Monkey. This questionnaire was modelled along the same parameters as ones used in prior research (Abdel-Kader & Luther, 2006b, 2008; CIMA, 2009; Zabri & Ahmad, 2015).

Section A of the questionnaire was designed to collect demographic data. In section B respondents were required to indicate whether they used or did not use the selected management accounting tools. In addition, respondents were requested to indicate the level of usage or importance on a Likert scale where 1 was not used and 5 was frequently used/very important signifying the level of importance of each of the 37 management accounting tools to their organisations. In section C, to ascertain what contingent factors affected use of the management accounting tools, respondents were required to rate each of the contingent factors for their organisations. In this section the survey collected data to determine whether there is a relationship between selected contingent factors and the selected management accounting tools. Section D of the questionnaire required respondents to indicate which management accounting tools their organisations would be adopting soon. The questionnaire ended with a general comments box requesting respondents to give a general comment on the use of management accounting tools in their organisation. Table 3 shows how responses on use or non-use and level of use (importance) were collected using YES/NO and a 5-point Likert scale. The questionnaire can be found in Appendix A.

Table 3: Summary of management accounting tools

Management accounting tools	**Use**	**Level of usage/importance**
Costing (7 tools)	Yes/No	1-5 –Likert scale
Budgeting (7 tools)	Yes/No	1-5 –Likert scale
Performance evaluation (6 tools)	Yes/No	1-5 –Likert scale
Profitability analysis (4 tools)	Yes/No	1-5 –Likert scale
Investment decision making (5 tools)	Yes/No	1-5 –Likert scale
Strategic management accounting (8 tools)	Yes/No	1-5 –Likert scale

3.3 Model and data analysis

Analysis of data collected was aimed at addressing management accounting tools usage level, their importance and ultimately the factors influencing their usage.

3.3.1 Usage of tools

Data collected on use or non-use of the various tools was analysed using descriptive statistics. Statistics such as what percentage of the respondents used a tool was calculated and presented in the form of graphs, charts and tables.

3.3.2 Importance of tools

The level of importance of each tool was analysed using descriptive statistics. A management accounting tool with a rating of 5 means that the tool was very frequently used or very important for the firm. Calculating the sample mean for each management accounting tool assisted in rating how important (level of usage) the management accounting tool was in the sample e.g. a mean of 4 on budgeting would indicate that budgets are frequently used by the sampled companies. Means and medians were also calculated and assisted in analysing the data on the level of usage or importance.

3.3.3 Contingent factors

Nine contingent factors were tested against each of the 37 management accounting tools to establish whether the contingent factors influenced the level of importance associated with each tool. This was done using ordered probit regression analysis. The contingent factors were the independent variables in the regression model. Table 4 shows a summary of the factors. Respondents were asked to rank these on a Likert scale of 1-5.

Table 4: Summary of contingent factors (independent variables)

Independent Variable	**Ranking**	**Key**
Perceived environmental uncertainty	5 –Likert scale	1=highly predictable (low uncertainty), 5=highly unpredictable (high uncertainty)
Competitive pressure from the market	5 –Likert scale	1=not intense at all, 2=not intense,3=slightly intense,4=intense,5=very intense
Structure (decentralisation)	5 –Likert scale	1=no delegation at all, 5=highly decentralised (full delegation)
Size	5 –Likert scale	1=<R100, 2=R100-500million, 3=R501-1 billion,4=R1-2 billion, 5=>R2 billion
Practitioner education level	5 –Likert scale	1=no formal business qualification, 2=Business certificate, 3=Business Diploma, 4=Business undergraduate degree, 5=Professional accounting qualification/Business Masters degree
Complexity of process system	5 –Likert scale	1=not diversified, 5=highly diversified
AMT	5 –Likert scale	1=not used, 5=widely used
TQM	5 –Likert scale	1=not used, 5=widely used
JIT	5 –Likert scale	1=not used, 5=widely used

Research question (iii) in 1.4 aimed to establish some relationships between the selected contingent factors (the independent variables) and the selected management accounting tools (the dependent variables) as per the below model;

$$MATU = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon$$

Where;

MATU = management accounting tool usage

β_0 - β_9 =determination coefficients of the constant and of the independent variable

X_1-X_9 = the contingent factors or independent variables i.e. (perceived environmental uncertainty, competitive pressure from the market, structure, size, practitioner education level, complexity of process, AMT, TQM, JIT)

ε = error term

Since the data is ranked and not linear, ordered probit regression analysis was used to test for the relationship between the contingent factors (independent variable) and management accounting tool (dependent variable). The researcher used Eview software and Excel for statistical analysis and data presentation. The model was run 37 times as 37 tools were assessed. The list of abbreviations used when running the model are in Appendix B. The results of the statistical analysis are shown in Appendix C.

A positive parameter in the regression model indicates that higher values of the associated contingent variable (X) increases the probability of the importance of the tool (Y). For example, a **positive** contingence factor will increase the probability for a **higher** ranking on the importance, *ceteris paribus*; a **negative** contingence factor will **decrease** the probability for a higher ranking on the importance, *ceteris paribus.* So only, the sign of the parameter/coefficient of the results can be interpreted. To interpret the magnitude of the coefficients the marginal effect has to be calculated. The marginal effect gives the increase in probability of the importance of the dependent variable for each unit increase of the independent variable. The coefficients and the marginal effects for the 37 regression models were calculated and are included in Appendix B.

3.4 Validity, reliability and non-response bias

The questionnaire was piloted prior to being sent to the companies. Following the feedback received there were some changes to the questionnaire. The statistical analysis was carried out with the help of a statistician who ensured that the procedures followed were appropriate for use of the Ordered Probit regression model. The researcher is also confident of the results of the survey as the questionnaires were directed to the Finance Departments to make sure they were completed by people who understood the subject matter.

Chapter IV – Results

4.1 Introduction

The researcher contacted the selected companies by email to alert them of the impending research questionnaire. Emails targeted CFO/accountants and, where there was no finance contact, recipients were requested to forward the emails to their finance personnel. Respondents were given two weeks to respond to the questionnaire. The response rate was very low with less than 30 responses received in two weeks. The researcher then decided to follow up by resending the emails for the second time and calling the respondents as a reminder.

Questionnaires were e-mailed to respondents on the 3rd of January 2017. Respondents had up to the 17th of January 2017 to complete the questionnaire. The target response rate was 100 usable questionnaires. The researcher however managed to get 66 responses from the 942 targeted respondents signifying a 7% response rate. Of the 66 responses only 38 responses were fully complete; meaning 28 of the questionnaires could not be used for the purpose of this study. Even though the number of usable questionnaires was low, upon consulting with the statistician that carried out the analysis it was established that 38 responses would be sufficient to carry out the ordered probit regression.

4.2 Results analysis

The first research question (RQ1) aimed to establish which of the selected management accounting tools were employed by companies in South Africa. RQ1 is restated here.
RQ1: What management accounting tools are employed by South African companies? The second research question (RQ2) sought to establish the level of importance attached to each management accounting tool. The research question is restated here. RQ2: What level of importance is attached to the various management accounting tools?

The difference between the first and second research questions is that RQ2 asks respondents to rate the importance of each tool to their organisations using a 5-point Likert scale whereas RQ1 only focused on whether a tool was used or not.

The third research question aimed to establish if there was a relationship between use of selected management accounting tools and selected contingent factors. The research question is restated as follows: RQ3 – What contingent factors explain the use of the various management accounting tools in the South African context? Respondents were asked to rank the nine contingent factors on a 5-point Likert scale. The results of their ranking are shown in Table 6.

Before analysing the results, it was important to look at the sectors of the responding firms. As shown in Table 5 the sample was dominated by financial and service sectors making up 47.4% of the sample. Interestingly retail was only 5.3% and manufacturing 13.1%. As can be seen the nature of the sectors is very diverse. Also 34.2% of companies did not fit into the categories that had been initially identified.

Table 5: Industry sector analysis

Industry/Sector	Number	Percentage
Financial	9	23.7%
Retail	2	5.3%
Service	9	23.7%
Manufacturing	5	13.1%
Other	13	34.2%
	38	**100.0%**

4.3 The Contingent Factors

Table 6 shows a summary of the contingent factors and their rating amongst the responding firms.

Table 6: Contingent factor rating

Contingent Factors	n	Mean	Median	S.D	Key
Perceived Environmental Uncertainty	38	3.37	3.00	0.91	1=highly predictable (low uncertainty), 5= highly unpredictable (high uncertainty)
Competitive pressure from the market	38	4.05	4.00	0.73	1=Not intense at all, 2=Not intense, 3 =Slightly intense, 4=Intense, 5=Very Intense
Structure (Decentralisation)	38	3.29	3.00	1.14	1= No delegation at all, 5= Highly decentralised (full delegation)
Size (measured by annual turnover)	38	2.34	2.00	1.42	1= <R100 million 2 =R100-500 million, 3= R501- 1 billion, 4= R1- 2 billion, 5 = > R2 billion
Accounting practitioner education level	38	4.32	4.50	0.81	1=no formal business qualification 2= Business Certificate 3=Business Diploma 4= Business undergraduate degree 5 = Professional accounting qualification/Business Masters degree
Complexity of process and product multiplicity	38	3.24	3.00	1.17	1 = being not diversified and 5 = highly diversified
Advanced Manufacturing Technology (AMT) use	38	1.79	1.00	1.21	1 indicating not used and 5 indicating widely used
Total Quality Management	38	2.76	3.00	1.32	1 indicating not used and 5 indicating widely used
Just In Time (JIT) use	38	2.30	2.00	1.44	1 indicating not used and 5 indicating widely used

Respondents were asked to rate the contingent factors using the key shown in Table 6. The results of the ratings indicate that the operating environment was somewhat unpredictable (PEU mean=3.37, median=3), characterised by intense competition (competitive pressure from the market mean=4.05, median=4) and firms had some degree of decentralisation (mean=3.29, median=3). Size as measured by annual turnover indicates that on average responding firms had an annual turnover between R100-R500 million. Accounting practitioners had on average a business undergraduate degree. The firms also had some degree of complexity of process and product multiplicity (mean=3.24, median=3) but there was little to no use of AMT (mean=1.79, median=1). This could be explained by the fact that only 13.1% of firms were manufacturing firms and of those the manufacturing operations are likely to be relatively simple. Total quality management was somewhat used (mean=2.76, median=3) while JIT was rarely used (mean 2.30, median=2).

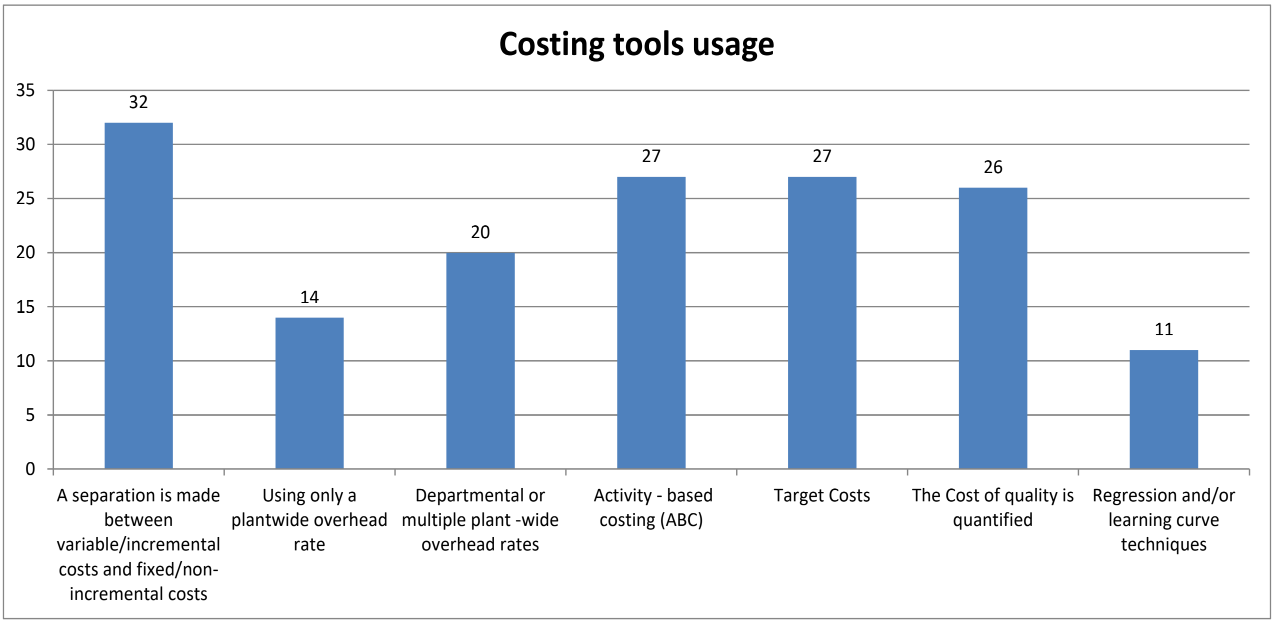
4.4 Costing tools

Seven costing tools were investigated as shown in Figure 4.

4.4.1 Costing tools usage

The study revealed that all selected costing tools were in use. This included a combination of tools developed in the nineteenth century and contemporary tools such as ABC (Dugdale, Jones, & Green, 2005). Most firms (84.2%) separate between variable and fixed costs. Second in popularity was ABC with 71.1% of the respondents using this technique. Less popular was use of plant wide overhead rate at 36.8% and regression and/or learning curve techniques at 28.9%.

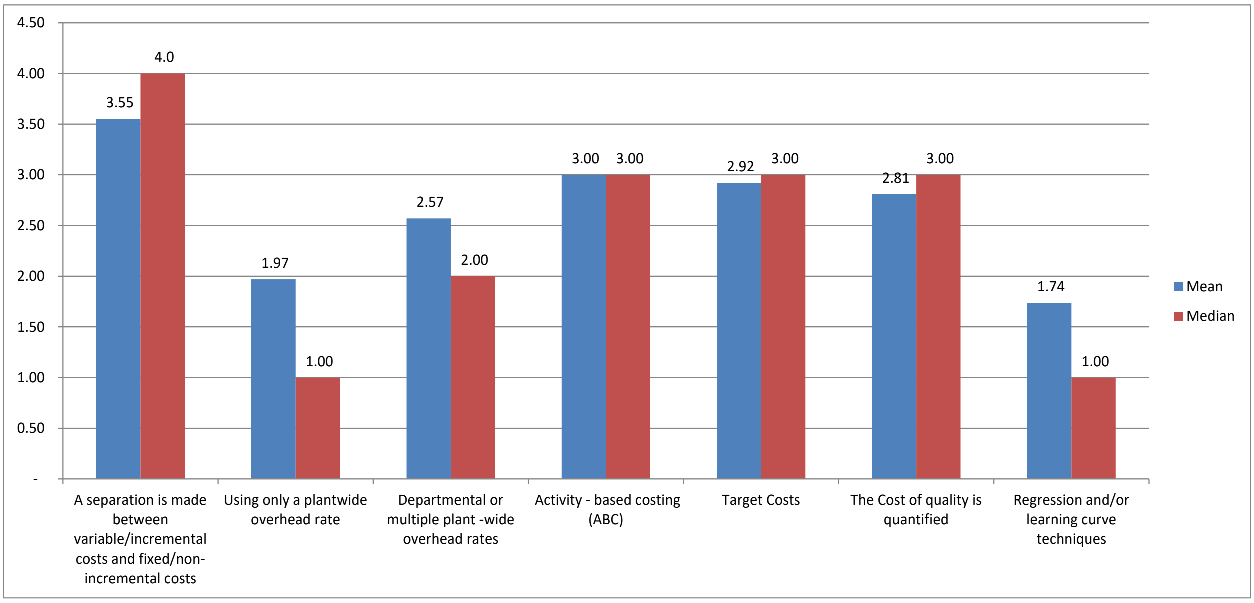
Figure 4: Costing tools usage



4.4.2 Costing tools importance

Figure 5 shows how the costing tools were rated in terms of importance or frequency of use. The mean and median were used to analyse the results.

Figure 5: Costing tools importance



The results show that the most important costing tool was the separation of variable and fixed costs with a median of 4 and mean of 3.55. Target costs, ABC and quantifying the costs of quality were less frequently used with each having a median of 3. Use of only a plant wide rate had a mean of 1.97 (median=1) meaning the tool was far less important. This is also confirmed by a 36.5% usage among responding firms. Use of departmental or multiple plant wide overhead rates had a mean of 2.57 (median = 2) indicating little importance was attached to the technique. Regression and/or learning curve techniques had a mean of 1.74 (median =1) also indicating close to nil importance was placed on the tool.

4.4.3 Contingent factors affecting use of costing tools

Table 7 summarises the findings for the ordered probit regression model. Only the significant variables are shown. For each variable the sign of the coefficient (either +/-) and the level of significance is given. This will apply to all probit regression analysis tables in this report.

Table 7: Probit regression analysis – costing tools

Contingent factors	PEU	COMP	STRUC	SIZE	EDU	DIV	AMT	TQM	JIT
Costing Tool									
A separation is made between variable/incremental costs and fixed/non- incremental costs				(+)0.0119**					(+)0.0536*
Using only a plantwide overhead rate	(+)0.0302**					(+)0.0053***	(+)0.0132**		
Departmental or multiple plant -wide overhead rates	(-)0.0006***		(+)0.0095***	(-)0.0611*	(+)0.0023***		(+)0.0122**	(+)0.0518*	
Activity - based costing (ABC)			(-)0.0769*						(+)0.0067**
Target Costs	(-)0.057*							(+)0.0567*	
The Cost of quality is quantified									
Regression and/or learning curve techniques							(+)0.0561*		(+)0.0768*
	* 90% confidence level		** 95% confidence level		*** 99% confidence level		(+)(-) sign of the regression coefficient		

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

Based on ordered probability analysis, the study found no relationship at all between the contingent factors and the quantification of cost of quality as shown in table 7. This could be attributable to the composition of the sample as manufacturing companies who often place a bigger emphasis on cost of quality accounted for only 13.1% of the respondents. Use of JIT system and size were found to have a relationship with the separation of variable and fixed costs. Holding other factors constant, an increase in firm size would result in a 2% increase in the use of the 'separation between variable and fixed costs' as shown in the marginal effect (Equation 1, Appendix D). The greater the firm size (turnover) the more likely a separation of variable and fixed costs is done. A JIT system will increase the probability of a higher ranking of the separation between variable and fixed costs. All other things being equal, a unit increase in JIT will result in a 2% increase in the application of the separation between variable and fixed costs. Use of only plant wide overhead rate could be related to PEU, complexity of process and product and use of AMT as shown in Table 7. Holding other factors constant, a unit increase in the PEU would result in a 0.2% increase in the use of only plant wide overhead rate. As product diversity and process complexity increases there is only a marginal increase in the use of only plant wide overhead rates. An increase in use of AMT would also result in a marginal increase in the use of only plant wide overhead rate. The more diversified the product range and complex the manufacturing process is, the greater the fixed costs. In such environments there is need to allocate overheads to a variety of products based not only on plant wide overhead rate (Drury & Al-Omiria, 2007).

The most outstanding tool was the use of departmental or multiple plant overhead rates. This could be linked to six of the nine contingent factors investigated. A unit increase in PEU (holding other factors constant) would result in 4% decrease in the use of multiple plant overhead rates. A unit increase in structure (decentralisation) would result in a 22% increase in the use of multiple plant overhead rates. This is more common in decentralised organisations who have to share costs relating to shared services amongst operating business units (Drury & Tayles, 1994). As the size (measured by turnover) increases the use of multiple plant wide overhead rates goes down by 10% (see Appendix D).

The study revealed that as the management accounting practitioner's level of education increases use of multiple plant wide overhead rates become increasingly prevalent. This could be attributed to practitioners applying what they learnt in business school, see Graham and Harvey (2001). According to the results holding other factors constant, a unit increase in practitioner's education level would result is a 23% increase in the use of multiple plant wide overhead rates.

Activity based costing could only be linked to structure and JIT usage contrary to prior studies which established a relation between ABC and all the nine contingent factors (Abdel-Kader & Luther, 2006b; Drury & Al-Omiria, 2007). This could be attributable to the fact that there were less manufacturing companies in the sample. According to the results the more decentralised an organisation is, the less likely the use of ABC as business units become autonomous.

Target costing could be linked to PEU and TQM. An increase PEU would reduce the importance of target costing all other factors remaining constant. On the other hand an increase in the use of TQM would result in an increase in the use of target costing. An organisation that employs TQM will monitor all its costs and would not accept any deviations in the cost of their products.

Regression and/or learning curve techniques are complex mathematical models that require proper systems to be implemented and benefit organisations. According to the study use of this tool could only be linked to AMT and JIT systems. The lack of sophisticated manufacturing companies in the sample could also have contributed to the results.

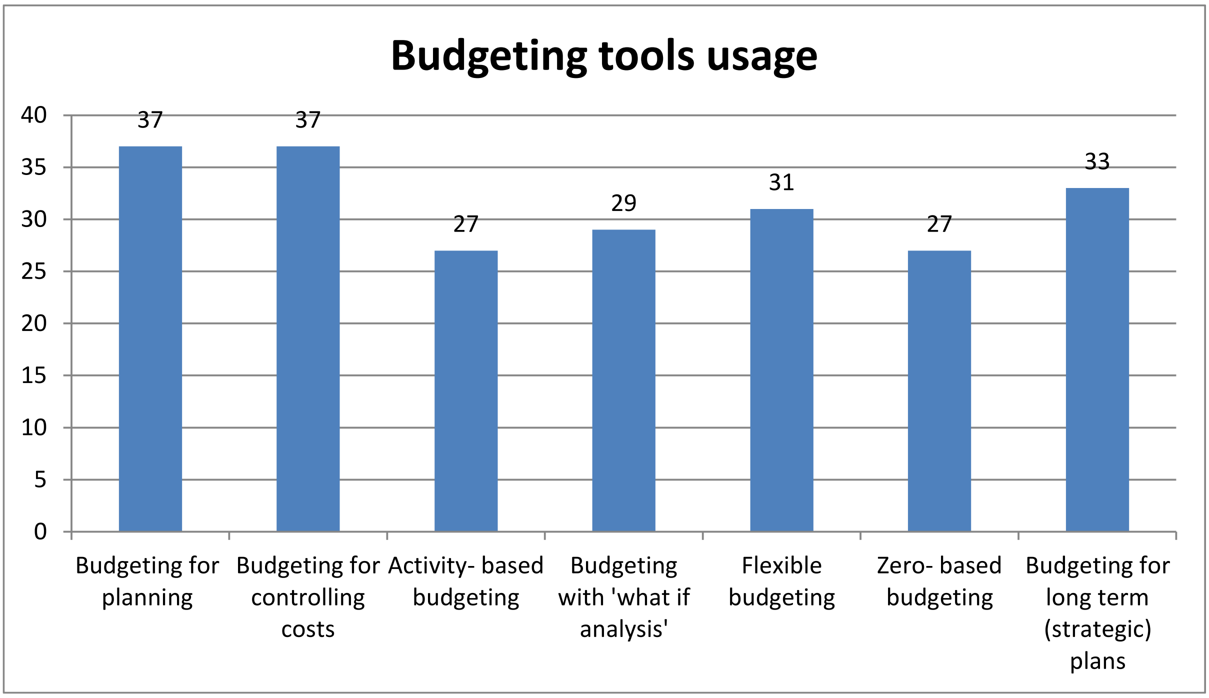
4.5 Budgeting tools

Seven budgeting tools were investigated. These were budgeting for planning, budgeting for controlling costs, activity based budgeting, budgeting with 'what if' analysis, flexible budgeting, zero based budgeting and budgeting for long term (strategic) plans.

4.5.1 Budgeting tools usage

Budgeting tools appeared to be the most popular with 97.4% of the respondents indicating using at least one of the selected budgeting tools. ZBB as well as ABB was used by 71.1% of firms. Ninety seven percent used budgeting for planning and controlling costs. The results from the analysis are shown in figure 6.

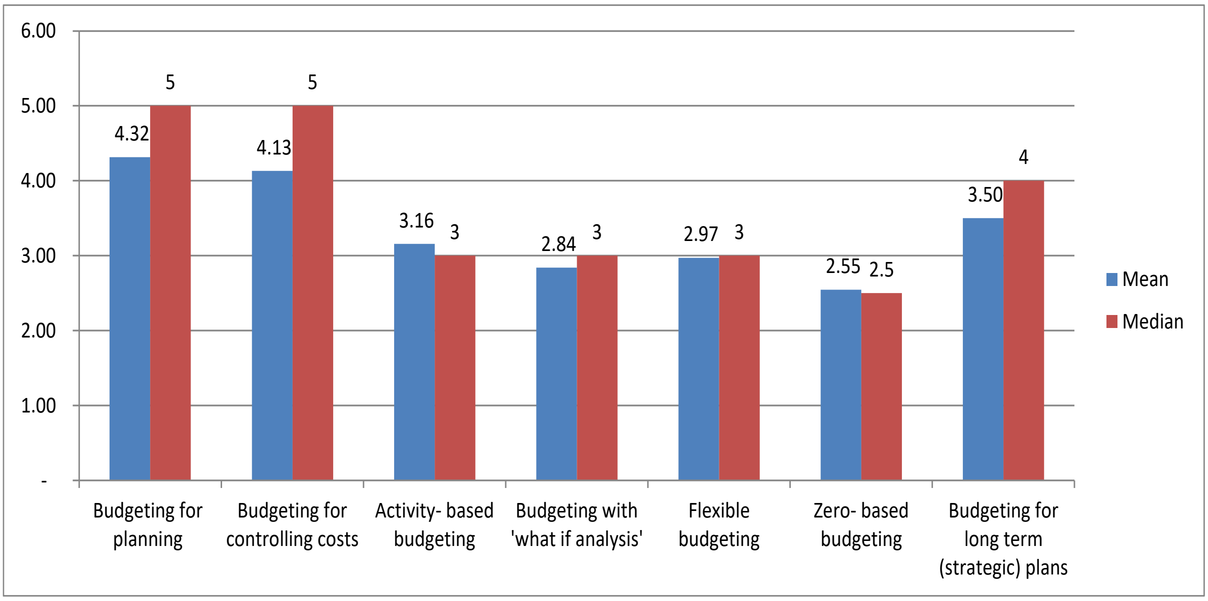
Figure 6: Budgeting tools usage



4.5.2 Budgeting tools importance

Budgeting as a management accounting tool received the highest rating in terms of importance. Budgeting for planning had a mean of 4.33 (median=5) indicating very frequent use and very high importance. Out of the 38 respondents only one company (2.6%) confirmed they did not use budgets at all. Budgeting for controlling costs with a mean of 4.13 (median =5) ranked second among budgeting tools. Budgeting for long term (strategic) plans was third in importance with a mean of 3.5 and median of 4. Less frequently used were ABB (mean=3.16, median=3), budgeting with 'what if analysis' (mean=2.84, median=3), flexible budgeting (mean=2.97, median=3) and zero-based budgeting (mean=2.55, median=2.5). These results are summarised in Figure 7.

Figure 7: Budgeting tools importance



4.5.3 Factors affecting use of budgeting tools

Out of the seven budgeting tools investigated, budgeting for planning was the only tool that could not be related to any of the nine contingent factors, see Table 8. This could be attributable to the fact that regardless of circumstances organisations do budget for planning purposes anyway. This can be supported by the 97.4% usage rate and stands out as the highest among all 37 management accounting tools investigated.

Table 8: Probit regression analysis –Budgeting tools

Contingent factors	PEU	COMP	STRUC	SIZE	EDU	DIV	AMT	TQM	JIT
Budgeting tools									
Budgeting for planning									
Budgeting for controlling costs		(-)0.0386**					(-)0.0546*		
Activity- based budgeting									(+)0.062*
Budgeting with 'what if analysis'							(-)0.0525*	(+)0.0144**	(+)0.0116**
Flexible budgeting					(+)0.068*		(+)0.0269**		
Zero- based budgeting		(-)0.030**		(+)0.0084***			(-)0.0007***	(+)0.0235**	(+)0.0279**
Budgeting for long term (strategic) plans		(-)0.0566*			(+)0.0241**			(-)0.0427**	(+)0.0134**
	* 90% confidence level			** 95% confidence level	*** 99% confidence level			(+)(-) sign of the regression coefficient	

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

The results of the study show a relationship between competitive pressure from the market and budgeting for controlling costs. A unit increase in the competitive pressure, ceteris paribus, will result in 2% decrease in the probability of importance or usage of budgeting for controlling costs. This is contrary to expectations as we would expect importance of cost control to increase with increased competition. This could be explained by companies who do not use cost as a strategy despite being faced by intense competition. The study also confirms a relationship between AMT usage and budgeting for controlling costs. The results indicate that holding all other factors constant, a unit increase in AMT usage will result in a 7% decrease in the probability of importance or usage of budgeting for controlling costs.

Activity based budgeting could only be linked to the use of JIT systems. A unit increase (all other factors remaining constant) would result in a 3% increase in the probability of usage of ABB. This confirms theory as in JIT environments activities consume resources which cause costs (Kaplan, 1984; Kaplan & Atkinson, 1998).

Budgeting with what if analysis is used to solve complex management accounting problems by bringing in different scenarios, (Kaplan & Atkinson, 1998). The study confirms that AMT usage, TQM and JIT systems usage have an impact on the usage of budgeting with ‘what if’ analysis. Holding all other factors constant, a unit increase in the use of AMT decreases the probability of importance or usage of ‘what if’ analysis by 7%. On the other hand a unit increase in TQM or JIT (independently and holding other factors constant) usage will increase the probability of importance of ‘what if’ analysis by 9%.

Flexible budgeting could only be linked to two contingent factors which are accounting practitioner education and AMT usage. Holding other factors constant, a unit increase in practitioner education or AMT will increase the probability of usage of flexible budgeting by 11% as shown in Appendix D (Equation 12).

Zero based budgeting could be linked to at least five of the nine contingent factors investigated although it was the least used tool amongst the seven budgeting tools. A unit increase, ceteris paribus, in competitive pressure from the market will reduce the probability of importance of zero based budgeting, while a unit increase in size of organisation will increase the probability of importance or usage of zero based budgeting. Abdel-Kader and Luther (2008) found that a positive relationship exists between budgeting and the contingent factors in their study on how firm specific characteristics affected management accounting practices in the UK beverage industry. The bigger the organisation the more likely it is to employ sophisticated budgeting tools. The results also confirm that holding other factors constant, a unit increase in AMT usage will reduce the probability of the usage of zero based budgeting by 6%. A unit increase in TQM and JIT (one at a time and holding other factors constant) will increase the probability of usage of zero based budgeting by 4% and 3% respectively. These results confirm the findings of Abdel-Kader and Luther (2008).

Budgeting for long term strategic plans could be linked to competitive pressure from the market, accounting practitioner education level, TQM and JIT systems usage. All other factors remaining the same, an increase in competitive pressure will result in a decrease in the probability of importance of budgeting for long term strategic plans. The more intense the level of competition we would expect organisations to craft long term strategies hence the result is not as expected. However, the study suggests that firms that are not market leaders in their industries end up focusing on short term strategies which in most cases are reactionary. The more learned an accounting practitioner becomes the more they are likely to employ modern management accounting tools (Graham & Harvey, 2001). This is confirmed by the results where a unit increase in the education level, ceteris paribus, will increase the probability of importance for long term strategic planning by 13,5%. A unit increase in the use of TQM will result in a decrease in the probability of importance of budgeting for long term strategic plans by 10%. Finally, a unit increase in JIT system usage will increase the probability of usage of budgeting for long term strategic plans by 11.4%.

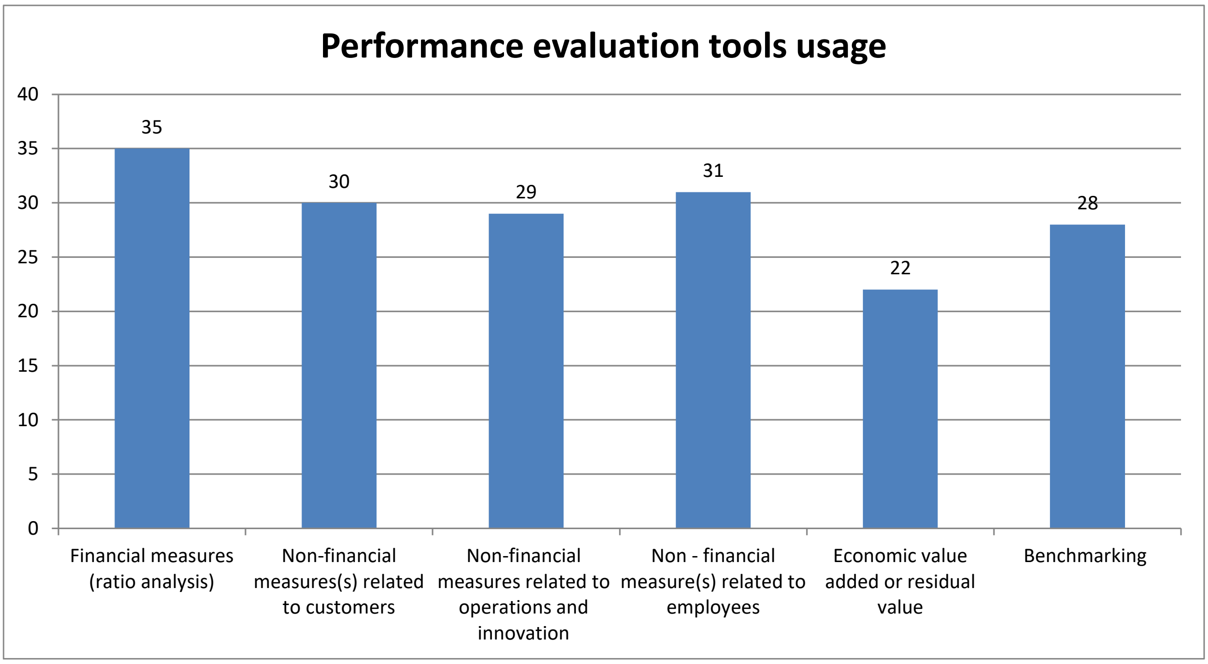
4.6 Performance evaluation tools

Six performance evaluation tools were investigated. Benchmarking, economic value added (EVA), non-financial measures related to employees, non-financial measures related to operations and innovation, non-financial measures related to customers and ratio analysis were the six tools investigated.

4.6.1 Performance evaluation tools usage

The study revealed that financial measures still top the list of performance evaluation tools with usage at 92.1% among responding firms. Figure 8 shows these results.

Figure 8: Performance evaluation tools usage

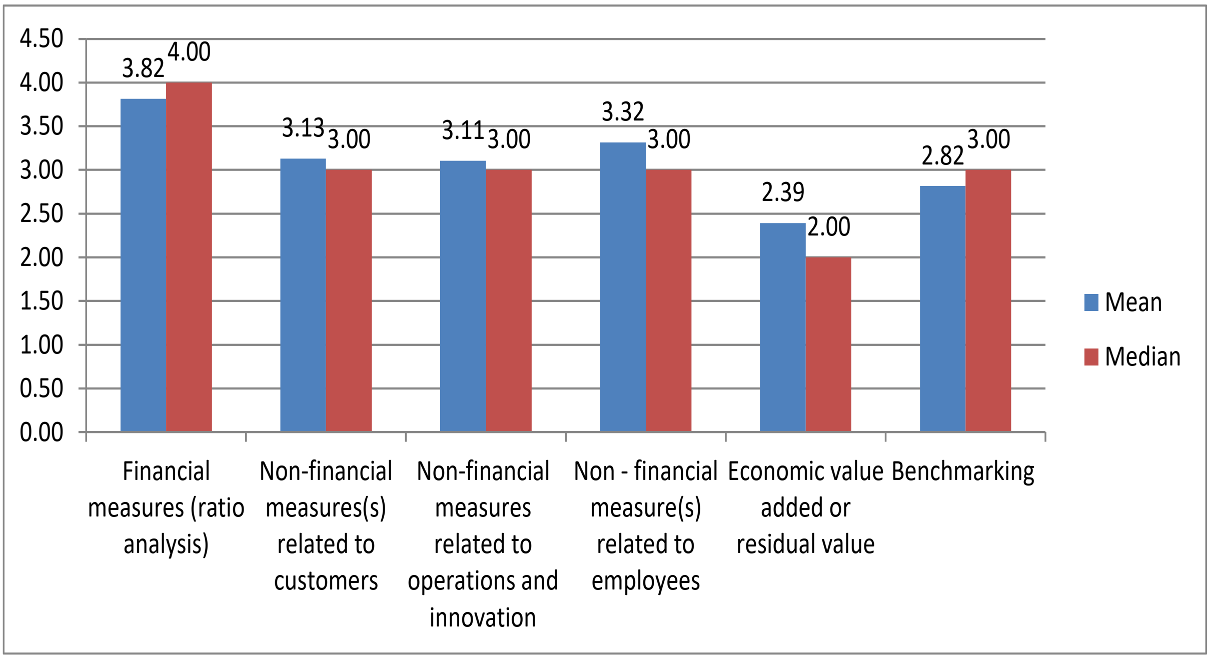


It is important to note that the use of non-financial measures related to employees was second at 81.6%. This is in line with the findings of (Affes & Ayad, 2014; Burns & Scapens, 2000; Kaplan, 1984). Firms are increasingly incorporating non-financial performance measures in evaluating performance. The least popular performance evaluation tool was economic value added (EVA) or residual value with only 57.9% of the respondents using this tool.

4.6.2 Performance evaluation tools importance

Financial measures (ratio analysis) were ranked the most important of the performance evaluation tools with a mean of 3.82 and median of 4. Figure 9 shows these results.

Figure 9: Performance evaluation tools importance



Non-financial measures related to employees were second in terms of importance with a mean of 3.32 and median of 3.0. Non-financial measures related customers were third (mean=3.13, median=3). Non-financial measures related to operations and innovation (mean=3.11, median=3) were fourth in terms of importance. Benchmarking (mean=2.82, median=3) and EVA (mean=2.39, median=2) were rated as not that important.

4.6.3 Factors affecting usage of performance evaluation tools

The nine contingent factors were tested against the six performance evaluation tools. The results in Table 9 show that three contingent factors could not be linked to any performance evaluation tool. Use of financial measures (ratio analysis) could be linked to size and JIT system usage. Holding other factors constant, a unit increase in the size of an organisation will increase the probability of usage of ratio analysis by 2%.

Table 9: Probit regression analysis – Performance evaluation tools

Contingent factors	PE	COMP	STR	SIZE	EDU	DIV	AMT	TQM	JIT
Performance Evaluation									
Financial measures (ratio analysis)				(+)0.0287**					(+)0.0119**
Non-financial measures(s) related to customers									
Non-financial measures related to operations and innovation									
Non - financial measure(s) related to employees									
Economic value added or residual value					(+)0.0414**		(+)0.0635*	(-)0.0333**	(+)0.0022***
Benchmarking		(-)0.0096***			(+)0.035**				(+)0.0029***
	* 90% confidence level		** 95% confidence level		*** 99% confidence level			(+)(-) sign of the regression coefficient	

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

This is in line with prior studies, see Zabri and Ahmad (2015). The greater the size the more metrics are required to measure performance and ratio analysis becomes a critical component of this. With regards to JIT systems, a unit increase in JIT will increase the probability of importance or usage of ratio analysis by 2%.

Non-financial measures related to customers are usually aimed at establishing how satisfied an organisation's clients are. No relationship could be established between the nine contingent factors and use of non-financial measures related to customers. This could be attributable to the size of the organisations in the sample.

Non-financial measures related to operations and innovations entail such measures as process improvements and new product development. In this study no relationship could be established between the nine contingent factors and use of non-financial measures related to operations and innovation.

Non-financial measures related to employees look at aspects such as employee engagement levels. The results of the study show that no relationship exists between the nine contingent factors and use of non-financial measures related to employees suggesting that there could be other factors responsible for this based on the 81.6% usage rate in the sample.

Use of EVA or residual value could be linked to four contingent factors indicating that a relationship does exist between the contingent factors and use of EVA. According to the study accounting practitioner education level has an impact on the use of EVA. Holding other factors constant, a unit increase in accounting practitioner education level will increase the probability of usage of EVA by 15%, while a unit increase in AMT would increase the probability of EVA usage by 10%. A unit increase in TQM will decrease the probability of EVA usage by 12% while a unit increase in JIT usage increases the probability of usage by 16%. The application of these tools requires high levels of education as many adjustments need to be applied to financials to determine EVA. It is expected that these techniques would be applied in technologically advanced industries by qualified personnel.

The results of the study indicate that an increase in competitive pressure would reduce the importance of benchmarking. This is contrary to expectations as companies are expected to use benchmarking the more competitive the environment is. An increase accounting practitioner education level would result in 13% increase in the usage or importance of benchmarking while an increase in JIT would result in a 13% increase in the probability of importance for benchmarking. These findings are in line with expectations and prior studies (Graham & Harvey, 2001).

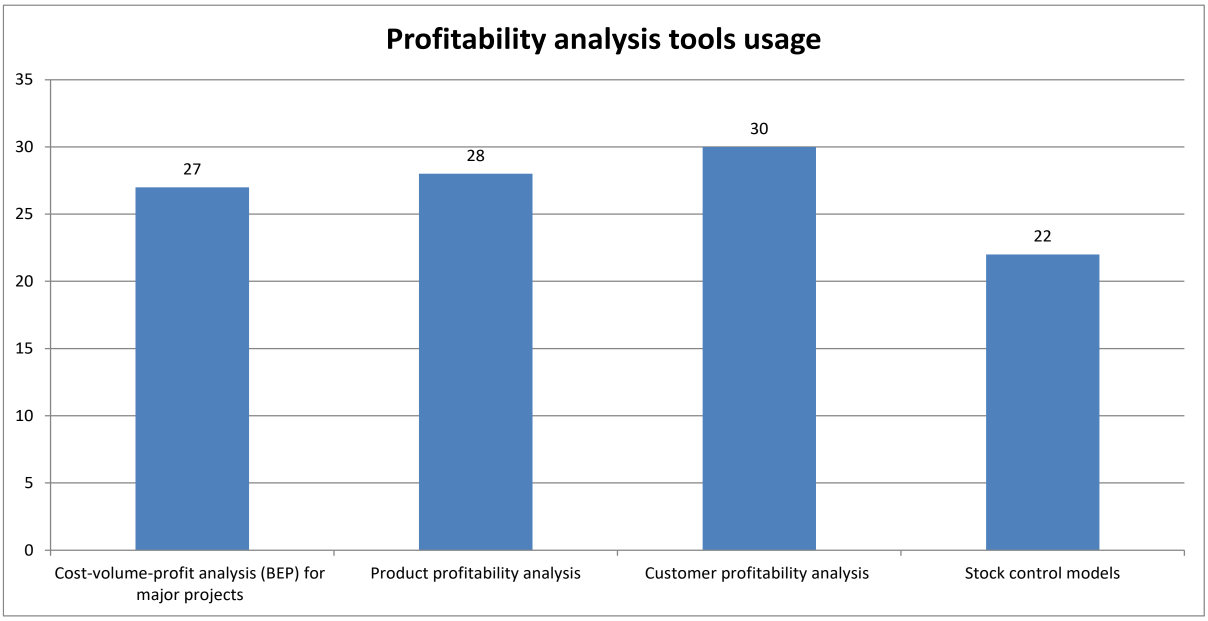
4.7 Profitability analysis tools

Cost volume profit analysis (BEP) for major projects, product profitability analysis, customer profitability analysis and stock control models are the four profitability analysis tools investigated in the study.

4.7.1 Profitability analysis tools usage

Profitability analysis tools were the least popular management accounting tools with the most used tool at 78.9%. Figure 10 shows usage of profitability analysis tools. Customer profitability analysis was leading at 78.9%, followed by product profitability analysis (73.7%), cost-volume profit analysis (71.1%) and stock control models at 57.9%.

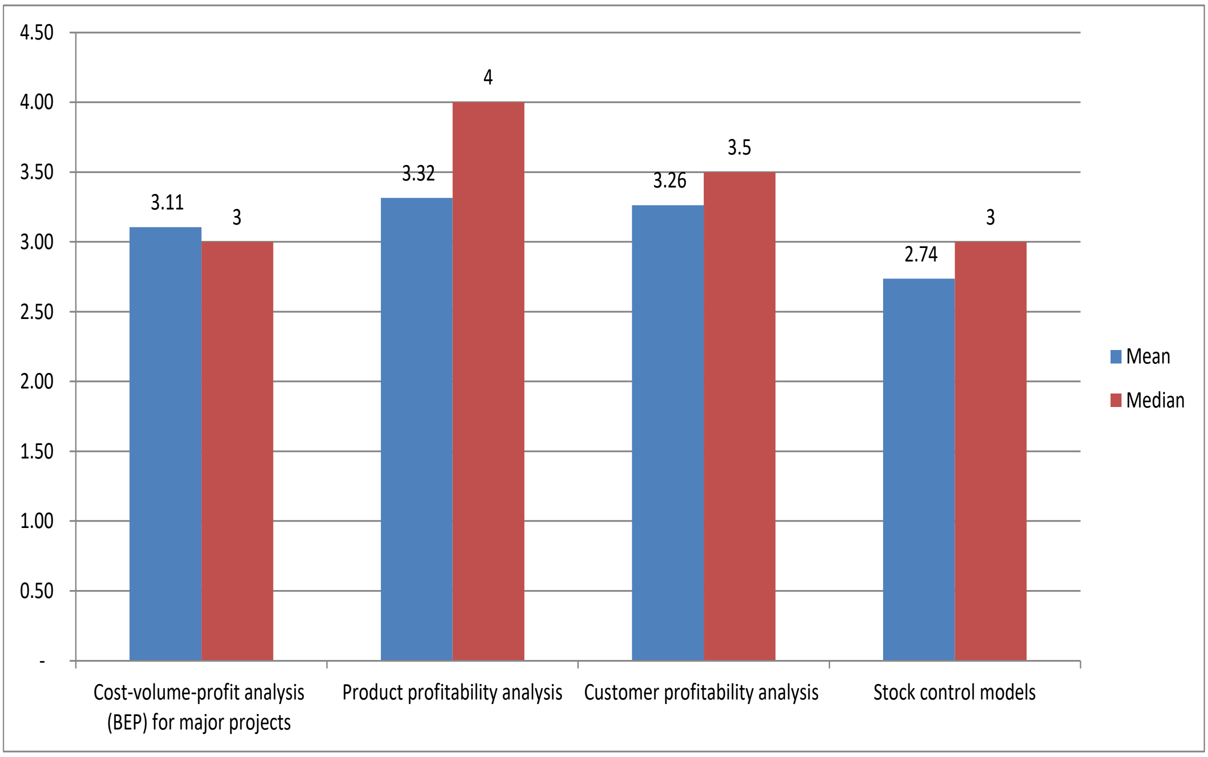
Figure 10: Profitability analysis tools usage



4.7.2 Importance of profitability analysis tools

Product profitability analysis was the most frequently used tool with a mean of 3.32 and median of 4. Customer profitability analysis was also frequently used with a mean of 3.26 and a median of 3.5. Cost-volume profit analysis (BEP) for major projects (mean=3.11, median=3) were sometimes used (somewhat important). Least important were stock control models (mean=2.67, median=2.5).

Figure 11: Profitability analysis tools importance



4.7.3 Factors affecting usage of profitability analysis tools

The nine contingent factors were tested against the four profitability analysis tools. Stock control models could not be related to any of the nine contingent factors as shown in Table 10. This could be attributable to the small number of manufacturing firms who would ordinarily deal with stock.

Table 10: Probit regression analysis – Profitability analysis tools

Contingent factors	PEU	COMP	STRUC	SIZE	EDU	DIV	AMT	TQM	JIT
Profitability Analysis									
Cost-volume-profit analysis (BEP) for major projects					(+)0.0266**				(+)0.0187**
Product profitability analysis									(+)0.027**
Customer profitability analysis								(+)0.0273**	
Stock control models									
	* 90% confidence level			** 95% confidence level *** 99% confidence level				(+)(-) sign of the regression coefficient	

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

Cost volume – profit analysis for major projects usage could be linked to accounting practitioner education and JIT system usage. Holding other factors constant, a unit increase in practitioner education level will increase the probability of usage of BEP by 2.6%. On the other hand a unit increase in JIT will result in an increase in the probability of importance or usage of product profitability analysis by 5%.

Product profitability could only be linked to JIT. An increase in JIT would result in a 5% increase in the probability of importance of product profitability. It is expected that where JIT is in use product profitability knowledge becomes critical as it informs what inventory to hold and in what quantities.

Holding other factors constant an increase in TQM would increase the probability of importance of customer profitability analysis by 9%. Where TQM is practiced it becomes imperative to focus on overall profitability of a customer as clients may require different standards or additional services. These results are in line with expectations.

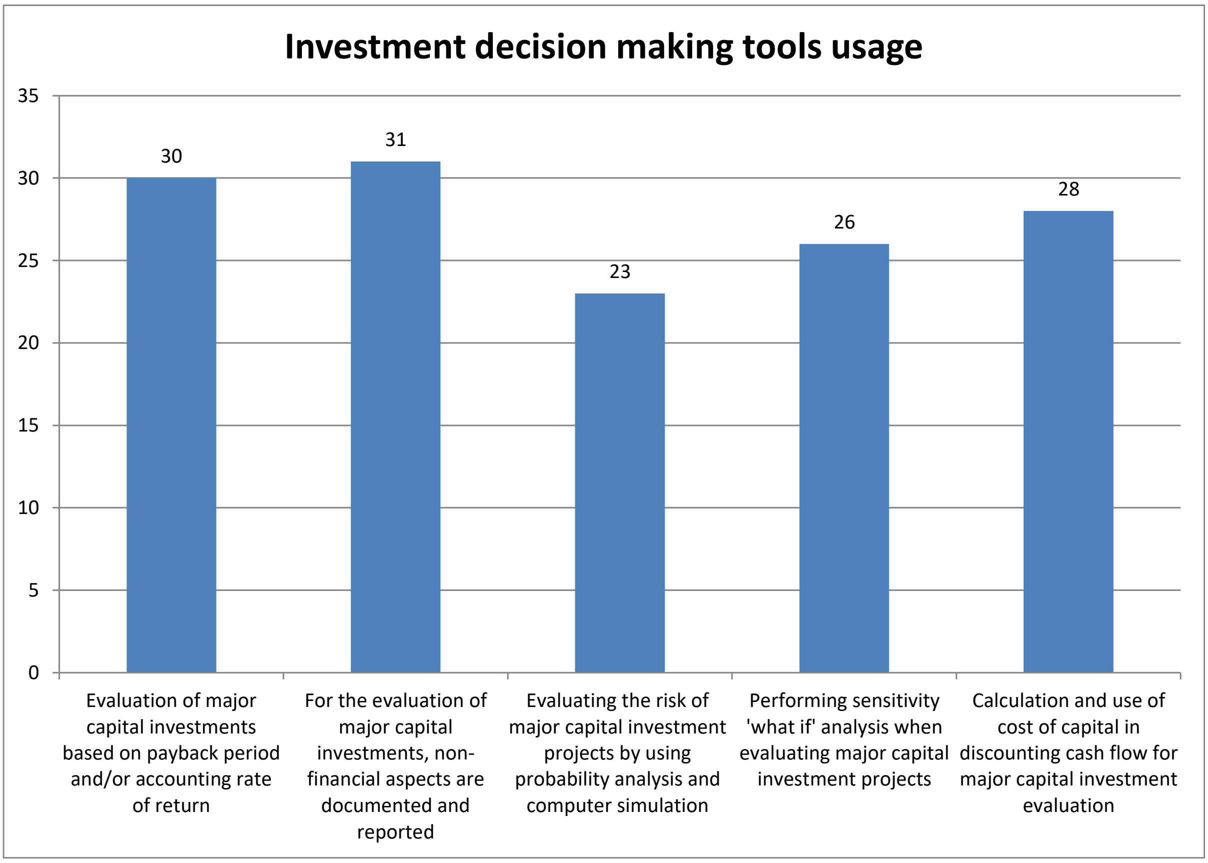
4.8 Investment decision making tools

Five investment decision making tool were investigated as shown in Figure 12.

4.8.1 Investment decision making tools usage

At least 81.6% of the respondents used at least one of the selected investment decision making tools. The most popular was the documentation and reporting of non-financial aspects in evaluating major capital investments. This indicates a shift from the traditional approach where firms would make investment decisions based only on financial measures, (Graham & Harvey, 2001). The least used investment tool was the use of probability analysis and computer simulation in evaluating major capital projects. This could be attributed to the size of the firms in the sample. The average annual turnover of the responding firms was between R100 million to R500 million. While use of discounted cash flows (DCF) in evaluating major capital investment was at 73.7%.

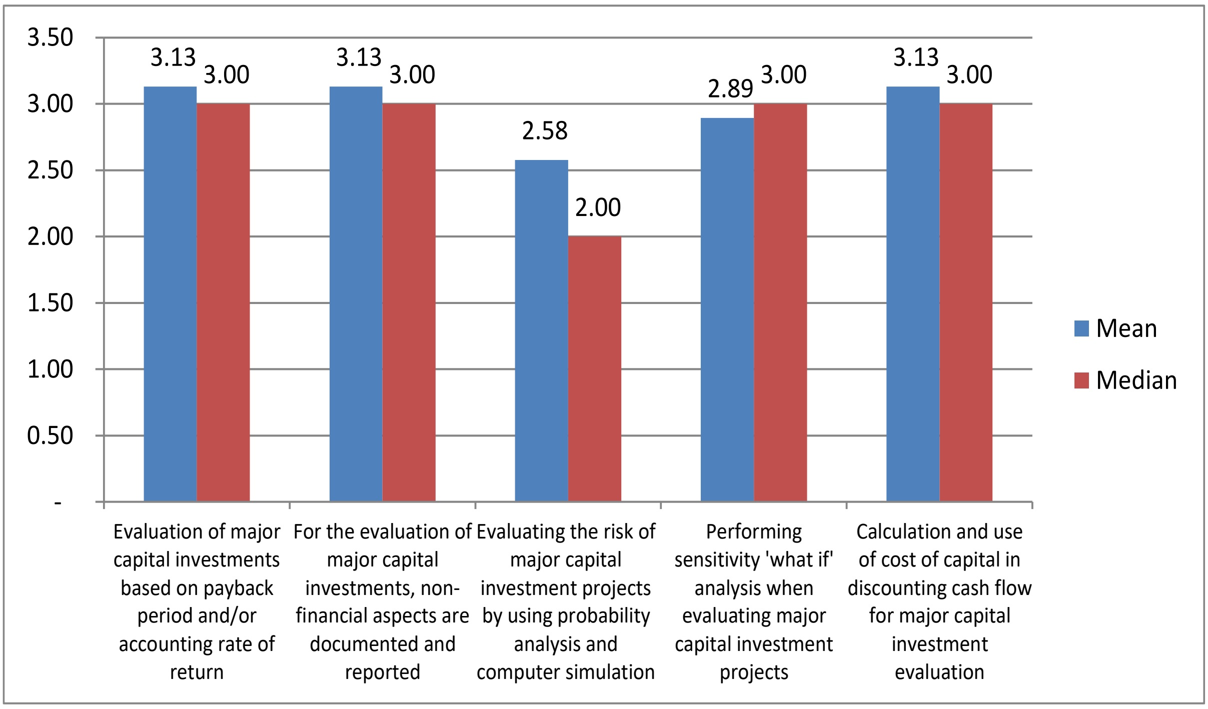
Figure 12: Investment decision making tools usage



4.8.2 Investment decision making tools importance

When making decisions firms are faced with options that range from simplistic methods such as payback period to complex methods that include computer simulation and what if analyses. The importance or how frequently a method is used depends on a wide range of factors (Abdel-Kader & Luther, 2006b).This study revealed that the payback period and/or accounting rate of return, DCF method and documentation of non-financial aspects (mean=3.13, median=3) were somewhat important in the responding organisations. Sensitivity what if analysis (mean=2.89, median=3) were second least important investment decision making tools. The least important was the use of probability analysis and computer simulation with a mean and median of 2.58 and 2 respectively. These results are graphically depicted in Figure 13.

Figure 13: Investment decision making tools importance



4.8.3 Factors influencing investment decision making tools usage

The five investment decision making tools were tested against the nine contingent factors. No relationship could be established between all the five investment decision making tools and competitive pressure from the market, complexity of process and product multiplicity and TQM. This suggests there could be other factors responsible for their usage in the sample.

Table 11: Probit regression analysis – Investment decision making tools

Contingent factors	*PEU*	*COMP*	*STRUC*	*SIZE*	*EDU*	*DIV*	*AMT*	*TQM*	*JIT*
Investment decision making tools									
Evaluation of major capital investments based on payback period and/or accounting rate of return					(+)0.0347**				
For the evaluation of major capital investments, non-financial aspects are documented and reported	(-)0.014**		(+)0.098*		(+)0.0237**				
Evaluating the risk of major capital investment projects by using probability analysis and computer simulation	(-)0.0028***						(+)0.0076***		
Performing sensitivity 'what if' analysis when evaluating major capital investment projects				(+)0.0476**					(+)0.0532*
Calculation and use of cost of capital in discounting cash flow for major capital investment evaluation									
* 90% confidence level		** 95% confidence level			*** 99% confidence level		(+)(-) sign of the regression coefficient		

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

Use of payback period or ARR could only be linked to accounting practitioner level of education. This is in line with the findings of Graham and Harvey (2001). Practitioners are likely to apply models they have learnt. It is however possible that some models are applied dictated by company policy. We may probably want to then trace the origins of such policy and it may not be surprising that we come back to accounting practitioner education level. Holding other factors constant, a unit increase in accounting practitioner education level increases the probability of usage of ARR by 0.3%.

Perceived environmental uncertainty was found to have an impact on documentation of non-financial aspects in the evaluation of major capital projects. The results show that holding other factors constant, a unit increase in PEU decreases the probability of the usage of documentation of non-financial information related to major capital projects by 1.4%. This is not as expected and maybe due to lack of awareness of the importance of non-financial aspects. Alternatively, decision making could still be driven by financial analysis with accountants not comfortable investigating non-financial aspects which are difficult to quantify. A unit increase in structure (decentralisation) increases the probability of usage by 8%. A unit increase in practitioner education level increases the probability of usage by 13%.

Use of probability analysis and computer simulation in the evaluation of major capital investment projects could be related to two factors only. Holding other factors constant, a unit increase in PEU decreases the probability of usage of computer simulation or probability analysis by 6%. This is in contrast to what theory suggests. As the environment becomes uncertain the more we expect more complex models to be used applying some simulation and probability analysis. This result could be attributable to the size of organisations in the sample. A unit increase in AMT usage increases the probability of usage of probability analysis or computer simulation by 4%.

Use of sensitivity ‘what if’ analysis could be linked to organisational size and JIT usage. Holding other factors constant, a unit increase in size increases the probability of usage of ‘what if’ analysis by 2% while a unit increase in JIT usage increases the probability by 2%.

No relationship could be established between calculation and use of cost of capital in discounting cash flow for major capital investment evaluation and all the nine contingent factors.

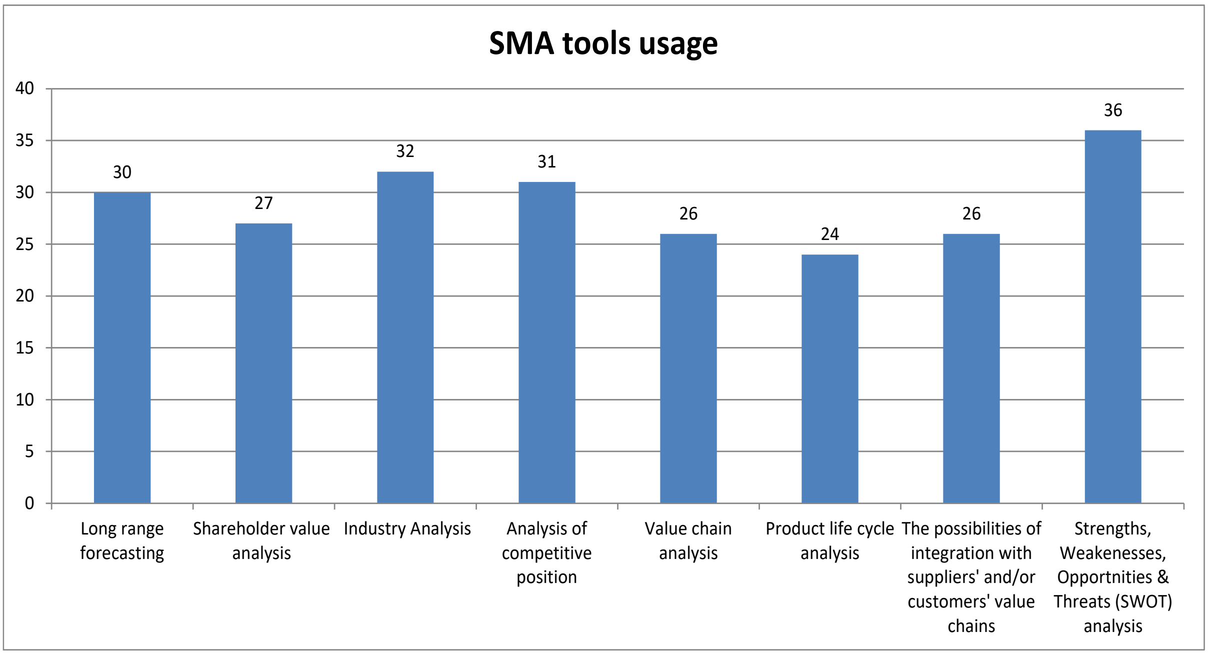
4.9 Strategic management accounting tools

Eight strategic management accounting tools were investigated as shown in Figure 14.

4.9.1 Strategic management accounting tools usage

Usage of selected strategic management accounting (SMA) tools was investigated. The results show that SWOT analysis topped the list with 94.7% of the respondents applying the tool. This was followed by industry analysis being applied by 84.2% of the respondents. Such usage indicates the rising importance of SMA regardless of the industry a firm operates in, see (Jack, 2005; Ramljak & Rogosic, 2012). Long range forecasting was at 78.9% and analysis of competitive position at 81.6%. Product life cycle analysis was the least used amongst the SMA tools with only 25 (63.2%) respondents applying this tool. Figure 14 shows these results.

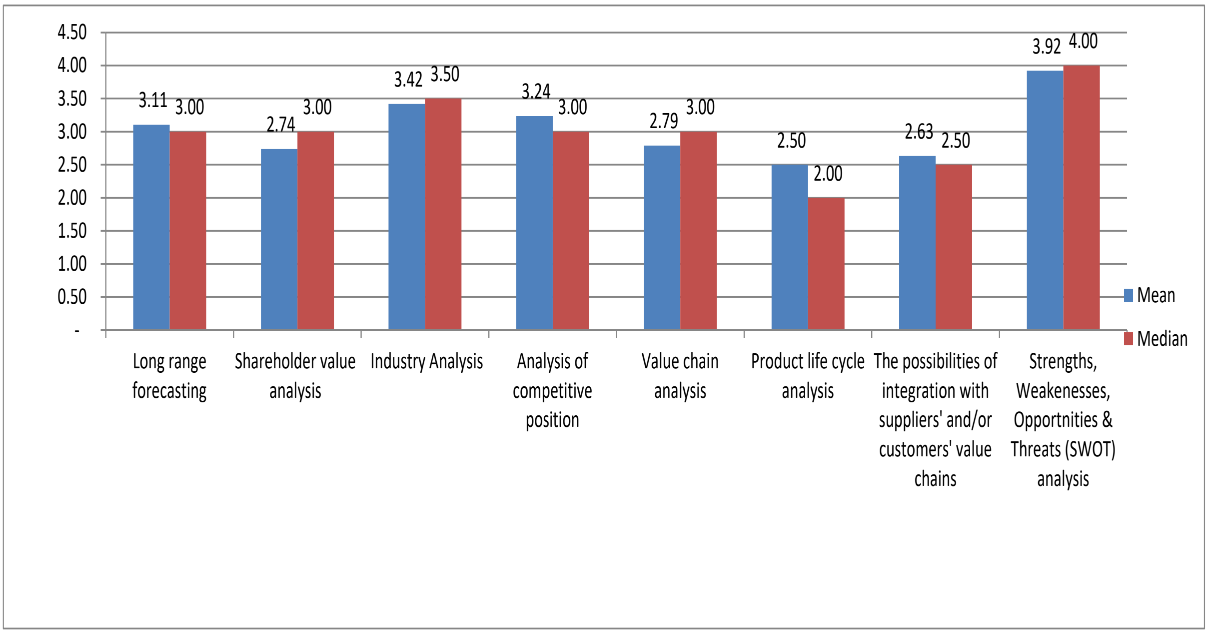
Figure 14: Strategic management accounting tools usage



4.9.2 Strategic management accounting tools importance

Strategic management accounting has grown in popularity especially in the twenty first century (CIMA, 2013). Companies are faced with a volatile, uncertain, complex and ambiguous (VUCA) operating environment and hence the need to embrace strategic management accounting. The results of the study indicate that SWOT analysis was the most important SMA tool with a mean of 3.92 and median of 4. Rarely used or less important were product life cycle analysis (mean=2.5, median=2) and possibilities of integration with suppliers and/or customers' value chains. Figure 15 summarises these results graphically.

Figure 15: Strategic management accounting tools importance



4.9.3 Factors influencing SMA tools usage

The nine contingent factors were tested against eight strategic management accounting tools. No relationship could be established between firm size and all the eight strategic management accounting tools. Of the eight strategic management accounting tools, long range forecasting, value chain analysis and integration with suppliers had no relationship at all to any of the nine contingent factors in Table 12. Use of shareholder value analysis could be linked to accounting practitioner education level, TQM and use of JIT systems. The results show that holding other factors constant, a unit increase in accounting practitioner education level increases the probability of usage of shareholder value analysis by 3%, while a unit increase in TQM increases the probability by 3%. Lastly a unit increase in JIT system usage increases the probability of shareholder value analysis usage by 3%.

Industry analysis usage could be linked to four of the nine contingent factors. Holding other factors constant, a unit increase in PEU decreases the probability of usage of industry analysis by 4%. This is not in line with expectations as industry analysis becomes critical the greater the uncertainty, (CIMA, 2013). A unit increase in competitive pressure increases the probability by 5%. A unit increase in structure (decentralisation) increases the probability of industry analysis usage by 2%. AMT usage increases the probability of usage of industry analysis. A unit increase in AMT increases the probability of usage by 3%.

Analysis of competitive position could be linked to three contingent factors. According to results a unit increase in PEU reduces the probability of usage for competitor analysis by 9%. This is contrary to expectations as we would have expected an increase in PEU to promote use of competitor analysis. Holding other factors constant, a unit increase in competitive pressure from the market increases the probability of use of competitor analysis by 9%. This is in line with expectations and also confirms results of prior studies, see (Abdel-Kader & Luther, 2008; Zabri & Ahmad, 2015). A unit increase in AMT increases the probability of use of competitor analysis by 5%.

Product life cycle analysis could only be related to AMT. Holding other factors constant a unit increase in AMT increases the probability of product life cycle analysis by 10%. The use of SWOT analysis could be related to two of the nine contingent factors despite SWOT being the most popular of all the strategic management accounting tools amongst the respondents.

Holding other factors constant, a unit increase in complexity of process and product multiplicity increases the probability of SWOT usage by 0.9% while a unit increase in AMT decreases the probability by 0.6%.

Table 12: Probit regression analysis – SMA tools

Contingent factors	*PEU*	*COMP*	*STRUC*	*SIZE*	*EDU*	*DIV*	*AMT*	*TQM*	*JIT*
Strategic Management Accounting									
Long range forecasting									
Shareholder value analysis					(+)0.053*			(+)0.0581*	(+)0.0419**
Industry Analysis	(-)0.0051***	(+)0.0023***	(+)0.0367**				(+)0.0119**		
Analysis of competitive position	(-)0.0171**	(+)0.371**					(+)0.0946*		
Value chain analysis									
Product life cycle analysis							(+)0.05**		
The possibilities of integration with suppliers' and/or customers' value chains									
Strengths, Weakenesses, Opportnities & Threats (SWOT) analysis						(+)0.0067***	(-)0.0483**		

* 90% confidence level ** 95% confidence level *** 99% confidence level (+)(-) sign of the regression coefficient

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

4.10 Summary of ordered probit regression results

A summary of the relationships (whether negative or positive) for all relationships that were significant at between 90-99% confidence level is shown in Table 13.

Table 13: Summary of relationships between factors and tools

Tool	Costing		Budgeting		Performance		Profitability		Investment		SMA		Comment
Relationship	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	
Factors													
PEU	2	1					2				2		*Inconclusive*
COMP			3		1							2	*Inconclusive*
STRUC	1	1						1				1	*Inconclusive*
SIZE	1	1		1		1		1					*Inconclusive*
EDU		**1**		**2**		**2**				**1**		**1**	***Positive***
DIV		**1**										**1**	***Positive***
AMT		3	3	1		1		1			1	3	*Inconclusive*
TQM		3	1	2	1					1		1	*Inconclusive*
JIT		**3**		**4**		**3**		**1**		**2**		**1**	***Positive***

n=number of times a negative or positive a regression coefficient was obtained

e.g. a 3 under costing (positive) & JIT means JIT had a positive influence on 3 of the costing tools

Key

PEU= perceived environmental uncertainty

COMP= competitive pressure from the market

STRUC= Structure (decentralisation)

SIZE = size (measured by turnover)

EDU= accounting practitioner education level

DIV= complexity of process and product multiplicity

AMT= Advanced Manufacturing Technology

TQM= Total Quality Management

JIT= Just In Time

4.11 Other factors affecting management accounting tools usage

The study inquired about other factors that affected management accounting practices in the responding organisations through open ended questions in the questionnaire. Most of the factors highlighted were just semantically different from the nine contingent factors that formed part of the study. The following are however worth noting.

4.11.1 Requirements by providers of funds

This response came mainly from the non-governmental organisations where providers of funds required their beneficiaries to provide specific reports relating to their activities and funding. In this category respondents indicated that the choice of which management accounting tools to use was predominantly determined by their sponsors.

4.11.2 Change in legislation affecting industry

Legislation passed by national governments may force companies to use certain management accounting tools as they seek to comply with certain directives. Of note in South Africa is the need to comply with Black Economic Empowerment (BEE) where there are certain prescribed ratios e.g. what percentage of an organisation's profit must be channelled towards enterprise development? In this instance organisations are required to adopt certain profitability measurement tools.

4.11.3 Industry practice

This is more of an institutional factor were there are specific taken for granted rules within an industry. Where industry is heavily unionised, and unions use certain parameters to bargain for wage increases, players in the industry are likely to adopt certain management accounting tools. This is line with the work of Scapens (2006).

4.11.4 Head office practice

Some South African companies who were subsidiaries of international companies confirmed that they had no say as to which management accounting tools should be used but instead the head offices dictated what accounting tools must be used depending on their information requirements.

Chapter V Conclusion and recommendations

The study has investigated the application of management accounting tools in South Africa through an online survey questionnaire using a sample of 942 respondents and achieved a response rate of 7% before data cleaning. The results confirm usage of all the six (37 tools in total) management accounting tool categories by firms in South Africa. While the study confirmed use of all the 37 management accounting tools, the importance attached to each tool as measured by the means and medians varied widely per category. The most frequently (regarded as more important) used were budgets followed by SMA tools, performance evaluation tools, costing tools, profitability analysis tools and finally investment decision making tools.

An analysis of the contingent factors affecting usage of the management accounting tools revealed that twenty seven of the thirty-seven management accounting tools could be related to at least one of the selected nine contingent factors. The study could however not conclusively establish a positive relationship between the contingent factors and the management accounting tools. Ignoring cases where no relationships could be established between contingent factors and the tools, only three of the nine contingent factors had a positive influence on management accounting tools used. These factors include accounting practitioner education level, diversity of process and product multiplicity and JIT. Results for the other six contingent factors were inconclusive as contingent factors had both negative and positive influences on management accounting tools usage e.g. PEU (Table 13) had both negative and positive influence on costing tools, depending on the tool analysed. The researcher would recommend further studies on how contingent factors influence management accounting practice as this study was inconclusive on these other factors.

As mentioned earlier one of the limitations of this study was that it was not industry specific and did not look at specific organisational size. The researcher recommends that a similar study be carried out focusing on specific company size as measured using number of employees, annual turnover or total assets.

The results show that perceived environmental uncertainty seemed not to influence usage of management accounting tools. The researcher recommends that case studies be used to gather an in-depth understanding of how South African companies operate, and how they deal with uncertainty. This will shed more light as to why some of the results obtained were not as expected.

Finally, as this study was not industry sector specific, the researcher recommends a sector specific study be carried out in South Africa e.g. mining sector or insurance sector. This will assist in gaining a better understanding on how contingent factors play a role in those sectors, and the results obtained may be more consistent than the ones found in the present study.

References

Abdel-Kader, M., & Luther, R. (2006a). IFAC's Conception of the Evolution of Management Accounting. *Advances in Management Accounting, 15*, 229-247.

Abdel-Kader, M., & Luther, R. (2006b). Management accounting practices in the UK food and drinks industry. London: Chartered Institute of Management Accountants (CIMA).

Abdel-Kader, M., & Luther, R. (2008). The Impact of Firm Characteristics on Management Accounting Practices: A UK Based Empirical Analysis. *The British Accounting Review, 40*(1), 2-27. doi: DOI: 10.1016/j.bar.2007.11.003

Affes, H., & Ayad, F. (2014). Contextual factors impact on the use of new management accounting practices: An Empirical analysis in the Tunisian context. *Journal of Research in International Business and Management, 4*(3), 45-55. doi: http:/dx.doi.org/10.14303/jribm.2014.010

Ahmad, N. S. M., & Leftesi, A. (2014). An Exploratory Study of the Level of Sophistication of Management Accounting Practices in Libyan Manufacturing Companies. *International Journal of Business and Management, II*(2), 1-8.

AICPA. (2017). Global management accounting principles. London: Association of International Certified Professional Accountants (AICPA)

Al-Mawali, H. (2015). Contingent factors of Strategic Management Accounting. *Research Journal of Finance and Accounting 6*(11), 130-138.

Albright, T., & Lam, M. (2006). Managerial accounting and continuous improvement initiatives: A retrospective and framework. *Journal of Managerial Issues, 18*(2), 157-175.

Alleyne, P., & Weeks-Marshal, D. (2011). An Exploratory Study of Management Accounting Practices in Manufacturing Companies in Barbados. *International Journal of Business and Social Science, 2*(9), 49-58.

Askrany, D. (2005). *The evolution of management accounting innovations and the level of satisfaction with traditional accounting techniques*. Paper presented at the AFAANZ Conference, Melbourne, Australia.

Baldvinsdottir, G., Mitchell, F., & Norreklit, H. (2010). Issues in the relationship between theory and practice in management accounting. *Management Accounting Research, 21*(2), 79-82.

Burns, J., Ezzamel, M., & Scapens, R. W. (2003). The Challenge of Management Accounting Change: Behavioural and Cultural Aspects of Change Management *CIMA Publishing/Elsevier, London/Oxford*.

Burns, J., & Scapens, R. W. (2000). Conceptualising Management Accounting Change: An Institutional Framework. *Management Accounting Research, 11*(1), 3-25.

Burns, J., & Vaivio, J. (2001). Management accounting change. *Management Accounting Research, 12*, 389-402. doi: 10.1006/mare.2001.0178

Chenhall, R. H. (2003). Management control systems design within its organisational context: findings from contingency-based research and directions for the future. *Accounting Organisations and Society, 28*, 127-168.

CIMA. (2009). Management accounting tools for today and tomorrow. London: Chartered Institute Management Accountants.

CIMA. (2013). Essential tools for management accountants.The tools and techniques to support sustainable business success. London: Chartered Institute of Management Accountants (CIMA)

DiMaggio, P. J., & Powell, W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organisational fields. *American Sociological Review, 48*(2), 147-160.

Dropulic, I. (2013). The effect of contingency factors on management control Systems: A study of manufacturing companies in Croatia. *Ekonomska istrazivanja-Economic Research* (Special Issue), 369-382

Drury, C., & Al-Omiria, M. (2007). A survey of factors influencing the choice of product costing systems in UK organisations. *Management Accounting Research, 18*(4), 399-424.

Drury, C., & Tayles, M. (1994). Product costing in UK manufacturing organisations. *The European Accounting Review, 3*(3), 443-469.

Dugdale, D., Jones, C., & Green, S. (2005). *Contemporary management accounting practices in UK manufacturing* (Vol. 1). London: Elsevier.

Fakoya, M. B. (2014). On Managerial Accounting Practices in South African Public Departments. *Journal of Economics, 5*(2), 133-139.

Garg, A., Ghosh, D., Hudick, J., & Nowacki, C. (2003). Roles and Practices in Management Accounting Today London: Institute of Management Accountants - Ernst & Young.

Gordon, L. A., & Miller, D. (1976). A contingency framework for the design of accounting information systems. *Accounting, Organisations and Society, 1*(1), 59-69.

Graham, J. R., & Harvey, C. R. (2001). How do CFOs make capital budgeting and capital structure decisions? *The Journal of Applied Corporate Finance 15*(1), 265-301.

IFAC. (1998). International Management Accounting Practice Statement: Management Accounting Concepts. (pp. 82-100). New York: Financial and Management Accounting Committee.

Ittner, C. D., & Larcker, D. F. (1998). Innovations in performance measurement:Trends and research implications. *Journal of Management Accounting Research, 10*, 205-238.

Jack, L. (2005). The adoption of strategic management accounting tools in agriculture post subsidy reform: a comparative study of practices in the UK, the US, Australia and New Zealand *Research executive summary*

(Vol. 5, pp. 1-7). London: Chartered Institute on Management Accountants.

Jinga, G., & Dumitru, M. (2015). The Management Accounting Tools and the Integrated Reporting. *SEA - Practical Application of Science, III*(1(7)), 45-50.

Johnson, H. T., & Kaplan, R. S. (1987). *Relevance lost: The rise and fall of management accounting*. Boston, Massachusetts: Harvard Business School Press.

Kaplan, R. S. (1984). The Evolution of Management Accounting. *The Accounting Review, LIX, No.3*, 390-418.

Kaplan, R. S., & Atkinson, A. A. (1998). *Advanced Management Accounting* (3rd ed.). New Jersey: Prentice Hall, Inc.

Kaplan, R. S., & Cooper, R. (1998). *Cost & Effect: Using Integrated Cost Systems to Drive Profitability and Performance*: Harvard Business School Press.

Langfield-Smith, K., & Chenhall, R. H. (1998). Adoption and benefits of management accounting practices: an Australian study. *Management Accounting Research, 9*, 1-19.

Mat, T. Z. T. (2013). Theoretical framework on management accounting and organisational change. *Asia Pacific Management Accounting Journal, 9*(2), 85-105.

McNally, G. M., & Lee, H. E. (1980). Management Accounting Practices and Company Characteristics. *ABACUS, 16*(2), 142-150.

Montvale, N. J. (1994). What Corporate America wants in entry level accountants. New York: Institute of Management Accountants.

Ramljak, B., & Rogosic, A. (2012). Strategic Management Accounting Practices in Croatia. *The Journal of International Management Studies, 7*(2), 93-100.

Robalo, R. (2014). Explanations for the gap between management accounting rules and routines: An institutional approach. *Spanish Accounting Review, 17*(2), 88-97.

Roslender, R. (1996). Relevance lost and found:Critical perspectives on the promise of management accounting. *Critical Perspectives on Accounting, 7*, 533-561.

Scapens, R. W. (1994). Never Mind the Gap: Towards an Institutional Perspective of Management Accounting Practices. *Management Accounting Research, 5*(3/4), 301-321. doi: 10.1006/mare.1994.1019

Scapens, R. W. (2006). Understanding management accounting practices: A personal journey. *The British Accounting Review, 38*, 1-30.

Sharaf - Addin, H., Omar, N., & Sulaiman, S. (2014). Target Costing Evolution: A Review of the Literature from IFAC's (1998) Model. *Asian Social Science, 10*(9), 82-99.

Sharkar, M. Z. H., Sobhan, M. A., & Sultana, S. (2006). Management Accounting Development and Practices in Bangladesh. *BRAC University Journal, III*(2), 113-124.

Uyar, A. (2010). Cost and management accounting practices: A survey of manufacturing companies. *Eurasian Journal of Business and Economics, 3*(6), 113-125.

Wanderley, C. D., Miranda, L. C., De Meira, J. M., & Cullen, J. (2011). Management Accounting Change: A model based on three different theoretical frameworks. *BASE-REVISTA ADMINISTRACAO E CONTABILIDADE DA UNISINOS, 8*(2), 111-121.

Waweru, N. M., Hoque, Z., & Uliana, E. (2005). A Survey of Management Accounting practices in South Africa: Case Study of Retail Services. *Journal of Accounting, Auditing and Performance Evaluation, 2*(3), 22-29.

Wijewardena, H., & De Zoysa, A. (1999). Comparative Analysis of Management Accounting Practices in Australia and Japan: An Empirical Investigation. *The International Journal of Accounting, 34*(1), 49-70.

Zabri, M. S., & Ahmad, K. (2015). Factors explaining the use of management accounting practices in Malaysian medium-sized firms. *Journal of Small Business and Enterprise Development, 22*(4), 762-781. doi: 10.1108/JSBED-04-2012-0057

Appendix A - Questionnaire

A Demographics

Title: ____________________________ *(As per job description)*

Age: ____________________________

Highest Qualification: Undergraduate Degree ☐ Masters Degree ☐ Other (specify) ________

Industry Sector: Service ☐ Financial ☐ Manufacturing ☐ Retail ☐ Other ....

Professional Membership: CIMA ☐ SAICA ☐ SAIPA ☐ CIS ☐ ACCA ☐ Other ....

B Management Accounting Tools Usage

Please indicate whether the following tools are used by your organisation
If yes please indicate the frequency of use on a scale of 1-5, 1 = not used (not important)
2= rarely used, 3= sometimes used, 4=frequently used and 5 = very frequently used (very important).

B1	**Costing Tools**	**Usage**		**Degree of usage (importance)**				
		Yes	No	1	2	3	4	5
	A separation is made between variable/incremental costs and fixed/ non- incremental costs							
	Using only a plantwide overhead rate							
	Departmental or multiple plant -wide overhead rates							
	Activity - based costing (ABC)							
	Target Costs							
	The Cost of quality is quantified							
	Regression and/or learning curve techniques							
B2	**Budgeting Tools**							
	Budgeting for planning							
	Budgeting for controlling costs							
	Activity- based budgeting							
	Budgeting with 'what if analysis'							
	Flexible budgeting							
	Zero- based budgeting							
	Budgeting for long term (strategic) plans							

B3 **Performance Evaluation Tools**

Financial measures (ratio analysis)							
Non-financial measures(s) related to customers							
Non-financial measures related to operations and innovation							
Non - financial measure(s) related to employees							
Economic value added or residual value							
Benchmarking							

B4 **Profitability Analysis Tools**

Cost-volume-profit analysis (BEP) for major projects							
Product profitability analysis							
Customer profitability analysis							
Stock control models							

B5 **Investment decision making tools**

Evaluation of major capital investments based on payback period and/or accounting rate of return							
For the evaluation of major capital investments, non-financial aspects are doucumeted and reported							
Evaluating the risk of major capital investment projects by using probability analysis and computer simulation							
Perfoming sensitivity 'what if' analsysis when evaluationg major capital investment projects							
Calculation and use of cost of capital in discounting cash flow for major capital investment evaluation							

B6 **Strategic Management Accounting Tools**

Long range forecasting								
Shareholder value analysis								
Industry Analysis								
Analysis of competitive position								
Value chain analysis								
Product life cycle analysis								
The possibilities of integration with suppliers' and/ or customers' value chains								
Strengths, Weakenesses, Opportnities & Threats (SWOT) analysis								

C **Using the given scales, kindly rate the following contingent factors for your organisation**

	1	2	3	4	5
Perceived Environmental Uncertainty (PEU) *On a scale of 1-5 indicate how predictible your external environment is including suppliers, competitors, customers and government* *1=highly predictible (low uncertainty), 5= highly unpredectible (high uncertainty)*					
Competitive pressure from the market *On a scale of 1-5 indicacte the intensity of competition faced by your organisation* *1=Not intense at all, 2=Not intense, 3=Slightly intense, 4=Intense, 5=Very Intense*					
Structure (Decentralisation) *On a scale of 1-5 indicate the degree of authority delegated by your Chief Executive in making decisions on new investments, pricing, hiring & firing of managerial staff* *1= No delegation at all 5= Highly decentralised (full delegation)*					
Size (measured by annual turnover) *On a scale of 1-5 indicate the size of your organisation* *1= <R100 million 2 =R100-500 million, 3= R501- 1 billion, 4= R1- 2 billion, 5 = > R2 billion*					
Accounting practitioner education level *On a scale of 1-5, indictate the education level of the key management accounting personnel* *1=no formal business qualification, 2 = Business Certificate 3=Business Diploma* *4= Business degree and 5 = Professional accounting qualification/Business Masters degree*					

Complexity of process and product multiplicity
Using a scale of 1-5, indicate the level of product & process diversityn in your organisation, 1 being not diversified and 5 highly diversified

1	2	3	4	5

Advanced Manufacturing Technology (AMT)
Using a scale of 1-5, indicate the level of use of AMT 1 indicating not used and 5 indciating widely used

1	2	3	4	5

Total Quality Management (TQM)
Using a scale of 1-5, indicate the level of use of TQM 1 indicating not used and 5 indicating widely used

1	2	3	4	5

Just In Time (JIT)
Using a scale of 1-5, indicate the level of use of JIT 1 indicating not used and 5 indicating widely used

1	2	3	4	5

D Which of the following initatives would your organsiation adopt in the near future (in the next 3 years assuming they are not yet in use).

- ☐ Balanced Scorecard
- ☐ Activity based Costing
- ☐ Activity based budgeting
- ☐ Discounted Cashflows for evaluating capital projects
- ☐ Value Based Management
- ☐ Benchmarking
- ☐ Target costing
- ☐ Value chain analysis
- ☐ Economic value added
- ☐ Industry Analysis

E What other key factors drive the use of management accounting tools in your organisation?

Appendix B –independent and dependent variables abbreviations

Independent variables	
Perceived Environmental Uncertainty - On a scale of 1-5 indicate how predictable your external environment is including suppliers, competitors, customers and government, where; 1=highly predictable (low uncertainty), 5= highly unpredictable (high uncertainty)	***PEU***
Competitive pressure from the market - On a scale of 1-5 indicate the intensity of competition faced by your organisation 1=Not intense at all, 2=Not intense, 3 =Slightly intense, 4=Intense, 5=Very Intense	***COMP***
Structure (Decentralisation) - On a scale of 1-5 indicate the degree of authority delegated by your Chief Executive in making decisions on new investments, pricing, hiring & firing of managerial staff, 1= No delegation at all, 5= Highly decentralised (full delegation	***STRUC***
Size (measured by annual turnover) - On a scale of 1-5 indicate the size of your organisation where 1= <R100 million 2 =R100-500 million, 3= R501- 1 billion, 4= R1- 2 billion, 5 = > R2 billion	***Size***
Accounting practitioner education level: On a scale of 1-5, indicate the education level of the key management accounting personnel: 1=no formal business qualification 2= Business Certificate 3=Business Diploma 4= Business undergraduate degree5 = Professional accounting qualification/Business Masters degree	***Edu***
Complexity of process and product multiplicity: Using a scale of 1-5, indicate the level of product & process diversity in your organisation, 1 = being not diversified and 5 = highly diversified	***Div***
Advanced Manufacturing Technology (AMT): Using a scale of 1-5, indicate the level of use of AMT;1 indicating not used and >5 indicating widely used	***AMT***
Total Quality Management (TQM); Using a scale of 1-5, indicate the level of use of TQM, 1 indicating not used and 5 indicating widely used	***TQM***
Just In Time (JIT); Using a scale of 1-5, indicate the level of use of JIT, 1 indicating not used and 5 indicating widely used	***JIT***

Dependent variables	
Costing Tools - A separation is made between variable/incremental costs and fixed/non-incremental costs - Degree of usage(importance)	***Cost_sep***
Costing Tools - Using only a plantwide overhead rate - Degree of usage(importance)	***Cost_plant***
Costing Tools - Departmental or multiple plant -wide overhead rates - Degree of usage(importance)	***Cost_dept***
Costing Tools - Activity - based costing (ABC) - Degree of usage(importance)	***Cost_ABC***
Costing Tools - Target Costs - Degree of usage(importance)	***Cost_TC***
Costing Tools - The Cost of quality is quantified - Degree of usage(importance)	***Cost_qual***
Costing Tools - Regression and/or learning curve techniques - Degree of usage(importance)	***Cost_reg***
Budgeting Tools - Budgeting for planning - Degree of usage (importance)	***Bud_plan***
Budgeting Tools - Budgeting for controlling costs - Degree of usage (importance)	***Bud_control***
Budgeting Tools - Activity- based budgeting - Degree of usage (importance)	***Bud_AB***
Budgeting Tools - Budgeting with 'what if analysis' - Degree of usage (importance)	***Bud_if***
Budgeting Tools - Flexible budgeting - Degree of usage (importance)	***Bud_flex***
Budgeting Tools - Zero- based budgeting - Degree of usage (importance)	***Bud_zero***
Budgeting Tools - Budgeting for long term (strategic) plans - Degree of usage (importance)	***Bud_long***
Performance Evaluation Tools - Financial measures (ratio analysis) - Degree of usage (importance)	***Perf_Fin***
Performance Evaluation Tools - Non-financial measures(s) related to customers - Degree of usage (importance)	***Perf_cust***
Performance Evaluation Tools - Non-financial measures related to operations and innovation - Degree of usage (importance)	***Perf_op***
Performance Evaluation Tools - Non - financial measure(s) related to employees - Degree of usage (importance)	***Perf_emp***
Performance Evaluation Tools - Economic value added or residual value - Degree of usage (importance)	***Perf_EVA***
Performance Evaluation Tools - Benchmarking - Degree of usage (importance)	***Perf_bench***
Profitability Analysis Tools - Cost-volume-profit analysis (BEP) for major projects - Degree of usage (importance)	***Prof_BEP***
Profitability Analysis Tools - Product profitability analysis - Degree of usage (importance)	***Prof_prod***
Profitability Analysis Tools - Customer profitability analysis - Degree of usage (importance)	***Prof_cust***
Profitability Analysis Tools - Stock control models - Degree of usage (importance)	***Prof_stock***
Investment decision making tools - Evaluation of major capital investments based on payback period and/or accounting rate of return - Degree of usage (importance)	***Inv_ret***
Investment decision making tools - For the evaluation of major capital investments, non-financial aspects are documented and reported - Degree of usage (importance)	***Inv_nonfin***
Investment decision making tools - Evaluating the risk of major capital investment projects by using probability analysis and computer simulation - Degree of usage (importance)	***Inv_risk***
Investment decision making tools - Performing sensitivity 'what if' analysis when evaluating major capital investment projects - Degree of usage (importance)	***Inv_if***
Investment decision making tools - Calculation and use of cost of capital in discounting cash flow for major capital investment evaluation - Degree of usage (importance)	***Inv_CC***
Strategic Management Accounting Tools - Long range forecasting - Degree of usage (importance)	***SMA_for***
Strategic Management Accounting Tools - Shareholder value analysis - Degree of usage (importance)	***SMA_share***
Strategic Management Accounting Tools - Industry Analysis - Degree of usage (importance)	***SMA_ind***
Strategic Management Accounting Tools - Analysis of competitive position - Degree of usage (importance)	***SMA_comp***
Strategic Management Accounting Tools - Value chain analysis - Degree of usage (importance)	***SMA_VC***
Strategic Management Accounting Tools - Product life cycle analysis - <strong>Degree of usage (importance)	***SMA_prod***
Strategic Management Accounting Tools - The possibilities of integration with suppliers' and/or customers' value chains - Degree of usage	***SMA_inte***
Strategic Management Accounting Tools - Strengths, Weakenesses, Opportnities & Threats (SWOT) analysis - Degree of usage (importance)	***SMA_SWOT***

Appendix C – Demographics

Age distribution

Age (years)	Number	%ge
21-29	4	10.5%
30-39	25	65.8%
40-49	5	13.2%
50-59	3	7.9%
60 or older	1	2.6%
	38	**100.0%**

Highest Qualification

Qualification	Number	%ge
Masters degree	11	28.9%
Undergraduate degree	15	39.5%
Other	12	31.6%
	38	**100.0%**

Note: refers to nil or non-business related qualification

Professional membership

Professional membership	Number	%ge
SAICA	6	15.8%
CIMA	9	23.7%
SAIPA	2	5.3%
CIS	4	10.5%
ACCA	4	10.5%
Other	13	34.2%
	38	**100.0%**

Note: Other refers to nil or non accounting bodies

Appendix D – Ordered Probit regression analysis results

1. Costing tools

Equation 1

Dependent Variable: COST_SEP
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:36
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.28279	0.241627	-1.17036	0.2419	-0.01
COMP	0.199077	0.274891	0.724202	0.4689	0.01
STRUC	0.020273	0.207239	0.097825	0.9221	0.00
SIZE	0.382085	0.151863	2.515983	**0.0119**	0.02
EDU	0.345904	0.256164	1.350324	0.1769	0.02
DIV	0.14934	0.212955	0.701273	0.4831	0.01
AMT	0.114399	0.212518	0.538302	0.5904	0.01
TQM	-0.25234	0.199706	-1.26354	0.2064	-0.01
JIT	0.378799	0.196242	1.930267	**0.0536**	0.02
	Limit Points				
LIMIT_2:C(10)	1.825769	1.695803	1.07664	0.2816	
LIMIT_3:C(11)	2.121739	1.700653	1.247603	0.2122	
LIMIT_4:C(12)	3.031466	1.732176	1.750091	0.0801	
LIMIT_5:C(13)	3.62571	1.755305	2.065572	0.0389	

Pseudo R-squared	0.157492	Akaike info criterion	3.156228
Schwarz criterion	3.716455	Log likelihood	-46.9683
Hannan-Quinn criter.	3.355552	Restr. log likelihood	-55.7482
LR statistic	17.5598	Avg. log likelihood	-1.23601
Prob(LR statistic)	0.040638		

Equation 2

Dependent Variable: COST_PLANT
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:31
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	0.703005	0.324346	2.167454	**0.0302**	0.002
COMP	-0.30254	0.321741	-0.94033	0.347	-0.001
STRUC	-0.04475	0.241357	-0.18541	0.8529	0.000
SIZE	0.204082	0.178841	1.141137	0.2538	0.001
EDU	0.120239	0.339822	0.353829	0.7235	0.000
DIV	0.781255	0.280198	2.788222	**0.0053**	0.002
AMT	0.602929	0.243216	2.478982	**0.0132**	0.002
TQM	-0.19475	0.260361	-0.74798	0.4545	-0.001
JIT	0.05552	0.243831	0.227697	0.8199	0.000
	Limit Points				
LIMIT_2:C(10)	5.400954	2.106859	2.56351	0.0104	
LIMIT_3:C(11)	5.769148	2.12823	2.710773	0.0067	
LIMIT_4:C(12)	6.919196	2.221545	3.114587	0.0018	
LIMIT_5:C(13)	8.214814	2.423275	3.389963	0.0007	

Pseudo R-squared	0.319843	Akaike info criterion	2.34439
Schwarz criterion	2.904617	Log likelihood	-31.5434
Hannan-Quinn criter.	2.543714	Restr. log likelihood	-46.3767
LR statistic	29.6665	Avg. log likelihood	-0.83009
Prob(LR statistic)	0.0005		

Equation 3

Dependent Variable: COST_DEPT
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:24
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 7 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-1.84811	0.53739	-3.43906	**0.0006**	-0.40
COMP	0.533448	0.400907	1.330601	0.1833	0.12
STRUC	1.036394	0.399406	2.59484	**0.0095**	0.22
SIZE	-0.48272	0.257777	-1.87263	**0.0611**	-0.10
EDU	1.058186	0.346672	3.052407	**0.0023**	0.23
DIV	-0.23088	0.276253	-0.83574	0.4033	-0.05
AMT	0.816289	0.325512	2.507709	**0.0122**	0.18
TQM	0.493621	0.253805	1.944879	**0.0518**	0.11
JIT	0.148137	0.230332	0.643147	0.5201	0.03
	Limit Points				
LIMIT_2:C(10)	5.002679	2.443346	2.047471	0.0406	
LIMIT_3:C(11)	5.603067	2.497058	2.243867	0.0248	
LIMIT_4:C(12)	6.246751	2.502144	2.496559	0.0125	
LIMIT_5:C(13)	6.696332	2.504316	2.673916	0.0075	

Pseudo R-squared	0.423486	Akaike info criterion	2.232876
Schwarz criterion	2.793103	Log likelihood	-29.4247
Hannan-Quinn criter.	2.432201	Restr. log likelihood	-51.0389
LR statistic	43.22846	Avg. log likelihood	-0.77433
Prob(LR statistic)	0.000002		

Equation 4

Dependent Variable: COST_ABC
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 15:54
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.1132	0.210357	-0.53812	0.5905	-0.01
COMP	-0.44324	0.28859	-1.53587	0.1246	-0.05
STRUC	**-0.36344**	**0.205456**	**-1.76894**	**0.0769**	**-0.04**
SIZE	-0.00021	0.147678	-0.0014	0.9989	0.00
EDU	-0.05252	0.262974	-0.19972	0.8417	-0.01
DIV	0.216126	0.207131	1.043428	0.2968	0.02
AMT	0.239984	0.206657	1.161268	0.2455	0.03
TQM	-0.19907	0.204392	-0.97394	0.3301	-0.02
JIT	**0.530255**	**0.195524**	**2.711976**	**0.0067**	**0.06**
	Limit Points				
LIMIT_2:C(10)	-2.53497	1.794947	-1.41228	0.1579	
LIMIT_3:C(11)	-2.23905	1.792795	-1.24892	0.2117	
LIMIT_4:C(12)	-1.55972	1.78536	-0.87362	0.3823	
LIMIT_5:C(13)	-0.89972	1.768856	-0.50864	0.611	

Pseudo R-squared	0.147482	Akaike info criterion	3.310131
Schwarz criterion	3.870358	Log likelihood	-49.8925
Hannan-Quinn criter.	3.509455	Restr. log likelihood	-58.5237
LR statistic	17.26235	Avg. log likelihood	-1.31296
Prob(LR statistic)	0.044763		

Equation 5

Dependent Variable: COST_TC
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 15:58
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-0.4373	0.22972	-1.90363	**0.057**	-0.03
COMP	-0.1829	0.270017	-0.67736	0.4982	-0.01
STRUC	-0.24101	0.197337	-1.2213	0.222	-0.02
SIZE	-0.16633	0.15367	-1.08237	0.2791	-0.01
EDU	0.123173	0.247668	0.497331	0.619	0.01
DIV	-0.12218	0.213611	-0.57195	0.5674	-0.01
AMT	0.010722	0.205965	0.052058	0.9585	0.00
TQM	0.373091	0.195812	1.905356	**0.0567**	0.02
JIT	0.137072	0.178794	0.766645	0.4433	0.01
	Limit Points				
LIMIT_2:C(10)	-2.81072	1.792725	-1.56785	0.1169	
LIMIT_3:C(11)	-2.42381	1.790845	-1.35345	0.1759	
LIMIT_4:C(12)	-1.16697	1.745902	-0.66841	0.5039	
LIMIT_5:C(13)	-0.83197	1.738926	-0.47844	0.6323	

Pseudo R-squared	0.144338	Akaike info criterion	3.207507
Schwarz criterion	3.767734	Log likelihood	-47.9426
Hannan-Quinn criter.	3.406832	Restr. log likelihood	-56.0299
LR statistic	16.17453	Avg. log likelihood	-1.26165
Prob(LR statistic)	0.063325		

<u>Equation 6</u>

Dependent Variable: COST_QUAL
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 15:56
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-0.12597	0.213678	-0.58951	0.5555	-0.03
COMP	-0.0398	0.275511	-0.14446	0.8851	-0.01

STRUC	-0.03804	0.197742	-0.19235	0.8475	-0.01
SIZE	-0.00564	0.154832	-0.03642	0.9709	0.00
EDU	-0.04339	0.253355	-0.17127	0.864	-0.01
DIV	0.156011	0.209933	0.743144	0.4574	0.04
AMT	0.292194	0.207475	1.408334	0.159	0.07
TQM	0.217599	0.194841	1.116803	0.2641	0.05
JIT	-0.00731	0.180781	-0.04042	0.9678	0.00
	Limit Points				
LIMIT_2:C(10)	0.275487	1.695415	0.16249	0.8709	
LIMIT_3:C(11)	0.539726	1.695751	0.318282	0.7503	
LIMIT_4:C(12)	1.06899	1.697495	0.629746	0.5289	
LIMIT_5:C(13)	1.60266	1.705687	0.939598	0.3474	

Pseudo R-squared	0.103681	Akaike info criterion	3.359462
Schwarz criterion	3.919689	Log likelihood	-50.8298
Hannan-Quinn criter.	3.558787	Restr. log likelihood	-56.7095
LR statistic	11.75944	Avg. log likelihood	-1.33763
Prob(LR statistic)	0.227213		

<u>Equation 7</u>

Dependent Variable: COST_REG
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 15:57
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	0.188473	0.301845	0.624403	0.5324	0.04
COMP	-0.46287	0.372747	-1.24179	0.2143	-0.11
STRUC	0.309879	0.302658	1.023856	0.3059	0.07
SIZE	0.250732	0.191046	1.312418	0.1894	0.06
EDU	0.003164	0.34548	0.009158	0.9927	0.00
DIV	-0.17435	0.283749	-0.61446	0.5389	-0.04
AMT	0.523053	0.273849	1.910004	**0.0561**	0.12
TQM	-0.37626	0.367701	-1.02329	0.3062	-0.09
JIT	0.50688	0.286434	1.769621	**0.0768**	0.12

	Limit Points			
LIMIT_2:C(10)	1.743326	2.250772	0.774546	0.4386
LIMIT_3:C(11)	1.861232	2.253391	0.825969	0.4088
LIMIT_4:C(12)	2.904401	2.268456	1.280343	0.2004
LIMIT_5:C(13)	3.183362	2.274091	1.399839	0.1616

Pseudo R-squared	0.267583	Akaike info criterion	2.040889
Schwarz criterion	2.601116	Log likelihood	-25.7769
Hannan-Quinn criter.	2.240213	Restr. log likelihood	-35.1943
LR statistic	18.83479	Avg. log likelihood	-0.67834
Prob(LR statistic)	0.026635		

2. Budgeting tools

Equation 8

Dependent Variable: BUD_PLAN
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:08
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.23096	0.265286	-0.87059	0.384	-0.06
COMP	-0.22064	0.287447	-0.76759	0.4427	-0.05
STRUC	-0.06556	0.213187	-0.30754	0.7584	-0.02
SIZE	0.09029	0.158211	0.570693	0.5682	0.02
EDU	0.133961	0.265388	0.504772	0.6137	0.03
DIV	0.351042	0.227405	1.543685	0.1227	0.09
AMT	-0.19906	0.226791	-0.87771	0.3801	-0.05
TQM	-0.04601	0.225202	-0.20431	0.8381	-0.01
JIT	0.142226	0.196637	0.723291	0.4695	0.04
	Limit Points				
LIMIT_2:C(10)	-2.2895	1.949855	-1.17419	0.2403	
LIMIT_3:C(11)	-1.92118	1.928854	-0.99602	0.3192	
LIMIT_4:C(12)	-1.12843	1.924361	-0.58639	0.5576	

LIMIT_5:C(13)	-0.3342	1.922172	-0.17387	0.862

Pseudo R-squared	0.079385	Akaike info criterion	2.738787
Schwarz criterion	3.299014	Log likelihood	-39.037
Hannan-Quinn criter.	2.938111	Restr. log likelihood	-42.4031
LR statistic	6.732351	Avg. log likelihood	-1.02729
Prob(LR statistic)	0.664963		

Equation 9

Dependent Variable: BUD_CONTROL
Method: ML - Ordered Probit (Quadratic hill climbing / EViews legacy)
Date: 12/08/17 Time: 13:05
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.13161	0.235035	-0.55996	0.5755	-0.02
COMP	-0.64719	0.312933	-2.06815	**0.0386**	-0.10
STRUC	-0.08644	0.220495	-0.39204	0.695	-0.01
SIZE	0.123882	0.153162	0.808826	0.4186	0.02
EDU	0.049811	0.279928	0.177941	0.8588	0.01
DIV	0.125556	0.212953	0.589595	0.5555	0.02
AMT	-0.44891	0.233526	-1.92231	**0.0546**	-0.07
TQM	0.268785	0.223816	1.200917	0.2298	0.04
JIT	0.221107	0.208401	1.060973	0.2887	0.03
	Limit Points				
LIMIT_2:C(10)	-4.45948	2.10398	-2.11955	0.034	
LIMIT_3:C(11)	-3.98719	2.07713	-1.91957	0.0549	
LIMIT_4:C(12)	-2.53303	2.044251	-1.2391	0.2153	
LIMIT_5:C(13)	-2.04791	2.033724	-1.00698	0.3139	

Pseudo R-squared	0.123693	Akaike info criterion	2.738331
Schwarz criterion	3.298558	Log likelihood	-39.0283
Hannan-Quinn criter.	2.937655	Restr. log likelihood	-44.5372
LR statistic	11.01787	Avg. log	-1.02706

		likelihood	
Prob(LR statistic)	0.274486		

Equation 10

Dependent Variable: BUD_AB
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:53
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.2775	0.236698	-1.17237	0.241	-0.03
COMP	-0.41877	0.294249	-1.42319	0.1547	-0.04
STRUC	-0.15647	0.213343	-0.73343	0.4633	-0.01
SIZE	0.116155	0.155893	0.745095	0.4562	0.01
EDU	-0.36701	0.269891	-1.35985	0.1739	-0.03
DIV	0.131281	0.217265	0.604244	0.5457	0.01
AMT	-0.09133	0.216456	-0.42192	0.6731	-0.01
TQM	0.183557	0.203159	0.903515	0.3663	0.02
JIT	0.375045	0.200977	1.866108	**0.062**	0.03
	Limit Points				
LIMIT_2:C(10)	-3.57706	1.82594	-1.95902	0.0501	
LIMIT_3:C(11)	-3.29429	1.813846	-1.81619	0.0693	
LIMIT_4:C(12)	-2.66606	1.79796	-1.48282	0.1381	
LIMIT_5:C(13)	-2.38733	1.79514	-1.32989	0.1836	

Pseudo R-squared	0.152796	Akaike info criterion	3.122891
Schwarz criterion	3.683118	Log likelihood	-46.3349
Hannan-Quinn criter.	3.322216	Restr. log likelihood	-54.6916
LR statistic	16.71328	Avg. log likelihood	-1.21934
Prob(LR statistic)	0.0534		

Equation 11

Dependent Variable: BUD_IF
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:09
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.1538	0.214464	-0.71714	0.4733	-0.03
COMP	-0.19822	0.270333	-0.73325	0.4634	-0.04
STRUC	0.095075	0.196364	0.484177	0.6283	0.02
SIZE	0.095565	0.148922	0.641711	0.5211	0.02
EDU	0.125578	0.255018	0.492427	0.6224	0.02
DIV	-0.13833	0.204743	-0.67562	0.4993	-0.02
AMT	-0.40441	0.208591	-1.93878	**0.0525**	-0.07
TQM	0.500637	0.204483	2.448301	**0.0144**	0.09
JIT	0.501256	0.198664	2.523135	**0.0116**	0.09
	Limit Points				
LIMIT_2:C(10)	0.146848	1.701291	0.086316	0.9312	
LIMIT_3:C(11)	0.871674	1.702211	0.512083	0.6086	
LIMIT_4:C(12)	1.790204	1.714652	1.044063	0.2965	
LIMIT_5:C(13)	2.417711	1.72122	1.404649	0.1601	

Pseudo R-squared	0.197042	Akaike info criterion	3.232753
Schwarz criterion	3.79298	Log likelihood	-48.4223
Hannan-Quinn criter.	3.432077	Restr. log likelihood	-60.3049
LR statistic	23.76523	Avg. log likelihood	-1.27427
Prob(LR statistic)	0.004688		

Equation 12

Dependent Variable: BUD_FLEX
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:03
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5

Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-0.2414	0.217615	-1.10931	0.2673	-0.06
COMP	0.051737	0.261574	0.197789	0.8432	0.01
STRUC	-0.19523	0.191716	-1.0183	0.3085	-0.05
SIZE	-0.13288	0.148841	-0.89279	0.372	-0.03
EDU	0.468738	0.256824	1.825134	**0.068**	0.11
DIV	-0.07471	0.202964	-0.36811	0.7128	-0.02
AMT	0.463648	0.209453	2.213609	**0.0269**	0.11
TQM	0.174615	0.194014	0.90001	0.3681	0.04
JIT	0.110471	0.182208	0.606287	0.5443	0.03
	Limit Points				
LIMIT_2:C(10)	0.628319	1.66704	0.376907	0.7062	
LIMIT_3:C(11)	1.288812	1.671513	0.771045	0.4407	
LIMIT_4:C(12)	2.511769	1.710326	1.468591	0.1419	
LIMIT_5:C(13)	2.805195	1.717375	1.63342	0.1024	

Pseudo R-squared	0.13753	Akaike info criterion	3.27063
Schwarz criterion	3.830857	Log likelihood	-49.142
Hannan-Quinn criter.	3.469955	Restr. log likelihood	-56.9782
LR statistic	15.6724	Avg. log likelihood	-1.29321
Prob(LR statistic)	0.074046		

<u>Equation 13</u>

Dependent Variable: BUD_ZERO
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:09
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	0.201021	0.229501	0.875905	0.3811	0.02
COMP	-0.63568	0.294282	-2.1601	**0.0308**	-0.05
STRUC	-0.06058	0.197206	-0.30717	0.7587	0.00
SIZE	0.412289	0.156318	2.637498	**0.0084**	0.03
EDU	0.303054	0.272229	1.11323	0.2656	0.02
DIV	0.047619	0.212953	0.223615	0.8231	0.00
AMT	-0.75591	0.2224	-3.39887	**0.0007**	-0.06
TQM	0.47644	0.210329	2.265214	**0.0235**	0.04
JIT	0.444688	0.202194	2.199311	**0.0279**	0.03
	Limit Points				
LIMIT_2:C(10)	0.752785	1.684153	0.446981	0.6549	
LIMIT_3:C(11)	1.345088	1.682688	0.799369	0.4241	
LIMIT_4:C(12)	2.258799	1.693052	1.334158	0.1822	
LIMIT_5:C(13)	2.930102	1.718044	1.705487	0.0881	

Pseudo R-squared	0.194254	Akaike info criterion	3.15505
Schwarz criterion	3.715277	Log likelihood	- 46.9459
Hannan-Quinn criter.	3.354374	Restr. log likelihood	-58.264
LR statistic	22.63606	Avg. log likelihood	- 1.23542
Prob(LR statistic)	0.007068		

<u>Equation 14</u>

Dependent Variable: BUD_LONG
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:12
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-0.15928	0.250578	-0.63564	0.525	-0.0379
COMP	-0.51077	0.267972	-1.90604	**0.0566**	-0.1216

STRUC	0.225549	0.194992	1.156708	0.2474	0.0537
SIZE	0.017177	0.145983	0.117663	0.9063	0.0041
EDU	0.568407	0.252065	2.254999	**0.0241**	0.1353
DIV	0.247566	0.217902	1.136133	0.2559	0.0589
AMT	0.012884	0.20897	0.061656	0.9508	0.0031
TQM	-0.42898	0.211663	-2.02672	**0.0427**	-0.1021
JIT	0.47831	0.193435	2.472717	**0.0134**	0.1139
	Limit Points				
LIMIT_2:C(10)	0.010314	1.761027	0.005857	0.9953	
LIMIT_3:C(11)	0.419615	1.75134	0.239596	0.8106	
LIMIT_4:C(12)	1.27562	1.745406	0.730844	0.4649	
LIMIT_5:C(13)	1.936833	1.760711	1.100029	0.2713	

Pseudo R-squared	0.125147	Akaike info criterion	3.327418
Schwarz criterion	3.887645	Log likelihood	-50.2209
Hannan-Quinn criter.	3.526742	Restr. log likelihood	-57.405
LR statistic	14.3681	Avg. log likelihood	-1.3216
Prob(LR statistic)	0.109821		

3. Performance Evaluation tools

<u>Equation 15</u>

Dependent Variable: PERF_FIN
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:24
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.33669	0.267168	-1.2602	0.2076	-0.01
COMP	0.043103	0.276999	0.155606	0.8763	0.00
STRUC	0.272361	0.206155	1.321148	0.1865	0.01
SIZE	0.355963	0.162749	2.187186	**0.0287**	0.02
EDU	0.384505	0.253373	1.517543	0.1291	0.02

DIV	0.039901	0.22044	0.181004	0.8564	0.00
AMT	-0.03745	0.22635	-0.16544	0.8686	0.00
TQM	-0.10783	0.198664	-0.54278	0.5873	0.00
JIT	0.521241	0.207253	2.515001	**0.0119**	0.02
	Limit Points				
LIMIT_2:C(10)	1.444055	1.787428	0.807895	0.4192	
LIMIT_3:C(11)	2.102397	1.75568	1.197483	0.2311	
LIMIT_4:C(12)	2.801578	1.779501	1.574362	0.1154	
LIMIT_5:C(13)	3.685122	1.837054	2.005996	0.0449	

Pseudo R-squared	0.179972	Akaike info criterion	3.036408
Schwarz criterion	3.596635	Log likelihood	-44.6918
Hannan-Quinn criter.	3.235732	Restr. log likelihood	-54.5003
LR statistic	19.61703	Avg. log likelihood	-1.1761
Prob(LR statistic)	0.020429		

<u>Equation 16</u>

Dependent Variable: PERF_CUST
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:10
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.07549	0.212424	-0.35536	0.7223	-0.02
COMP	0.381456	0.269953	1.413047	0.1576	0.08
STRUC	-0.23404	0.191945	-1.21932	0.2227	-0.05
SIZE	-0.06123	0.148699	-0.4118	0.6805	-0.01
EDU	-0.03966	0.247472	-0.16028	0.8727	-0.01
DIV	-0.1836	0.204555	-0.89757	0.3694	-0.04
AMT	0.301655	0.207927	1.450774	0.1468	0.06
TQM	0.249999	0.193919	1.289191	0.1973	0.05
JIT	0.183959	0.181409	1.014055	0.3106	0.04
	Limit Points				

LIMIT_2:C(10)	0.273441	1.731943	0.157881	0.8746
LIMIT_3:C(11)	1.090842	1.743936	0.625506	0.5316
LIMIT_4:C(12)	1.40116	1.746143	0.802431	0.4223
LIMIT_5:C(13)	1.944849	1.749747	1.111503	0.2664

Pseudo R-squared	0.114216	Akaike info criterion	3.454094
Schwarz criterion	4.01432	Log likelihood	-52.6278
Hannan-Quinn criter.	3.653418	Restr. log likelihood	-59.4138
LR statistic	13.57207	Avg. log likelihood	-1.38494
Prob(LR statistic)	0.138383		

Equation 17

Dependent Variable: PERF_OP
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:12
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.00766	0.208786	-0.03671	0.9707	0.00
COMP	0.149338	0.263893	0.565905	0.5715	0.04
STRUC	-0.0386	0.190703	-0.20243	0.8396	-0.01
SIZE	0.024799	0.145116	0.170891	0.8643	0.01
EDU	-0.35965	0.246267	-1.46042	0.1442	-0.09
DIV	-0.02734	0.203995	-0.13401	0.8934	-0.01
AMT	0.153567	0.205221	0.748303	0.4543	0.04
TQM	0.307075	0.194955	1.575104	0.1152	0.07
JIT	-0.02955	0.182137	-0.16222	0.8711	-0.01
	Limit Points				
LIMIT_2:C(10)	-0.88507	1.630742	-0.54274	0.5873	
LIMIT_3:C(11)	-0.4558	1.620231	-0.28132	0.7785	
LIMIT_4:C(12)	0.131741	1.628943	0.080875	0.9355	
LIMIT_5:C(13)	0.547166	1.638786	0.333885	0.7385	

Pseudo R-squared	0.078204	Akaike info criterion	3.56344
Schwarz criterion	4.123667	Log likelihood	-

Hannan-Quinn criter.	3.762764	Restr. log likelihood	54.7054 - 59.3465
LR statistic	9.282272	Avg. log likelihood	- 1.43962
Prob(LR statistic)	0.411637		

Equation 18

Dependent Variable: PERF_EMP
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:19
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.06526	0.216016	-0.30208	0.7626	-0.01
COMP	-0.019	0.263685	-0.07205	0.9426	0.00
STRUC	0.058285	0.191866	0.303781	0.7613	0.01
SIZE	0.109553	0.148131	0.739573	0.4596	0.02
EDU	-0.14253	0.243579	-0.58513	0.5585	-0.03
DIV	0.308265	0.209055	1.474568	0.1403	0.06
AMT	-0.00573	0.202674	-0.02827	0.9774	0.00
TQM	-0.14015	0.186214	-0.75261	0.4517	-0.03
JIT	0.231536	0.177795	1.302267	0.1928	0.04
	Limit Points				
LIMIT_2:C(10)	-0.3516	1.652354	-0.21278	0.8315	
LIMIT_3:C(11)	-0.04735	1.647274	-0.02875	0.9771	
LIMIT_4:C(12)	0.759371	1.646808	0.461117	0.6447	
LIMIT_5:C(13)	1.315459	1.658617	0.793106	0.4277	

Pseudo R-squared	0.07535	Akaike info criterion	3.520793
Schwarz criterion	4.08102	Log likelihood	-53.8951
Hannan-Quinn criter.	3.720117	Restr. log likelihood	-58.287
LR statistic	8.783864	Avg. log likelihood	-1.41829
Prob(LR statistic)	0.45746		

Equation 19

Dependent Variable: PERF_EVA
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:11
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.25796	0.221794	-1.16305	0.2448	-0.06
COMP	-0.19009	0.310077	-0.61305	0.5398	-0.05
STRUC	-0.01537	0.217068	-0.0708	0.9436	0.00
SIZE	0.034863	0.151566	0.230019	0.8181	0.01
EDU	0.617561	0.302814	2.039404	**0.0414**	0.15
DIV	-0.08333	0.206003	-0.40449	0.6858	-0.02
AMT	0.39867	0.214831	1.855741	**0.0635**	0.10
TQM	-0.48843	0.229436	-2.12881	**0.0333**	-0.12
JIT	0.659563	0.215144	3.065679	**0.0022**	0.16
	Limit Points				
LIMIT_2:C(10)	1.46509	1.887083	0.776378	0.4375	
LIMIT_3:C(11)	2.159433	1.88361	1.146433	0.2516	
LIMIT_4:C(12)	2.71939	1.893643	1.436062	0.151	
LIMIT_5:C(13)	2.929526	1.902735	1.539639	0.1236	

Pseudo R-squared	0.174526	Akaike info criterion	3.051465
Schwarz criterion	3.611691	Log likelihood	-44.9778
Hannan-Quinn criter.	3.250789	Restr. log likelihood	-54.4873
LR statistic	19.01887	Avg. log likelihood	-1.18363
Prob(LR statistic)	0.025033		

Equation 20

Dependent Variable: PERF_BENCH
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:16
Sample: 1 38

Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.23336	0.21945	-1.06341	0.2876	-0.05
COMP	-0.80966	0.312802	-2.58841	**0.0096**	-0.17
STRUC	-0.08712	0.203432	-0.42823	0.6685	-0.02
SIZE	0.008428	0.152319	0.055329	0.9559	0.00
EDU	0.611357	0.289943	2.108544	**0.035**	0.13
DIV	0.218274	0.206663	1.056182	0.2909	0.05
AMT	0.243257	0.205552	1.183435	0.2366	0.05
TQM	-0.20689	0.201008	-1.02927	0.3034	-0.04
JIT	0.618347	0.207919	2.973985	**0.0029**	0.13
	Limit Points				
LIMIT_2:C(10)	-0.58293	1.708452	-0.3412	0.733	
LIMIT_3:C(11)	0.303674	1.709036	0.177687	0.859	
LIMIT_4:C(12)	0.943085	1.721038	0.547975	0.5837	
LIMIT_5:C(13)	1.469383	1.726742	0.850957	0.3948	

Pseudo R-squared	0.200231	Akaike info criterion	3.220858
Schwarz criterion	3.781085	Log likelihood	-48.1963
Hannan-Quinn criter.	3.420183	Restr. log likelihood	-60.2628
LR statistic	24.13298	Avg. log likelihood	-1.26832
Prob(LR statistic)	0.004096		

4. Profitability Analysis tools

<u>Equation 21</u>

Dependent Variable: PROF_BEP
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:34
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.18556	0.2347	-0.79064	0.4292	-0.0075
COMP	-0.04285	0.31332	-0.13675	0.8912	-0.0017
STRUC	-0.00456	0.206536	-0.02207	0.9824	-0.0002
SIZE	0.180798	0.149149	1.212194	0.2254	0.0073
EDU	0.638721	0.288071	2.217235	**0.0266**	0.0257
DIV	-0.03734	0.20558	-0.18163	0.8559	-0.0015
AMT	0.215571	0.22013	0.979287	0.3274	0.0087
TQM	0.127326	0.190598	0.668035	0.5041	0.0051
JIT	0.483535	0.205657	2.351173	**0.0187**	0.0195
	Limit Points				
LIMIT_2:C(10)	3.333938	1.873916	1.779129	0.0752	
LIMIT_3:C(11)	3.596585	1.887991	1.90498	0.0568	
LIMIT_4:C(12)	4.34596	1.914483	2.270044	0.0232	
LIMIT_5:C(13)	4.874982	1.925229	2.532157	0.0113	

Pseudo R-squared	0.197738	Akaike info criterion	3.078421
Schwarz criterion	3.638648	Log likelihood	-45.49
Hannan-Quinn criter.	3.277745	Restr. log likelihood	-56.7022
LR statistic	22.42439	Avg. log likelihood	-1.19711
Prob(LR statistic)	0.007627		

<u>Equation 22</u>

Dependent Variable: PROF_PROD
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:38
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 7 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.22657	0.241879	-0.93671	0.3489	-0.02
COMP	0.402015	0.301618	1.33286	0.1826	0.04

STRUC	-0.01681	0.206924	-0.08124	0.9352	0.00
SIZE	0.188107	0.158089	1.189887	0.2341	0.02
EDU	-0.06502	0.270589	-0.24028	0.8101	-0.01
DIV	-0.17506	0.215073	-0.81393	0.4157	-0.02
AMT	0.105422	0.227665	0.463057	0.6433	0.01
TQM	0.153879	0.197488	0.779182	0.4359	0.02
JIT	0.474424	0.214573	2.211013	**0.027**	0.05
	Limit Points				
LIMIT_2:C(10)	1.230359	1.84095	0.668328	0.5039	
LIMIT_3:C(11)	1.549229	1.850883	0.837022	0.4026	
LIMIT_4:C(12)	1.988949	1.852045	1.07392	0.2829	
LIMIT_5:C(13)	2.417857	1.849425	1.307356	0.1911	

Pseudo R-squared	0.164876	Akaike info criterion	3.110091
Schwarz criterion	3.670318	Log likelihood	-46.0917
Hannan-Quinn criter.	3.309416	Restr. log likelihood	-55.1915
LR statistic	18.19944	Avg. log likelihood	-1.21294
Prob(LR statistic)	0.032929		

<u>Equation 23</u>

Dependent Variable: PROF_CUST
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:13
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.19602	0.211285	-0.92776	0.3535	-0.04
COMP	0.339562	0.271291	1.251655	0.2107	0.07
STRUC	-0.16393	0.197872	-0.82847	0.4074	-0.03
SIZE	0.201699	0.143645	1.404152	0.1603	0.04
EDU	-0.16992	0.250071	-0.67948	0.4968	-0.03
DIV	-0.21803	0.209838	-1.03902	0.2988	-0.04
AMT	0.143441	0.205859	0.69679	0.4859	0.03
TQM	0.45073	0.204253	2.206727	**0.0273**	0.09
JIT	-0.05206	0.183851	-0.28317	0.777	-0.01

	Limit Points			
LIMIT_2:C(10)	-0.26773	1.758458	-0.15225	0.879
LIMIT_3:C(11)	-0.14737	1.765101	-0.08349	0.9335
LIMIT_4:C(12)	0.619446	1.768601	0.350246	0.7262
LIMIT_5:C(13)	1.352878	1.74852	0.773728	0.4391

Pseudo R-squared	0.125362	Akaike info criterion	3.256445
Schwarz criterion	3.816672	Log likelihood	-48.8725
Hannan-Quinn criter.	3.455769	Restr. log likelihood	-55.8774
LR statistic	14.00982	Avg. log likelihood	-1.28612
Prob(LR statistic)	0.121976		

<u>Equation 24</u>

Dependent Variable: PROF_STOCK
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:14
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.04614	0.236566	-0.19504	0.8454	0.00
COMP	0.192977	0.296542	0.650759	0.5152	0.02
STRUC	0.024162	0.209639	0.115254	0.9082	0.00
SIZE	-0.11054	0.149246	-0.74067	0.4589	-0.01
EDU	0.17273	0.261509	0.660512	0.5089	0.02
DIV	0.058172	0.21463	0.271036	0.7864	0.01
AMT	0.225896	0.21843	1.034182	0.3011	0.02
TQM	0.18822	0.210688	0.893362	0.3717	0.02
JIT	0.192068	0.192875	0.995819	0.3193	0.02
	Limit Points				
LIMIT_2:C(10)	2.497198	1.876425	1.330827	0.1832	
LIMIT_3:C(11)	2.666178	1.879669	1.41843	0.1561	
LIMIT_4:C(12)	3.140136	1.889353	1.662017	0.0965	
LIMIT_5:C(13)	3.50072	1.899315	1.843148	0.0653	

Pseudo R-squared	0.120333	Akaike info criterion	3.145379
Schwarz criterion	3.705606	Log likelihood	-46.7622
Hannan-Quinn criter.	3.344704	Restr. log likelihood	-53.159
LR statistic	12.79354	Avg. log likelihood	-1.23058
Prob(LR statistic)	0.172173		

5. **Investment Decision Making tools**

<u>Equation 25</u>

Dependent Variable: INV_RET
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:01
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	0.053807	0.222041	0.242328	0.8085	0.0003
COMP	0.465416	0.288544	1.612983	0.1067	0.0022
STRUC	0.083407	0.192507	0.433266	0.6648	0.0004
SIZE	0.046393	0.142262	0.32611	0.7443	0.0002
EDU	0.528406	0.250188	2.112039	**0.0347**	0.0026
DIV	0.017464	0.198036	0.088187	0.9297	0.0001
AMT	0.325381	0.208239	1.562537	0.1182	0.0016
TQM	0.133393	0.18872	0.706831	0.4797	0.0006
JIT	0.214727	0.185922	1.154929	0.2481	0.0010
	Limit Points				
LIMIT_2:C(10)	5.161091	1.926467	2.679045	0.0074	
LIMIT_3:C(11)	5.58815	1.937366	2.884406	0.0039	
LIMIT_4:C(12)	6.310253	1.976873	3.192038	0.0014	
LIMIT_5:C(13)	7.438306	2.053471	3.622308	0.0003	

Pseudo R-squared	0.16241	Akaike info criterion	3.303391
Schwarz criterion	3.863618	Log likelihood	-49.7644
Hannan-Quinn	3.502716	Restr. log	-59.4138

criter.		likelihood	
LR statistic	19.29876	Avg. log likelihood	-1.30959
Prob(LR statistic)	0.022769		

Equation 26

Dependent Variable: INV_NONFIN
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:46
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.70816	0.288117	-2.4579	**0.014**	-0.16
COMP	-0.41247	0.279645	-1.47498	0.1402	-0.09
STRUC	0.362037	0.218822	1.654478	**0.098**	0.08
SIZE	0.103325	0.145783	0.708757	0.4785	0.02
EDU	0.605113	0.267591	2.261336	**0.0237**	0.13
DIV	-0.09362	0.20249	-0.46235	0.6438	-0.02
AMT	0.114823	0.20663	0.555693	0.5784	0.03
TQM	0.103476	0.201411	0.513755	0.6074	0.02
JIT	0.191305	0.194337	0.984399	0.3249	0.04
	Limit Points				
LIMIT_2:C(10)	-0.38021	1.686012	-0.22551	0.8216	
LIMIT_3:C(11)	-0.03728	1.6893	-0.02207	0.9824	
LIMIT_4:C(12)	0.881776	1.690167	0.52171	0.6019	
LIMIT_5:C(13)	1.449726	1.693453	0.856077	0.392	

Pseudo R-squared	0.170602	Akaike info criterion	3.231562
Schwarz criterion	3.791788	Log likelihood	-48.3997
Hannan-Quinn criter.	3.430886	Restr. log likelihood	-58.3552
LR statistic	19.91098	Avg. log likelihood	-1.27368
Prob(LR statistic)	0.01847		

Equation 27

Dependent Variable: INV_RISK
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:01
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-1.07003	0.358187	-2.98735	**0.0028**	-0.06
COMP	-0.27116	0.319111	-0.84975	0.3955	-0.02
STRUC	0.332704	0.269652	1.233826	0.2173	0.02
SIZE	-0.04004	0.168143	-0.23813	0.8118	0.00
EDU	0.477004	0.303946	1.569371	0.1166	0.03
DIV	-0.16685	0.213071	-0.78306	0.4336	-0.01
AMT	0.620738	0.232486	2.67	**0.0076**	0.04
TQM	0.04659	0.205788	0.226397	0.8209	0.00
JIT	0.144896	0.210495	0.688357	0.4912	0.01
	Limit Points				
LIMIT_2:C(10)	-1.04094	1.896921	-0.54875	0.5832	
LIMIT_3:C(11)	-0.62345	1.898082	-0.32847	0.7426	
LIMIT_4:C(12)	0.209436	1.885315	0.111088	0.9115	
LIMIT_5:C(13)	0.493231	1.881723	0.262117	0.7932	

Pseudo R-squared	0.25522	Akaike info criterion	2.782883
Schwarz criterion	3.34311	Log likelihood	-39.8748
Hannan-Quinn criter.	2.982208	Restr. log likelihood	-53.539
LR statistic	27.32842	Avg. log likelihood	-1.04934
Prob(LR statistic)	0.001234		

Equation 28

Dependent Variable: INV_IF
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 12:43
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5

Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.24276	0.231115	-1.0504	0.2935	-0.01
COMP	0.153352	0.298359	0.513986	0.6073	0.01
STRUC	-0.00181	0.201723	-0.00898	0.9928	0.00
SIZE	0.296768	0.149794	1.981177	**0.0476**	0.02
EDU	0.427288	0.275559	1.550624	0.121	0.02
DIV	-0.24252	0.208298	-1.16431	0.2443	-0.01
AMT	-0.02359	0.207447	-0.11371	0.9095	0.00
TQM	0.296691	0.20388	1.455221	0.1456	0.02
JIT	0.391029	0.202222	1.933659	**0.0532**	0.02
	Limit Points				
LIMIT_2:C(10)	2.584756	1.815624	1.423619	0.1546	
LIMIT_3:C(11)	3.202304	1.836312	1.743878	0.0812	
LIMIT_4:C(12)	3.571612	1.843977	1.936906	0.0528	
LIMIT_5:C(13)	4.10763	1.848934	2.221621	0.0263	

Pseudo R-squared	0.162203	Akaike info criterion	3.256566
Schwarz criterion	3.816793	Log likelihood	-48.8748
Hannan-Quinn criter.	3.45589	Restr. log likelihood	-58.3373
LR statistic	18.92501	Avg. log likelihood	-1.28618
Prob(LR statistic)	0.025838		

<u>Equation 29</u>

Dependent Variable: INV_CC
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 15:59
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 7 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.24944	0.23152	-1.07741	0.2813	-0.03

COMP	0.297659	0.280514	1.061118	0.2886	0.03
STRUC	0.025512	0.19265	0.132429	0.8946	0.00
SIZE	0.213465	0.144381	1.478488	0.1393	0.02
EDU	0.091036	0.247975	0.367116	0.7135	0.01
DIV	-0.1466	0.199213	-0.73591	0.4618	-0.02
AMT	0.163762	0.207587	0.788882	0.4302	0.02
TQM	0.310831	0.199539	1.557746	0.1193	0.03
JIT	0.056718	0.18698	0.303337	0.7616	0.01
	Limit Points				
LIMIT_2:C(10)	1.359725	1.748671	0.777576	0.4368	
LIMIT_3:C(11)	1.747009	1.753788	0.996135	0.3192	
LIMIT_4:C(12)	2.264719	1.759287	1.287294	0.198	
LIMIT_5:C(13)	2.836477	1.76623	1.60595	0.1083	

Pseudo R-squared	0.106466	Akaike info criterion	3.454564
Schwarz criterion	4.014791	Log likelihood	-52.6367
Hannan-Quinn criter.	3.653889	Restr. log likelihood	-58.9085
LR statistic	12.5435	Avg. log likelihood	-1.38518
Prob(LR statistic)	0.184373		

6. Strategic Management Accounting tools

Equation 30

Dependent Variable: SMA_FOR
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:15
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	0.044497	0.218835	0.203338	0.8389	0.00
COMP	0.08994	0.263494	0.341337	0.7328	0.01
STRUC	0.210672	0.185982	1.132757	0.2573	0.02
SIZE	-0.0608	0.144434	-0.42093	0.6738	-0.01
EDU	0.011543	0.242077	0.047685	0.962	0.00

DIV	0.248428	0.207364	1.198027	0.2309	0.02
AMT	0.217458	0.205215	1.059659	0.2893	0.02
TQM	0.065831	0.189987	0.346503	0.729	0.01
JIT	-0.07108	0.180734	-0.39327	0.6941	-0.01
	Limit Points				
LIMIT_2:C(10)	1.462174	1.690699	0.864834	0.3871	
LIMIT_3:C(11)	1.822079	1.687502	1.079749	0.2803	
LIMIT_4:C(12)	2.467142	1.704049	1.447811	0.1477	
LIMIT_5:C(13)	3.152804	1.733792	1.818444	0.069	

Pseudo R-squared	0.083859	Akaike info criterion	3.570634
Schwarz criterion	4.130861	Log likelihood	-54.8421
Hannan-Quinn criter.	3.769959	Restr. log likelihood	-59.862
LR statistic	10.03988	Avg. log likelihood	-1.44321
Prob(LR statistic)	0.347267		

Equation 31

Dependent Variable: SMA_SHARE
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:16
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.42009	0.248957	-1.68741	0.0915	-0.03
COMP	0.125822	0.285021	0.44145	0.6589	0.01
STRUC	0.341651	0.209615	1.629895	0.1031	0.02
SIZE	0.017938	0.155096	0.115658	0.9079	0.00
EDU	0.502487	0.259726	1.934678	**0.053**	0.03
DIV	-0.29846	0.211858	-1.40879	0.1589	-0.02
AMT	0.34021	0.214316	1.587422	0.1124	0.02
TQM	0.38584	0.203611	1.894983	**0.0581**	0.03
JIT	0.389379	0.191352	2.034883	**0.0419**	0.03
	Limit Points				

LIMIT_2:C(10)	3.060267	1.816373	1.684823	0.092
LIMIT_3:C(11)	3.827587	1.856457	2.06177	0.0392
LIMIT_4:C(12)	4.95499	1.883444	2.630814	0.0085
LIMIT_5:C(13)	5.442767	1.892364	2.876174	0.004

Pseudo R-squared	0.253966	Akaike info criterion	2.997249
Schwarz criterion	3.557476	Log likelihood	-43.9477
Hannan-Quinn criter.	3.196573	Restr. log likelihood	-58.9085
LR statistic	29.92149	Avg. log likelihood	-1.15652
Prob(LR statistic)	0.000452		

<u>Equation 32</u>

Dependent Variable: SMA_IND
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:43
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.77783	0.277532	-2.80267	**0.0051**	-0.04
COMP	0.969133	0.31735	3.053829	**0.0023**	0.05
STRUC	0.440898	0.211088	2.088688	**0.0367**	0.02
SIZE	0.120037	0.147887	0.811686	0.417	0.01
EDU	0.118652	0.249692	0.475195	0.6346	0.01
DIV	-0.061	0.214472	-0.2844	0.7761	0.00
AMT	0.565864	0.225098	2.513861	**0.0119**	0.03
TQM	-0.27516	0.197383	-1.39406	0.1633	-0.02
JIT	0.173591	0.187126	0.92767	0.3536	0.01
	Limit Points				
LIMIT_2:C(10)	2.377579	1.951187	1.21853	0.223	
LIMIT_3:C(11)	2.728536	1.977253	1.379963	0.1676	
LIMIT_4:C(12)	3.963771	2.019626	1.962626	0.0497	
LIMIT_5:C(13)	4.783557	2.02146	2.366387	0.018	

Pseudo R-squared	0.247107	Akaike info criterion	2.931089

Schwarz criterion	3.491316	Log likelihood	-42.6907
Hannan-Quinn criter.	3.130413	Restr. log likelihood	-56.7022
LR statistic	28.02301	Avg. log likelihood	-1.12344
Prob(LR statistic)	0.000945		

Equation 33

Dependent Variable: SMA_COMP
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:40
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.64602	0.270861	-2.38506	**0.0171**	-0.09
COMP	0.630863	0.302562	2.085072	**0.0371**	0.09
STRUC	0.276577	0.211729	1.306279	0.1915	0.04
SIZE	0.209756	0.147959	1.417657	0.1563	0.03
EDU	-0.19017	0.256727	-0.74075	0.4588	-0.03
DIV	0.134155	0.218041	0.615273	0.5384	0.02
AMT	0.367277	0.219702	1.671702	**0.0946**	0.05
TQM	-0.11913	0.193484	-0.61568	0.5381	-0.02
JIT	-0.00104	0.189383	-0.00551	0.9956	0.00
	Limit Points				
LIMIT_2:C(10)	0.565054	1.833181	0.308237	0.7579	
LIMIT_3:C(11)	0.998327	1.843858	0.541434	0.5882	
LIMIT_4:C(12)	1.965611	1.870001	1.051129	0.2932	
LIMIT_5:C(13)	2.268453	1.869219	1.213583	0.2249	

Pseudo R-squared	0.179412	Akaike info criterion	3.119265
Schwarz criterion	3.679492	Log likelihood	-46.266
Hannan-Quinn criter.	3.31859	Restr. log likelihood	-56.3815
LR statistic	20.23099	Avg. log likelihood	-1.21753
Prob(LR statistic)	0.016539		

Equation 34

Dependent Variable: SMA_VC
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:57
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 6 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	0.019845	0.21329	0.093041	0.9259	0.001808
COMP	0.0284	0.275916	0.102929	0.918	0.002587
STRUC	0.163538	0.196258	0.83328	0.4047	0.014898
SIZE	0.10967	0.145386	0.754341	0.4506	0.00999
EDU	0.140237	0.250203	0.56049	0.5751	0.012775
DIV	-0.17577	0.206819	-0.84987	0.3954	-0.01601
AMT	0.290264	0.202671	1.432195	0.1521	0.026442
TQM	0.178696	0.19793	0.902824	0.3666	0.016278
JIT	0.257906	0.18677	1.380876	0.1673	0.023494
	Limit Points				
LIMIT_2:C(10)	1.967716	1.788026	1.100496	0.2711	
LIMIT_3:C(11)	2.065899	1.790274	1.153957	0.2485	
LIMIT_4:C(12)	3.387998	1.847315	1.834012	0.0667	
LIMIT_5:C(13)	3.934397	1.858404	2.117084	0.0343	

Pseudo R-squared	0.149894	Akaike info criterion	3.040562
Schwarz criterion	3.600789	Log likelihood	-44.7707
Hannan-Quinn criter.	3.239886	Restr. log likelihood	-52.6649
LR statistic	15.78833	Avg. log likelihood	-1.17818
Prob(LR statistic)	0.071435		

Equation 35

Dependent Variable: SMA_PROD
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:47
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5

Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	**Marginal effect**
PEU	-0.25784	0.226433	-1.13872	0.2548	-0.06
COMP	0.213077	0.280478	0.759693	0.4474	0.05
STRUC	0.134374	0.194522	0.690791	0.4897	0.03
SIZE	-0.05444	0.146486	-0.37166	0.7101	-0.01
EDU	0.092317	0.249926	0.369379	0.7118	0.02
DIV	-0.29457	0.209348	-1.40708	0.1594	-0.07
AMT	0.39525	0.201651	1.960074	**0.05**	0.10
TQM	0.0572	0.199487	0.286734	0.7743	0.01
JIT	0.255159	0.184343	1.384152	0.1663	0.06
	Limit Points				
LIMIT_2:C(10)	0.783005	1.755081	0.446136	0.6555	
LIMIT_3:C(11)	1.339225	1.761476	0.760286	0.4471	
LIMIT_4:C(12)	2.053285	1.75637	1.16905	0.2424	
LIMIT_5:C(13)	2.291907	1.756704	1.304663	0.192	

Pseudo R-squared	0.116491	Akaike info criterion	3.289024
Schwarz criterion	3.849251	Log likelihood	-49.4915
Hannan-Quinn criter.	3.488349	Restr. log likelihood	-56.0169
LR statistic	13.05089	Avg. log likelihood	-1.30241
Prob(LR statistic)	0.160317		

<u>Equation 36</u>

Dependent Variable: SMA_INTE
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/06/17 Time: 16:16
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	-0.20229	0.210461	-0.96116	0.3365	-0.05
COMP	0.276239	0.273238	1.010983	0.312	0.07
STRUC	0.127317	0.191695	0.664162	0.5066	0.03
SIZE	-0.07941	0.151761	-0.52323	0.6008	-0.02
EDU	-0.42011	0.257345	-1.63249	0.1026	-0.10
DIV	0.083487	0.206028	0.40522	0.6853	0.02
AMT	0.074437	0.197146	0.377574	0.7057	0.02
TQM	0.140878	0.188702	0.746564	0.4553	0.03
JIT	0.15744	0.177624	0.886368	0.3754	0.04
	Limit Points				
LIMIT_2:C(10)	-0.64524	1.69592	-0.38047	0.7036	
LIMIT_3:C(11)	-0.03237	1.702718	-0.01901	0.9848	
LIMIT_4:C(12)	0.751162	1.707887	0.439819	0.6601	
LIMIT_5:C(13)	1.3349	1.703356	0.783688	0.4332	

Pseudo R-squared	0.135538	Akaike info criterion	3.384731
Schwarz criterion	3.944958	Log likelihood	-51.3099
Hannan-Quinn criter.	3.584056	Restr. log likelihood	-59.3547
LR statistic	16.08971	Avg. log likelihood	-1.35026
Prob(LR statistic)	0.065032		

Equation 37

Dependent Variable: SMA_SWOT
Method: ML - Ordered Probit (Newton-Raphson / Marquardt steps)
Date: 12/08/17 Time: 13:50
Sample: 1 38
Included observations: 38
Number of ordered indicator values: 5
Convergence achieved after 4 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effect
PEU	0.081353	0.219026	0.371432	0.7103	0.001
COMP	0.364906	0.300069	1.216072	0.224	0.005
STRUC	0.220196	0.214223	1.027882	0.304	0.003
SIZE	0.227687	0.166797	1.365055	0.1722	0.003

EDU	-0.33597	0.293781	-1.1436	0.2528	-0.004
DIV	0.651386	0.24034	2.710263	**0.0067**	0.009
AMT	-0.464	0.234986	-1.9746	**0.0483**	-0.006
TQM	-0.10162	0.20289	-0.50086	0.6165	-0.001
JIT	0.051318	0.201946	0.254116	0.7994	0.001
	Limit Points				
LIMIT_2:C(10)	0.553276	1.857245	0.297902	0.7658	
LIMIT_3:C(11)	1.100089	1.851542	0.594147	0.5524	
LIMIT_4:C(12)	2.183158	1.86048	1.173438	0.2406	
LIMIT_5:C(13)	2.763022	1.876781	1.472213	0.141	

Pseudo R-squared	0.168642	Akaike info criterion	2.915481
Schwarz criterion	3.475708	Log likelihood	-42.3942
Hannan-Quinn criter.	3.114806	Restr. log likelihood	-50.9939
LR statistic	17.19946	Avg. log likelihood	-1.11564
Prob(LR statistic)	0.045683		