BEHAVIOURAL ASPECTS THAT INFLUENCE BUSINESS DECISION-MAKING BY MANAGEMENT ACCOUNTING PROFESSIONALS

by

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ACKNOWLEDGEMENTS

ABSTRACT

In their traditional role as 'bean-counters', 'scorekeepers' and 'controllers', management accountants were frequently excluded from operational decision-making. Criticism by operational managers about management accountants' decisions-making behaviour included that management accountants preferred evidence-based decisions, as opposed to the intuitive decisions that were regularly required in the business management environment.

However, the role of management accounting professionals are changing to that of business partner. The first aspect which the study investigated was whether management accounting professionals experienced an increase in their involvement in business-related decision-making, as suggested by their emerging business partner role.

Psychology-related behavioural aspects, which may result in biased decision-making, play a definite role in decision-making behaviour where the use of intuition is required. A review of literature indicated that management accounting professionals were less comfortable with making intuitive decisions. Therefore, they could be particularly susceptible to decision biases related to the influence of behavioural aspects. Accordingly, the second aspect which the study investigated was the susceptibility of management accountants to the main behavioural decision biases related to the use of decision heuristics and the effects of frame dependence.

A survey design was employed to investigate decision-making involvement and susceptibility to behavioural biases by means of an electronic questionnaire. Responses were received from an international sample of management accounting professionals, including members of the Institute of Management Accountants (USA) and the Chartered Institute of Management Accountants (UK). The responses were analysed quantitatively, using both univariate and multivariate statistics.

The study extends the current body of knowledge by being the first to comprehensively investigate the presence of behavioural biases in the decision-making behaviour of management accounting professionals as a group of decision-makers, which is especially

relevant due to their changing decision-making role in organisations. Additionally, contrary to many previous studies in the behavioural decision-making field, the study focused on an international, widely dispersed, sample of professionally employed decision-makers. The study also contributes to the debate on the conflict in findings regarding the prevalence of the changing role of the management accountant.

The important findings of the study were as follows:

- Management accounting professionals were involved in making business-related decisions. However, this involvement varied depending on the position in which a management accounting professional was employed, and the size of the company in which the professional was employed. The findings regarding the decision-making involvement of management accounting professionals also indicated that the promulgated business partner role was not as pervasive as suggested by most of the literature.

- Management accounting professionals experienced an increase in business decision-making involvement. This experience was not as widespread as the literature on the business partner role suggests, and was more pronounced for professionals between 30 and 49 years of age, and those more amenable to using their judgement when making decisions.

- Management accounting professionals were susceptible to frame dependence bias. The susceptibility of management accounting professionals to the biases of concurrent decisions framing, the certainty effect and the pseudo-certainty effect was similar to that of other populations. However, these professionals exhibited a lower susceptibility to loss aversion bias. Their susceptibility to mental accounting bias requires further investigation.

- Management accounting professionals were also susceptible to heuristic-based bias. Their susceptibility was similar to that of other populations for the representativeness-related confirmation bias, as well as for the adjustment and anchoring heuristic-related bias. Management accounting professionals exhibited lower susceptibility than other populations to the biases of misconceptions of chance, misconceptions of regression to the mean, general overconfidence, and affect. However, they were more susceptible to overconfidence in performing difficult tasks than other populations.

The findings could be of value to the management accounting profession in indicating that educational requirements existed for both the traditional and emerging roles of the management accountant. The study also initiated the research into the susceptibility of management accounting professionals to behavioural biases and paved the way for research and other actions aimed to debias the decision-making behaviour of these professionals.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The fact that we lack an 'operating manual' for our minds might not seem important. In fact, however, our lack of knowledge about how our minds work has profound consequences. Without an understanding of our thoughts and behaviour, we cannot anticipate when the cognitive processes that serve us so well are likely to lead us astray (Bazerman & Moore, 2012:45).

In their traditional role as 'scorekeepers' and 'controllers', management accountants were frequently excluded from operational decision-making because they were deemed to be too focused on numbers, and lacked an understanding of business and other contextual factors (Byrne & Pierce, 2007:480; Pierce & O'Dea, 2003:282; Rausch, 2011:138; Siegel, Sorensen & Richtermeyer, 2003:41). Criticism by operational managers about decision-making by management accountants includes management accountants attempting to attain perfect information (Pierce & O'Dea 2003:276) in accordance with their education regarding decision-making, which is mostly based on various normative, profit-maximising decision models (Scapens, 1990:262-263). Attempts to attain perfect information gravely affect the timeliness of business-related decisions.

However, research reveals that during the last two decades, the role of management accounting professionals in businesses are changing from the traditional 'bean counter' and 'scorekeeper' to that of business partner in decision-making (Komakech, 2009:42; Pierce & O'Dea, 2003:278; Russell, Siegel & Kulesza, 1999:3; Siegel *et al.*, 2003:42; Sutton, 2006:3). The emerging role of business partner includes closer involvement in operational matters and the provision and interpretation of information for operational decision-making purposes (Montano, Donoso, Hassall & Joyce, 2001:302; Pierce & O'Dea, 2003:260; Rausch, 2011:138; Siegel *et al.*, 2003:43). Accordingly, indications are that management accounting professionals as business partners are becoming more extensively involved in business-related decision-making (CGMA, 2016:2; Goretzki, Strauss & Weber, 2013:55; Kim, Hatcher & Newton, 2012:11).

Management accounting professionals are trained to provide financial information for financial decision-making purposes based on extensive technical financial calculations (Scapens, 1990:263). Pierce and O'Dea (2003:274) state that the application of such a technical set of skills to the provision of daily information for business-related decision-making purposes may not be practical. According to these authors, the time available to make critical daily management decisions regularly does not allow for the undertaking of time-consuming investigations to prepare near-perfect financial calculations to aid decision-making. Business decisions are therefore regularly made in conditions of uncertainty due to the limited availability of supporting information (Järvenpää, 2007:100).

Harris (1994:14) argues that management accounting professionals prefer extensive and detailed support when making decisions due to their personality traits and they may therefore struggle to make intuitive decisions. Harris (1994:14) suggests that the personalities of management accounting professionals tend to be orientated towards sensing rather than towards intuition as measured by the Myers-Briggs test. According to Harris (1994:14), being orientated towards sensing indicates that management accountants prefer facts, figures and details to guide them in decision-making.

However, in their emerging role as business partners, management accounting professionals are now required to make business-related financial decisions, or at least be part of a team that makes decisions, which are often based on incomplete information (Järvenpää, 2007:100). Psychology-related behavioural aspects play a definite role in decisions with high levels of uncertainty (Alewine, Allport & Shen, 2016:32; Kahneman & Tversky, 1979:263; Tversky & Kahneman, 1974:1124; 1981:458). Rzeszutek (2015:77) reports higher susceptibility to decision biases among personalities that are less comfortable with making risky decisions, a characteristic attributed to management accounting professionals by Harris (1994:14), as discussed above.

The Chartered Institute of Management Accountants (CIMA) published a research report authored by Emmanuel, Harris and Komakech (2008) into practices applied by management accounting professionals in making strategic investment decisions. *Strategic investment decisions* refer in essence to decisions based on capital budgeting, which are important

long-term decisions in any organisation. Some evidence was found that heuristics were used in making strategic investment decisions (Emmanuel *et al.*, 2008:2). Emmanuel, Harris and Komakech (2010:500) expanded their investigation of capital budgeting-related decision-making and indicated that investigation into the influences and role of behavioural aspects in capital budgeting-related decision-making was still in its preliminary phase. Emmanuel *et al.* (2008; 2010), like most previous studies related to the management accounting profession, focused on a specific decision and not on the decision-maker. However, these studies indicate that behavioural aspects may be present in decision-making where management accounting professionals, as decision-makers, are involved.

Sutton (2006:4) states that the changing role that management accounting professionals experience provides an area for research into how the various heuristic-based biases, which have been reported in psychology, affect management accountants in this new role as business partner in decision-making. A report by a leading international accounting body, the Association of Chartered Certified Accountants (ACCA), corroborates the call for research into the influence of cognitive biases in decision-making by the global accounting profession to endeavour to improve decision-making processes (ACCA, 2017:18).

1.2   PROBLEM STATEMENT AND CONTEXT

Therefore, the problem that this study investigates is that management accounting professionals are becoming more involved in business decision-making and, as human beings, are susceptible to psychological bias which, under certain conditions, results in suboptimal decision-making.

Management accounting professionals are educated to make decisions based on reliable financial information. In their emerging role as business partners, they may now be required to regularly make business decisions based on incomplete information. The uncertainty created by incomplete decision-making information may result in management accounting professionals being influenced by behavioural aspects when making decisions. The influence of such behavioural aspects may lead to systematic and predictable errors (Tversky & Kahneman, 1974:1131). Komakech (2009:289) found that *heuristics*, a specific

set of behavioural aspects, were used in strategic investment decision-making by management accounting professionals. However, Komakech (2009:289) did not investigate whether any possible heuristic-based decision *biases* were present in decision-making by management accounting professionals.

Accordingly, the research objectives of this study are as follows:

- to determine the prevalence of the suggested increased involvement of management accounting professionals in business-related decision-making;
- to determine which behavioural aspects from a list of frame dependence factors identified in the literature are present in the decision-making behaviour of management accounting professionals; and
- to determine which behavioural aspects from a list of behavioural heuristics identified in the literature are present in the decision-making behaviour of management accounting professionals.

The preceding objectives are rephrased into three main research questions, which will be investigated by means of supportive hypotheses.

Research Question 1

Are management accounting professionals becoming more involved in business-related decision-making?

The literature indicates that the roles of management accountants are changing from information provision and controlling only, to now include decision-making. However, some authors challenge the pervasiveness of management accounting professionals' involvement in decision-making and the concept of the *business partner* role (Johnston, Brignall & Fitzgerald, 2002:1336; Lambert & Sponem, 2011:566; Pierce & O'Dea, 2003:493).

Goretzki *et al.* (2013:55) state that management accounting professionals are becoming involved in operational management to the extent that they perceive themselves as "enacting general management". This indicates an increase in the extent of business-related decision-making involvement of management accounting professionals.

Research Question 1 is investigated by means of the following hypotheses:

Hypothesis 1:
Management accounting professionals are currently involved in business-related decision-making.

Hypothesis 2:
The extent of the involvement of management accounting professionals in business-related decision-making has increased during the last decade.

Involvement in business-related decision-making reinforces the importance of investigating possible behavioural influences in decision-making by management accounting professionals (CGMA, 2016:6), which will be done by means of the two research questions that follow.

Research Question 2

Which behavioural aspects from a list of frame dependence factors identified in the literature are present in the decision-making behaviour of management accounting professionals?

Harwood, Pate and Schneider (1991:168) argue that management accountants should be aware of the effect of the framing of a decision on budgeting decisions. Frame dependence is the first group of behavioural aspects which will be tested in the present study. Decision-making by management accountants will be tested for the presence of the following possible effects resulting from the way the decision problem is framed, namely loss aversion, concurrent decisions obscuring the true decision options, the certainty effect (including pseudo-certainty), mental accounting and the endowment effect.

Research Question 2 is investigated by means of the following hypotheses:

Hypothesis 3:
Management accounting professionals are influenced by loss aversion in making business-related decisions.

Hypothesis 4:
Management accounting professionals are influenced by concurrent decisions framing, which obscures the true decision options in making business-related decisions.

Hypothesis 5:
Management accounting professionals are influenced by the certainty effect in making business-related decisions.

Hypothesis 6:
Management accounting professionals are influenced by pseudo-certainty, stemming from the certainty effect, in making business-related decisions.

Hypothesis 7:
Management accounting professionals are influenced by the effects of mental accounting in making business-related decisions.

Hypothesis 8:
Management accounting professionals are influenced by the endowment effect in making business-related decisions.

The possible influences of behavioural effects related to framing are the first group of behavioural aspects investigated in this study. The second group of behavioural aspects are investigated by means of the research question that follows.

<u>Research Question 3</u>

Which behavioural aspects from a list of behavioural heuristics identified in the literature are present in the decision-making behaviour of management accounting professionals?

Komakech (2009:287) states that heuristics influence managerial decision-making for strategic investments. The author also reports that a high number of managers involved in making strategic investment decisions have management accounting training. Accordingly, heuristic-driven bias in decision-making is the second group of behavioural aspects which will be tested.

Decision-making by management accounting professionals will be tested for the presence of the following heuristics: representativeness, overconfidence, anchoring and adjustment, and affect (emotion).

Research Question 3 is investigated by means of the following hypotheses:

Hypothesis 9:
Management accounting professionals are influenced by biases related to the use of the representativeness heuristic when making business-related decisions.

Hypothesis 10:
Management accounting professionals are influenced by bias related to overconfidence when making business-related decisions.

Hypothesis 11:
Management accounting professionals are influenced by biases related to the use of the anchoring and adjustment heuristic when making business-related decisions.

Hypothesis 12:
Management accounting professionals are influenced by bias related to the use of the affect heuristic when making business-related decisions.

Therefore, the research problem will be solved by means of three research questions, which are investigated by a total of 12 main hypotheses. The 12 main hypotheses are extended in the literature review chapters to assist in investigating possible demographic indicators of higher business-related decision-making involvement and higher susceptibility to behavioural decision-biases respectively.

1.3   IMPORTANCE AND BENEFITS OF THE STUDY

The study is the first comprehensive international study to focus on management accounting professionals as a specific group of decision-makers with the aim of identifying the possible prevalence of the influence of the selected combination of behavioural aspects in the business-related decision-making of management accounting professionals. The investigation into the influence of behavioural aspects on decisions by management accountants is particularly relevant due to the emergence of the business partner role of management accountants in recent years, including a possible increase in business-related decision-making involvement.

This study adds value in the following ways:
- Firstly, the investigation into the prevalence of the changing role of management accountants provides the management accounting profession and its educators with a better understanding of the emerging role of management accountants and their current level of decision-making involvement. The findings of this investigation should assist in enhancing the education of, and support to, management accounting professionals to incorporate the requirements of the changing role.
- Secondly, management accounting professionals are made aware of the behavioural aspects influencing their decisions as identified by the study. Awareness of the influence of these behavioural aspects should enhance decision-making by management accountants because they can now attempt to avoid the possible negative effect of these influences. The knowledge of the influences of behavioural aspects on their decisions should assist management accounting professionals to better adapt to their new role as business partner in decision-making. Kahneman, Lovallo and Sibony (2011:51) and Lovallo and Sibony (2010:8) state that effort by management to reduce bias in

organisational decision-making results in an increase in the financial returns generated by the relevant organisation.

- Thirdly, management accounting professionals are providers and interpreters of information for decision-making purposes to the management of the business. The way in which they provide the information or their interpretation thereof (part of the decision frame) may influence the decision made by management. Accordingly, the research project and resultant feedback of the study will serve to make management accountants aware of behavioural influences and enable them to ensure that the information that they as management accounting professionals provide is framed appropriately.

- Lastly, Kahneman *et al.* (2011:51) state that awareness of the possible biases is not sufficient to completely eliminate susceptibility to behavioural decision biases. Accordingly, the findings of this study will pave the way for further research into how the possible negative effects of the behavioural influences that are identified can effectively be minimised when management accountants are confronted with the respective decisions. *Debiasing* is the minimisation of the negative effects of behavioural influences.

Mala and Chand (2015:6) argue that it is of theoretical and practical interest to investigate the influence of behavioural aspects related to individuals in the accounting field because these professionals regularly have to rely on their decision-making skills to devise optimal solutions to wide-ranging decision problems. The importance of taking note of the possible influences of cognitive behavioural aspects in the decision-making behaviour of management accounting professionals in their evolving role as business partners is highlighted by a recent report published by the American Institute of Certified Public Accountants (AICPA) and the Chartered Institute of Management Accountants (CIMA) aimed at Chartered Global Management Accountants (CGMA, 2016:1-21).

The practical importance of the present study is highlighted by the interest of two leading international management accounting institutes. Both CIMA, with head-quarters in the United Kingdom, and the Institute of Management Accountants (IMA), with head-quarters in the United States of America, assisted in the process of obtaining responses to the questionnaire of this study from their respective members. Both institutes indicated an interest in obtaining research reports with reference to the findings of the study.

1.4 DELINEATIONS

The scope of the study is limited to the following:

- The focus of the study is on the population of management accounting professionals who practise management accounting. Therefore, it does not specifically include related fields such as auditing, tax consulting and legal consulting.
- The behavioural aspects that are investigated in the study are limited to the following due to questionnaire length considerations:
  - o frame dependence aspects are limited to loss aversion, the framing of concurrent events, the certainty effect, the pseudo-certainty effect, mental accounting and the endowment effect; and
  - o heuristic aspects are limited to representativeness, anchoring and adjustment, overconfidence and affect.

  The selected behavioural aspects are those found to be most prevalent in behavioural decision theory (see Sections 3.4 and 3.5). However, the influence of other behavioural aspects may also be present in the decision-making behaviour of management accounting professionals.
- The focus of this exploratory study is to identify the possible current presence of the selected behavioural aspects in the decision-making behaviour of management accounting professionals, including selected demographic variables which may indicate increased susceptibility of groups within the sample. Consequently, the findings will not be representative of each individual management accounting professional, but rather an indication of the average behaviour of management accounting professionals as a group. Furthermore, the study does not suggest that the bias susceptibility of the population remains static, as it may change over a period of time in the future.

1.5 LIMITATIONS

The study has the following limitations:

- The sample to the survey was obtained through a convenience sampling technique, which may affect the generalisability of the findings of the study. However, the various methods and channels used to obtain responses ensure a more representative sample

than would have been obtained through the use of a single sample generation channel as well as a wider coverage than could be obtained through more traditional sampling approaches.

- The statistical techniques available to analyse the data are limited by the following:
  - o the dichotomous nature of response options of questions aimed at identifying the presence of biases, which is in line with previous survey studies in the field (Kahneman & Tversky, 1984; Lowies, 2012; Tversky & Kahneman, 1974);
  - o demographic variables are mostly measured on ordinal and categorical scales in an attempt to limit the time required to complete the questionnaire;
  - o the assumptions regarding sample size of some potentially more powerful statistical techniques preclude the use of some of these techniques.

- The length of the questionnaire and the concentration required to complete it resulted in some respondents not fully completing the questionnaire. This limited the number of responses per question. However, the random order presentation of questions ensured that no single question was affected too adversely not to be analysed as part of the study.

1.6 DEFINITIONS OF KEY TERMS

Business-related decisions
- Decisions related to the management and running of a business such as financial, strategic and operational decisions. However, for the purposes of this study, business-related decisions specifically exclude decisions normally related to the traditional controller role of management accountants (e.g. which variances to investigate, and decisions regarding the financial accounting record-keeping system).

Decision problem
- "..the acts and options among which one must choose, the possible outcomes and consequences of these acts, and the contingencies and conditional probabilities that relate outcomes to acts" (Tversky & Kahneman, 1981:453).

Decision frame

- "…the decision-maker's conception of the acts, outcomes and contingencies associated with a particular choice. The frame that a decision-maker adopts is controlled partly by the formulation of the problem, and partly by the norm, habits and personal characteristics of the decision-maker" (Tversky & Kahneman, 1981:453).

Heuristics

- Simplification strategies, or rules of thumb, employed by decision-makers to deal with complex decisions under time and information constraints (Bazerman, 1994:6; Shefrin, 2002:14).

Involvement in business-related decision-making

- Making of business-related decisions individually or participating in a group that makes business-related decisions.

Management accounting

- Management accounting is primarily concerned with the following:
  - the periodic allocation of costs between costs of goods sold and inventories (cost calculation and allocation);
  - providing information for planning, control and performance measurement purposes (financial control); and
  - providing information for decision-making purposes.
  (Johnston *et al.*, 2002:1327)

Management accounting professional

- An individual with management accounting-related education and training, employed in a position where the individual's management accounting training is applied on a regular basis.

Prospect theory

- A theory describing human decision-making behaviour with the two following key elements:
  - 'a value function that is concave for gains, convex for losses, and steeper for losses than for gains'; and
  - 'a nonlinear transformation of the probability scale, which overweighs small probabilities and underweighs moderate and high probabilities'

(Tversky & Kahneman, 1992:297-298).

1.7   LIST OF ABBREVIATIONS

ACCA	=	Association of Chartered Certified Accountants
AICPA	=	American Institute of Certified Public Accountants
CEO	=	chief executive officer
CFO	=	chief financial officer
CIMA	=	Chartered Institute of Management Accountants
COO	=	chief operational officer
FD	=	financial director
IMA	=	Institute of Management Accountants
MA	=	management accounting/accountant
ROC	=	receiver operating characteristic
UK	=	United Kingdom
USA	=	United States of America

1.8   OUTLINE OF THE STUDY

Chapter 1 provided the background and motivation for the study, the problem investigated by the study and the delineation of the study. In Chapter 2, literature on the changing role of management accounting professionals is reviewed to justify the hypothesis that management accountants are becoming more involved in business decision-making. The focus of the study shifts in Chapter 3 to describe the psychological theories of behavioural influences in human decision-making. Research on the presence of behavioural influences

on financial decision-making by humans is discussed in Chapter 4. Chapter 4 concludes by demonstrating the gap that exists in the literature on the possible influences of behavioural aspects on decision-making by management accounting professionals as a group of decision-makers. This is followed by Chapter 5, which describes the research methods employed in the study. The results chapters are organised according to the three research questions investigated in the study. Accordingly, in Chapter 6 presents the results and findings of the investigation into the prevalence of increased decision-making involvement by management accounting professionals. In Chapters 7 and 8, the respective results and findings of the investigation of the presence of framing-related behavioural aspects, and heuristic-related behavioural aspects in the decision-making of management accounting professionals, are provided and discussed. The study is concluded by Chapter 9, which highlights the main findings of the study, presents the conclusions and its implications and proposes areas for future research.

CHAPTER 2: CHANGING ROLE OF MANAGEMENT ACCOUNTANTS

2.1 INTRODUCTION

Johnston *et al.* (2002:1327) state that management accounting and accordingly management accounting professionals are primarily concerned with the following:

- periodic allocation of costs between costs of goods sold and inventories (cost calculation and allocation);
- providing information for planning, control and performance measurement purposes (financial control); and
- providing information for decision-making purposes.

Improvements in information technology have resulted in computerised enterprise resource planning systems performing routine cost calculation and allocation tasks, and providing general financial information for decision-making purposes. Accordingly, Sutton (2006:4) states that enterprise resource planning systems are rapidly replacing the role of management accounting professionals as generators of reports. The replacement of the role of management accountants as periodic calculators and allocators of costs, as well as their role as providers of general financial information, implies that some of the aspects of the traditional role of management accountants are becoming redundant. Furthermore, management accounting professionals find themselves in a new decision-making environment, which indicates that a new role is emerging for management accounting professionals (Sutton, 2006:4). The aim of this chapter is to explore the literature on the changing role of management accounting professionals in the business environment. This change in the role is of particular relevance to the study because the increased involvement in decision-making provides impetus to the study.

The traditional role of management accountants is discussed next. The discussion is concluded by demonstrating the requirement for a change in the role of management accountants. Thereafter, literature on the emerging role of management accounting professionals is reviewed. Different views of the emerging role of management accounting

professionals are also discussed, including the responsibilities of management accounting professionals regarding business decision-making.

2.2   TRADITIONAL ROLE: 'SCOREKEEPERS' AND 'CONTROLLERS'

In the introduction to this chapter, the functions of the role of management accountants, according to Johnston *et al.* (2002), were identified as (1) cost calculation and allocation, (2) financial control and (3) provision of information for decision-making purposes. The traditional role of management accountants was primarily orientated towards cost calculation and allocation, as well as financial control (Johnson, 1983; Kaplan, 1984). However, cost accounting information as well as information from the financial control reports was also used by management for certain decision-making purposes (Kaplan, 1984:396-397), even though calculation and allocation of costs were primarily conducted for external reporting purposes (Goretzki *et al.*, 2013:51). Financial control is accomplished by preparing budgets (planning), measuring and investigating variances from the budget, and measuring managerial performance against pre-set performance measures. Cost calculation and allocation are primarily backward looking (Goretzki *et al.*, 2013:51). Apart from preparing the budgets, traditional financial control is also essentially backward looking (Johnston *et al.*, 2002:1327).

The focus on cost calculation and allocation as well as on financial control resulted in the occupational identity of management accountants becoming that of 'bean-counters' (Byrne & Pierce, 2007:470; Goretzki *et al.*, 2013:41; Siegel *et al.*, 2003:40), 'scorekeepers' (Burns & Vaivio, 2001:390; Järvenpää, 2007:100) and 'controllers' (Ahrens, 1997:636; Burns & Vaivio, 2001:390; Lambert & Sponem, 2011:565). For the purposes of this study, the term 'scorekeepers' is used to refer to the stereotype connected to the traditional role of management accounting professionals.

Crum (1953:366) reports on the differentiation of the role of cost accounting from that of financial accounting. According to Crum (1953:366-368), the cost accountant became responsible for calculating and allocating costs that are of particular importance and possibly difficult to trace and control. The responsibilities of the cost accountant were not limited to

cost calculation and allocation, but included cost control. Cost accounting developed to form part of the duties of management accountants (Johnson, 1983:141).

In a discussion of the emergence and history of management accountants, Sorensen (2009) refers to an alternative description of the role of management accountants to the description by Johnston *et al.* (2002). Sorensen (2009:1272) refers to the three functions of management accountants provided by Simon, Guetskow, Kozmetsky and Tyndall (1954:2-3), namely 'scorekeepers', attention directors and problem-solvers. From the continued discussion by Sorensen (2009:1272) of the history of management accounting, it is clear that in the traditional role of management accountants, these functions were performed by using cost calculation and allocation, and financial control techniques. The only technique which Sorensen (2009:1272) lists in the discussion of the traditional role of management accountants, which is a clear decision support technique, is linear programming.

Hopper (1980:402) refers to two main roles of management accountants identified in the literature, namely that of book-keeper (financial controller) and that of provider of service aid (information provider) to lower-level management (operational level). The bookkeeper role entailed the preparation of budgets and the consequent collection of actual results, which were then used to evaluate the performance of the operational level management of the business. Management accountants reported these evaluations directly to higher-level management. However, the service aid role entailed the provision of information to management at the operational level of the organisation to assist management to manage operations and make decisions.

Baldvinsdottir, Burns, Nørreklit and Scapens (2009:34) indicate that management accountants provided financial information that was relevant, in the opinion of the management accountants, in financial reports to operational management. However, Baldvinsdottir *et al.* (2009) argue that management accountants in their traditional role did not take further part in the decision-making process.

Hopper (1980:402) highlights that the roles of financial controller and information provider to lower-level management are in conflict, because the information provider role weakens

the financial controller role. The weakening of financial control by the combination of the financial controller and information provider roles emanates from the management accountant having to perform a form of self-oversight by servicing lower-level management in their decision-making information needs, as well as evaluating the performance (results of decisions made) of lower-level management. Hopper (1980:402) substantiates this claim by referring to studies by Lowe and Shaw (1968) and Schiff and Lewin (1970:263), which found instances of collusion between management and management accountants to manipulate budget figures, where the roles of information provider and controller were combined. Hopper (1980:402) also refers to a tension between management accountants and operational management, due to the authority held by management accountants in terms of their financial control role over operational managers.

Ahrens (1997:636) found indications that management accountants in their traditional role as 'scorekeepers' were seen to "only know better after something went wrong". To only know better after something went wrong emphasises the perception that management accountants were backward looking, focusing on historical data. However, it also indicates that management accountants might not have been involved in the decision-making process and therefore did not provide the necessary proactive input of what could possibly go wrong.

Pierce and O'Dea (2003:266) found evidence that management accountants in their traditional role were deliberately not involved in business decisions. According to their findings, operational managers saw management accountants as being too focused on financial aspects and lacking business orientation. This financial focus resulted in operational managers excluding management accountants from business decision-making. Another reason for the exclusion of management accountants from decision-making, as indicated by Pierce and O'Dea (2003:274), was that management accountants were so focused on attaining precise and perfect information that they could not provide assistance timeously. Vaivio and Kokko (2006:52), in a study of the role of management accountants in Finland, also refer to the preoccupation of the traditional management accountant with precision and form, to the detriment of timeous information.

Johnson and Kaplan (1987) predicted the demise of the traditional role of management accountants, claiming that it was no longer valid in the modern business environment. According to the authors, traditional management accounting practices were developed for a labour-intensive manufacturing environment, focused on the volume of output. The modern business environment, in comparison, is much more automated with a focus on strategically positioning the business to satisfy customer demand on a just-in-time basis. Additionally, enterprise resource planning systems, based on new developments in information technology, largely took over some of the traditional functions of management accountants, namely the tasks of calculating and allocating costs and of collecting and processing business information relevant for management (Caglio, 2003:145; Sutton, 2006:3). The pressures mentioned above resulted in a need for the role of management accountants to adapt. The traditional role of calculating, allocating and controlling costs alone no longer justifies the expense of employing a management accountant to perform these tasks.

2.3 EMERGING ROLE: BUSINESS PARTNERS

Much research has been undertaken in reaction to the claim by Johnson and Kaplan (1987) that management accounting was archaic, as well as to identify the effect of the development of enterprise resource management systems on the role of management accountants. Accordingly, the journal *Management Accounting Research* has dedicated two special editions to the changes in management accounting (Burns & Vaivio, 2001; Busco, Quattrone & Riccaboni, 2007).

Management accounting and the role of management accounting professionals have adapted in two ways. Firstly, advanced management accounting techniques with a more strategic approach have been developed to be relevant in the new business environment (Sorensen, 2009:1273). Secondly, management accounting professionals have become interpreters of financial information and internal consultants with reference to decision-making. This second development is of particular relevance to this study because increased involvement of management accountants in business decision-making justifies the current study.

Caglio (2003:124) investigated the effect of the adoption of an enterprise resource planning system on the role of management accountants in a medium-sized Italian business. She found that the role of management accountants was forced to change because the automated enterprise resource planning system performed the duties of collecting, processing and disseminating information, which were previously part of the duties of the management accountants. Caglio (2003:146) reported that a hybrid role for management accounting professionals developed, which included co-operation with all the functions in the business that used the information from the enterprise resource planning system. Management accounting professionals use their technical management accounting skills to interpret and analyse information obtained from the enterprise resource planning system for the other business functions. The increased co-operation with other functions indicates that closer involvement with operational segments of the business emerged. Caglio (2003:146) notes that the successful implementation of the enterprise resource planning system by management accounting professionals serves to instil trust in the expertise and abilities of these professionals among other personnel in the business.

Even earlier, Sathe (1984:46) indicated that the increase in size of organisations and the increasingly complex business environment created the need to involve the specialist technical financial skills of management accountants in business decision-making. Hopper (1980:409) reported an aspiration by management accountants to employ their technical skills in the management decision-making environment.

The term *business partner* has materialised in various studies with reference to the emerging role of management accounting professionals (Busco *et al.*, 2007:138; Goretzki *et al.*, 2013:55; Järvenpää, 2007:100; Siegel *et al.*, 2003:39; Sorensen, 2009:1280; Vaivio & Kokko, 2006:70). However, the validity and pervasiveness of the business partner role are widely debated (Ahrens & Chapman, 2000:496; Lambert & Sponem, 2011:587).

In studying the role of management accounting professionals in Britain and Germany, Ahrens (1997:636) found that in British firms, management accounting professionals were becoming proactively involved in operational proposals, signifying a change from the

scorekeeper role. However, contrary to British management accounting professionals, Ahrens (1997:636) found that, at the time of his study, the management accounting professionals (or 'controllers') in German firms were still used for their administrative expertise and to legitimise and rationalise completed operational proposals. Ahrens and Chapman (2000:497) found management accounting professionals to be involved in managing the economic elements of the enterprise, but also observed that closer involvement with operational matters started to emerge. However, this involvement in operational matters was again (also see Ahrens, 1997:636) found to be much more pervasive in Britain than in Germany. German controllers were still regarded as conducting distanced analysis of economic flows. Burns and Vaivio (2001:390) also acknowledge a closer involvement of management accounting professionals in operational matters, referring to the emerging trend of decentralisation of the management accounting function and the increased involvement in core business areas. The authors further mention that the role of the management accountant now includes that of business support and internal business consultant.

However, Johnston *et al.* (2002:1336) argue that a natural tension exists between operational managers and management accounting professionals. In accord with Hopper (1980:402), Johnston *et al.* (2002:1327) relate this tension to the role of management accounting professionals as controllers, who control budgets whereby operational managers are held to account for their decisions by comparing the actual performance of areas under their management to budgeted performance. Johnston *et al.* (2002:1331) found that operational managers responded to enquiries relating to the involvement of management accounting professionals in change processes by stating that, they as operational managers, were sceptical of the potential value that management accounting professionals could add to the process and that they viewed management accounting professionals as inhibiting processes from moving forward. Contrary to the earlier report by Hopper (1980:409), the operational managers in the study by Johnston *et al.* (2002:1331) stated that management accountants seemed unwilling to participate in operations. Johnston *et al.* (2002:1336) found that the tension between operational managers and management accountants was manifested in the fact that management accountants were not involved in half of the change processes investigated in the study.

From an analysis of the change processes in which management accounting professionals were fully involved, Johnston *et al.* (2002:1336) identified the following six prerequisites for greater collaboration between operational managers and management accounting professionals on the operational matter of change processes:

- a team player mentality on the side of the management accounting professionals;
- a trustworthy and thoroughly developed management accounting system in the business;
- possession or attainment of business and operational knowledge by the management accounting professionals;
- flexibility by the management accounting professionals in incorporating non-financial information in analyses and decision-making;
- communication and interpersonal skills by the management accounting professionals (this could be grouped along with team player mentality); and
- willingness by the management accounting professionals to question the current situation and to facilitate, instead of inhibit, change.

Pierce and O'Dea (2003) investigated the perceptions of operational managers regarding the current and desired future role of management accounting professionals. Although they found reference to a tension between operational managers and management accounting professionals, the role of business partners was found to be a recurring theme related to the desired future role of management accounting professionals (Pierce & O'Dea, 2003:278). The operational managers did, however, indicate that management accounting professionals need to become more business-orientated in their reasoning when interpreting financial matters.

Vaivio and Kokko (2006:55) investigated management accounting professionals working in large companies in Finland to determine whether the occupational identity of management accountants as 'bean-counters' still applied to Finnish management accounting professionals. According to Vaivio and Kokko (2006:52), a 'bean-counter' collects and processes information for financial control purposes and is pre-occupied with every detail of the financial figures. The study found that management accounting professionals in Finland

had become more business-orientated in performing their controller role. In the analysis and interpretation of performance evaluation measurements, management accounting professionals incorporated business and other qualitative information and communicated more openly with operational management. Vaivio and Kokko (2006:70) therefore argue that the role of management accountants in Finland is no longer constricted to the narrow 'bean-counter' role.

In a study of changes in management accounting in an emerging economy, namely South Africa, Waweru, Hoque and Uliana (2004:694) found that a requirement existed for management accounting professionals to be more involved in providing and interpreting information for decision-making purposes at operational level. The authors state that this represents a change from management accountants providing decision-making information only to top-level management.

Yazdifar and Tsamenyi (2005:181) investigated possible differences in the role and tasks of management accounting professionals registered with the Chartered Institute of Management Accountants (UK) between independent and dependent companies in the United Kingdom. Management accounting professionals were asked to indicate, in their opinion, how their role in their companies was perceived by other individuals in their companies. Yazdifar and Tsamenyi (2005:194) found that the general opinion of management accounting professionals was that they were perceived to be business and financial analysts, while fewer management accounting professionals believed that they were perceived as 'bean-counters', 'scorekeepers' or indeed business partners. It should be noted that management accountants of subsidiary (dependent) companies felt more likely to be perceived as 'bean-counters' and 'scorekeepers' than management accountants of independent companies. Management accounting professionals of independent companies felt more likely to be perceived as business partners than their colleagues in subsidiary companies. Yazdifar and Tsamenyi (2005:195) attribute the difference in perception of the management accounting professionals, to parent companies in groups dictating reporting requirements and the roles of positions in dependent companies.

Järvenpää (2007:101-102) conducted a longitudinal case study of the process of changing the role of management accounting professionals in a large international company from traditional scorekeeping controllers to business-orientated business partners. The management accounting professionals in a case study company became more business-orientated, which Järvenpää (2007:100) explains as the "willingness and ability … to provide more added value to management", which includes increased participation in business decision-making by actively taking part in managing the business. Decentralisation is a very important factor aiding the transition of management accountants from 'scorekeepers' to business partners as it encourages daily cross-functional interaction between management accounting professionals and operational managers. Järvenpää (2007:127-128) also cites formally managing values and mental frameworks related to the involvement of the management accountant in the business as factors supporting their transition to business partners. The formal management of values and frameworks may assist in overcoming the natural tension between management accounting professionals and operational managers to which various other studies refer (see Hopper, 1980; and Johnston *et al.*, 2002, for example).

In a study of the roles of management accounting professionals in manufacturing firms, Byrne and Pierce (2007:491) found that these professionals were becoming more involved in providing and interpreting information for decision-making purposes. However, the authors noted that the findings of their study did not clearly support the involvement of management accounting professionals as decision-makers and that operational managers stated that management accounting professionals sometimes needed to be excluded from the decision-making process due to their lack of knowledge on business-related matters. Byrne and Pierce (2007:491) therefore argue that the role of business partner is not clearly identified. Byrne and Pierce (2007) found the prerequisites for greater involvement in operational matters to be approachability, commercial awareness, team and communication skills, and flexibility on the part of management accounting professionals. These prerequisites agree with the prerequisites identified by Johnston *et al.* (2002). Furthermore, Byrne and Pierce (2007:489) found that management accounting professionals had more scope to become involved in operational matters in smaller businesses than in larger businesses and subsidiaries. The role conflict between the controller role and the closer

involvement in operational matters strengthens control, according to Byrne and Pierce (2007:492), due to management accounting professionals obtaining a better understanding of the qualitative factors that influence the outcomes of the controls. The finding that control is strengthened by increased involvement of management accounting professionals in the decision-making process echoes a proposition put forward much earlier by Sathe (1984:35). Sathe (1984:35) argues that a management accountant who is required to perform the controller role, as well as to be involved in the decision-making process, can be a critical corporate strength in providing anticipatory control.

Based on studies conducted in the United States of America among members of IMA, Siegel *et al.* (2003:39) and Sorensen (2009:1291) advocate the emergence of the business partner role, with clear emphasis on the decision-making involvement of management accounting professionals. Sorensen (2009:1281) notes that the findings of Byrne and Pierce (2007) do not support the increased involvement in decision-making in the business partner role and suggests that this is an avenue for further field research.

Despite the findings on the change in the role of management accountants presented in the preceding paragraphs, Lambert and Sponem (2011:566) argue that not all firms yearn for a business partner and that this role, including decision-making by management accounting professionals, is not as pervasive as widely believed (Lambert & Sponem, 2011:587). Lambert and Sponem (2011:587) refer to the conflict between the need for independence of management accounting professionals in their controller role, and the lack of independence when management accounting professionals are part of the decision-making team as an independence-*versus*-involvement dilemma. Lambert and Sponem (2011:587) cite this independence-*versus*-involvement dilemma, encapsulated in the controller-*versus*-business partner role, as one of the reasons for the lower-than-believed prevalence of the business partner role.

Goretzki *et al.* (2013:42) conducted a study similar to the study by Järvenpää (2007) by investigating the process of changing the role of management accounting professionals in a large company. However, the focus of Goretzki *et al.* (2013) was on how the various actors in the organisation drove the role change. The study was conducted in a German setting.

Goretzki *et al.* (2013:55) reported increased involvement of management accounting professionals in the management of the business to the extent that the management accounting professionals began to perceive themselves as enacting general management. The authors argue that the emerging management-orientated role should be described as the role of 'business partner', in accordance with studies by Sorensen (2009), Järvenpää (2007) and Byrne and Pierce (2007); notwithstanding the claims by Lambert and Sponem (2011) that the business partner role is not as sought after as widely believed. With reference to the natural tension between management accounting professionals and operational managers, Goretzki *et al.* (2013:59) found that management accounting professionals had to reconstruct their roles in the business and to legitimise their role as business partners by acting in a business-orientated manner that encouraged operational managers to accept their business partner role. Goretzki *et al.* (2013:59) argue that the change to business partner can also now be found in the role of German management accounting professionals.

An alternative view to the developments in the role of management accounting professionals is provided by Baldvinsdottir *et al.* (2009:34). Baldvinsdottir *et al.* (2009:34) argue that instead of the role of management accounting professionals being changed, it is rather the manner in which this role is performed that has changed. According to these authors, management accountants have always provided information for decision-making purposes. Baldvinsdottir *et al.* (2009:34) state that management accountants in their traditional role provided financial information to operational management in financial reports. However, they argue that management accountants provided information that they, as management accountants, deemed relevant to operational managers. The authors further state that management accountants still provide information for decision-making purposes; however, management accountants now do this as part of decision-making teams, which include the operational managers (Baldvinsdottir *et al.*, 2009:35). Accordingly, management accountants are now more closely involved in operational matters and also incorporate qualitative aspects in the information provided.

The conflicting arguments in the literature on the roles of management accountants are highlighted in the findings of a study conducted by Nielsen, Mitchell and Nørreklit (2015) of the role of management accounting professionals in outsourcing-related decision-making by

two companies in the European Union. The management accounting professionals of the one case study company formed part of the decision-making team (Nielsen *et al.*, 2015:76), whereas the management accounting professionals of the other case study company only provided information to the decision-making team but were not directly involved in making the decisions (Nielsen *et al.*, 2015:74). Nielsen *et al.* (2015:16) conclude that the roles of management accountants in businesses vary and are dynamic and intricate.

Therefore, it is clear that there are conflicting findings in the literature on the changing roles of management accounting professionals. Furthermore, previous studies focused on the changing role of management accounting professionals and not exclusively on their involvement in decision-making. Because the increased involvement of management accounting professionals in business decision-making forms an important part of the justification for this study, **Research Question 1** of the study was devised to investigate whether increased involvement of management accounting professionals in business decision-making was indeed present in practice, including the prevalence of any such involvement.

2.4   POSSIBLE INDICATORS OF HIGHER BUSINESS-RELATED DECISION-MAKING INVOLVEMENT

The review in the previous section hints toward a possible relationship between demographical variables and increased decision-making involvement, which is discussed in more detail in the following section.

Clinton and White (2012:40) followed up an earlier study by Garg, Ghosh and Hudick (2003:1), which investigated the role of the management accountant in organisations. Although the studies did not differentiate between internal reporting and decision-making involvement, both studies indicated the involvement of management accounting professionals in strategic planning. Consistent with Garg *et al.* (2003:8), Clinton and White (2012:41) argue that management accounting professionals employed in lower-level management accounting positions, should be referred to as *decision enablers* because they tend to have the role of providing information for decision-making purposes. According to

Clinton and White (2012:41), management accounting professionals employed in higher levels in the organisation make more decisions and should be referred to as *decision-makers*. However, in a South African study of the changes in the management accounting profession, Waweru *et al.* (2004:694) found that there was a need for increased decision-making at operational level and argue that management accounting systems should be adapted to provide more decision support at this level. Waweru *et al.* (2004:694) maintain that this increased need for decision-making at operational level contradicts the tradition of making most decisions at top management level. However, the review of the preceding studies indicates that management accounting professionals are only more involved in decision-making after progressing to the higher positions in the organisation. Therefore, the first hypothesis regarding indicators of a higher level of business decision-making involvement is developed as follows (numbered with reference to the main hypotheses in Chapter 1 of the present study):

Hypothesis 1.1 – *Position* and decision-making involvement:
The level of business decision-making involvement by management accounting professionals is significantly associated with the positions occupied by these professionals in their employing firm.

According to Crompton and Lyonette (2011:246), women do not advance at the same pace into higher positions in the organisation than their male counterparts do. Crompton and Lyonette (2011:249) argue that the demands of higher organisational positions in the accounting environment place pressure on women to successfully balance their domestic and work duties. Dambrin and Lambert (2012:12) confirm that women are not equally represented in the higher-level positions of the accounting profession. In a review of research literature on gender equality in management positions in general, Broadbridge and Simpson (2011:478) found that much progress had been made. However, even in the general management domain, Broadbridge and Simpson (2011:478) argue that equal representation of men and women in management positions has not yet been attained. Based on the studies in the previous paragraph which indicate that management accounting professionals become more involved in decision-making when they progress to higher-level positions in the organisation, the lower presence of women in higher-level accounting

positions may also translate into lower decision-making involvement. Accordingly, it may be that women management accounting professionals are in general also less involved in business decision-making due to an extension of gender stereotyping with reference to involvement of women in business, irrespective of the level of accounting position women occupy.

Hypothesis 1.2 – *Gender* and decision-making involvement:
Women are less involved in business-related decision-making than men.

Nevertheless, Broadbridge and Simpson (2011:470) acknowledge that much progress has been made in the level to which women are involved in higher-level decision-making positions and processes in general. This suggest that women, as a group of professionals, might have experienced a higher level of increase in decision-making involvement than men during the last decade, due to a lower original base rate of involvement than men. Yet, when focusing specifically on the accounting and related professions, the level of increase of women in higher-level decision-making positions and processes is found to be significantly lower than in other professions (Crompton & Lyonette, 2011:246; Dambrin & Lambert, 2012:12).

Hypothesis 2.1 – *Gender* and increase in decision-making involvement:
Women respondents report a lower increase in business decision-making involvement than men.

Arnold, Collier, Leech and Sutton (2000:123) indicate that the progression in the accounting profession to higher-level positions positively correlates with experience and age. The results of Crompton and Lyonette (2011:239) also indicate that the increase in managerial-level positions, in comparison with non-managerial positions, is associated with an increase in age. With reference to the top executive managerial position of chief executive officer, Cline and Yore (2016:174) found higher representation within the 48 to 62 years' age bracket compared with other age brackets. In accordance with the categorisation by Clinton and White (2012:41), namely that higher-level positions are associated with decision-making involvement, it is expected that an increase in decision-making involvement by management

accounting professionals will positively correlate with an increase in experience, as well as in age. Therefore, it may also be that older and more experienced management accounting professionals may be more involved in business-related decision-making, irrespective of the specific position in which they are employed, due to an appreciation of their attained wisdom.

Hypothesis 1.3 – *Age* and decision-making involvement:
Age correlates with a higher level of business decision-making involvement.

Hypothesis 2.2 – *Age* and increase in decision-making involvement:
Age correlates with a higher increase in business decision-making involvement.

Hypothesis 1.4 – *Experience* and decision-making involvement:
Experience correlates with a higher level of business decision-making involvement.

Hypothesis 2.3 – *Experience* and increase in decision-making involvement:
Experience correlates with a higher increase in business decision-making involvement.

Sathe (1984:46) argues that an increase in the size of an organisation creates the necessity to involve the specialist skills of management accounting professionals in business decision-making. However, Yazdifar and Tsamenyi (2005:196) found evidence, albeit to a limited extent, that the role of management accounting professionals in independent companies was less formalised in terms of management accounting duties and, accordingly, more inclined to business decision-making involvement. The finding by Yazdifar and Tsamenyi (2005:196) possibly indicates less scope for business decision-making involvement in larger groups of companies. Byrne and Pierce (2007:489-490) support the finding by Yazdifar and Tsamenyi (2005:196) and further argue that legislation in the United States of America has a significant effect on formalising the controller role of management accounting professionals within subsidiaries of listed companies. Therefore, Byrne and Pierce (2007:490) argue that the role of management accounting professionals in medium-sized companies is less formalised around the controller role than that of their counterparts in large multinational enterprises. Byrne and Pierce (2007:490) and Yazdifar and Tsamenyi (2005:196) recommend further research to investigate the association between the role of

the management accountant and the size of the company. The preliminary evidence of the above studies seems to hint to a greater scope for decision-making involvement by management accounting professionals working in smaller to medium companies where their controller role seems to be less formalised.

Hypothesis 1.5 – *Company size* and decision-making involvement:

Management accounting professionals employed in smaller companies are more involved in business decision-making than management accounting professionals in larger companies.

Hypothesis 2.4 – *Company size* and increase in decision-making involvement:

Management accounting professionals employed by smaller companies have experienced a higher level of increase in business decision-making involvement than their colleagues employed in larger companies.

According to Pierce and O'Dea (2003:266), a key reason why management accounting professionals were not traditionally involved in the type of business decisions generally performed by business managers, was due to management accounting professionals' focus on attainting precise information before making a decision. General managers considered this trait as inhibiting the ability to ensure timeous business decisions were made. Vaivio and Kokko (2006:52) confirmed that the preoccupation of management accountants with obtaining extensive supporting information were considered detrimental to timeous decision-making. Consequently, management accounting professionals who retain a preference for making decisions based on extensive supporting information may still be excluded from business decision-making by general management.

Hypothesis 1.6 – *Preference for supporting information* and decision-making involvement:

Management accounting professionals who indicated a higher level of preference for supporting information are less probable to be involved in business decision-making than management accounting professionals who indicated a preference for making intuition-based decisions.

Hypothesis 2.5 – *Preference for supporting information* and increase in decision-making involvement:

Management accounting professionals who indicated a higher level of preference for supporting information are less probable to have experienced an increase in business decision-making involvement, than management accounting professionals who indicated a preference for making intuition-based decisions.

Section 2.3 indicates that studies by Ahrens (1997:636) and Ahrens and Chapman (2000:497) report different development rates of the emerging roles of management accountants between Britain and Germany. Vaiman and Brewster (2015:151) argue that differences in human resource management practices between nations are related to cultural and institutional differences. With reference to research on cultural differences, Vaiman and Brewster (2015:153) confirm that the Hofstede model (Hofstede, 1980:42) is cited most frequently in various fields of research. Hofstede (2011:7-8) explains that the model consists of a total of six dimensions, as follows:

- the *power distance* dimension, related to the level of power that is ascribed to positions of authority;
- the *uncertainty avoidance* dimension, related to how stressful uncertainty is experienced;
- *individualism versus collectivism*, related to the importance attached to the individual in comparison with the group;
- *masculinity versus femininity*, related to society's acceptance of roles of men and women;
- *long-term versus short-term orientation*, related to whether the society's effort is focused on the future, or the past and present;
- *indulgence versus constraint*, related to the level of control that is expected to be exercised over basic human desires and indulgences.

A culture's approach to organisational structures and problem-solving is related to that culture's position on a matrix based on power distance and uncertainty avoidance, according to Hofstede (1994:7). However, with reference to clearly defined roles in organisations, the need for explicit organisational structures and rules are more acutely based on the culture's

level of preference for uncertainty avoidance (Hofstede, 1994:7-8). Hofstede (1993:83) argues that German management perceptions are based on formal systems and rules of control, explained by a comparatively higher level of uncertainty avoidance (Hofstede, 1994:10). The findings of Ahrens (1997:636) and Ahrens and Chapman (2000:497) corroborate the suggestion that the more the role of the management accountant is formalised, the lower the scope for business involvement to emerge (Byrne & Pierce, 2007:489-490). With reference to Britain and the United States of America, Hofstede (1993:83) indicates that the role of the manager depends more on the requirements of the circumstances because the manager acts on behalf of the owners and motivates others, and can be explained by a comparatively medium to lower level of uncertainty avoidance. Accordingly, the level of involvement of a management accounting professional in business decision-making may be influenced by the culture of the country in which the management accounting professional is employed. Therefore, the level of uncertainty avoidance of the culture of the country in which the management accounting professional is employed may serve as an indicator of the level of business decision-making involvement of the management accounting role. Uncertainty avoidance is measured on a 100-point scale in the Hofstede model. From a statistical perspective, the requirement to collect large samples from the various cultures to investigate the possible relationship between culture and decision-making involvement renders the addition of culture to the current variables impractical for the current study. This relationship could be investigated in a focused study in the future if the necessary responses could indeed be attained.

2.5 SUMMARY

The objective of this chapter was to explore the literature on the changing role of management accountants, including possible indications of increased involvement in business-related decision-making. It was established that management accountants traditionally focused more on cost calculation and allocation, as well as on financial control. In this traditional role, management accountants were found to be excluded from business decision-making due to various factors, including overweighting by management accountants of financial aspects as opposed to business and operational aspects, and time issues related to attempts by management accountants to attain near-perfect information.

The modern business environment and the development of enterprise resource planning systems place management accountants under pressure to adapt because the traditional role of management accountants is deemed to partly have become irrelevant and been taken over by computerised information systems. The emerging role of management accounting professionals is that of business partner, which includes duties as interpreters of information and partners in decision-making. Although the prevalence of the new role is challenged in the literature by some authors, the increasingly diversifying role of management accounting professionals in businesses is the main reason that this study refers to current management accountants as management accounting professionals.

The increased involvement in decision-making by management accounting professionals has created the need for investigating behavioural aspects and judgement in decision-making by management accounting professionals. Literature on behaviour and judgement in decision-making by human beings is discussed in the following chapter.

CHAPTER 3: BEHAVIOUR AND JUDGEMENT IN DECISION-MAKING

3.1 INTRODUCTION

In accordance with their changing role, management accounting professionals are becoming more involved in business decision-making, whether as interpreters of financial information or as decision-makers themselves. However, management accounting professionals are sometimes considered too focused on decision-making based on rational calculations, which is not always feasible in the complex and fast-paced business decision-making environment (Byrne & Pierce, 2007:480). The increased decision-making involvement of management accounting professionals in the complex business environment entails that these professionals should become aware of how decisions are made by human beings in the face of various uncertainties.

This chapter discusses the psychological aspects that influence human behaviour in decision-making. The two main approaches applied to the study of decision-making by human decision-makers are introduced first, then the prospect theory of judgement in decision-making is discussed. Studies of the influence of frame dependence on human decision-making behaviour emerged from continued research conducted in line with the prospect theory. Accordingly, research on frame dependence is reviewed after the section on the prospect theory. A section on simplifying strategies applied by human decision-makers, also referred to as heuristics, and some of the biases that result from applying heuristics in inappropriate situations, follows the discussion of frame dependence.

3.2 PRESCRIPTIVE AND DESCRIPTIVE DECISION RESEARCH

According to Bazerman and Moore (2012:3), the rational human decision-making process consists of the following six steps:

1. definition of the decision problem;
2. identification of the relevant criteria upon which to base the decision;
3. weighing of the relevant criteria in terms of order of importance;

4. generation of alternative decision options with which to solve the decision problem;

5. rating of each alternative decision option on each of the relevant criteria identified in Step 2; and

6. computation and selection of the optimal decision option.

According to Bazerman and Moore (2012:5), research on decision-making can be divided into two schools of research. The first school investigates human decision-making by developing models for optimal decision-making by a rational human decision-maker. This first school of research is referred to as prescriptive decision research because it prescribes how rational human decision-makers should behave when making a decision. The second school of research observes decision-making behaviour by human decision-makers with the objective to analyse how human beings make decisions in reality. This second school of research is referred to as descriptive decision research because it investigates and describes how human decision-makers actually make decisions. These research fields are discussed in the following sections.

3.2.1 Prescriptive decision research

Bazerman and Moore (2012:3) state that in prescriptive decision research, it is assumed that the decision-maker rationally follows the decision-making process. This means that the decision maker takes the following steps:

1. defines the decision problem perfectly;

2. identifies all relevant criteria;

3. weighs the importance of all criteria accurately;

4. generates a complete list of decision options;

5. assesses and rates all decision options accurately according to the relevant criteria identified; and

6. correctly calculates and definitely selects the optimal decision option.

Fairchild (2010:277) states that the assumptions of the prescriptive school of decision research are that human decision-makers are fully rational, self-interested and focused on maximising their utility. Prescriptive decision research suggests that rational human

decision-makers should maximise their expected utility when making decisions in situations involving risk (Von Neumann & Morgenstern, 1947:8). According to Edwards (1954:391), the maximisation of expected utility is achieved by maximising the expected value from a decision. The expected value for each decision option is attained by multiplying the utility from each possible outcome from the specific decision option by the probability of that outcome occurring. The solution of this multiplication calculation for each of the outcomes is then added up to attain the expected value for each decision option. The decision option with the highest expected value should then be selected by the rational decision-maker. Von Neumann and Morgenstern (1947:8) define *utility* as a monetary value or satisfaction desired by the decision-maker. Edwards (1954:382) refers to the positive utility of an object as a pleasure impulse that the object triggers within the decision-maker and negative utility as a pain impulse.

Baumol (1951:61) criticises the expected utility theory presented by Von Neumann and Morgenstern (1947) mainly on two aspects. The first criticism by Baumol (1951:62) is that the utility construct is not representative of the preference rating system employed by human decision-makers. Secondly, Baumol (1951:65) argues that the measurement of utilities is arbitrary in nature.

In their response to the criticisms by Baumol (1951:61), Friedman and Savage (1952:465) demonstrate that, with reference to the second criticism by Baumol (1951:61), the measurement of utilities to the level where they can be ranked according to preference is supported by economic theory. Von Neumann and Morgenstern (1947:8) state that the exact measurement of utilities is an area of contention and suggest that utilities simply need to be ordinal in nature to serve as a useful tool in line with their research. With reference to the first criticism by Baumol (1951:61), Friedman and Savage (1952:473) admit that little empirical research is available to either support or reject the criticism. Discrepancies between the preferences suggested by the expected utility theory and observed behaviour by human decision-makers are acknowledged by Friedman and Savage (1948:280) in their attempt to construct a curved utility function that accounts for these differences. Friedman and Savage (1952:474) conclude that the first criticism presented by Baumol (1951), namely that the utility construct is not representative of the preference rating system employed by

human decision-makers, should only be removed if it is contradicted by observations of actual human decision-making behaviour.

Since the comment made by Friedman and Savage (1952:474) regarding the existence of limited empirical research observing human decision-making, much research has been undertaken that observes and analyses human decision-making behaviour. Research that documents observations, and analyses of human decision-making behaviour belongs to the second school of human decision-making research, namely that of descriptive decision research, which is discussed in the following section.

3.2.2   Descriptive decision research

Research on human decision-making behaviour observes that, in simplistic and transparent decision environments, human decision-makers behave in a manner which maximises utility (Simon, 1959:258). However, when the decisions and the decision environment become more complex, the preference rating system and decision choices of human decision-makers do not conform to the behaviour suggested in prescriptive decision research (Kahneman & Tversky, 1979:263; Simon, 1959:258; Simon, 1979:506). Consequently, descriptive decision research has upheld the first criticism presented by Baumol (1951:61).

Simon (1957:198) states that the capability of human decision-makers to make optimal decisions in complex decision environments is limited. Bazerman (1994:5) summarises the factors that limit human decision-making capability as the following:

- incomplete information on which to base the decision;
- cost and time constraints;
- the ability to retain a relatively small amount of information in useable memory; and
- limitations on intelligence and perception abilities.

According to March and Simon (1993:190-191), the limitations listed above lead a decision-maker to forego the optimal solution in favour of an acceptable or reasonable solution. Simon (1957:198) argues that human decision-makers construct a simplified model of the complex decision environment in an attempt to make a reasonable decision. Simon

(1957:198) terms this simplifying decision-making model that human decision-makers employ *bounded rationality*. It is important to note that *bounded rationality* does not equate to *irrationality*, because the simplified decision-making model regularly leads to acceptable decisions, but may also lead to suboptimal decision-making in particular circumstances (Cristofaro, 2017:22). Irrational decision-making is driven by different forces and limitations from those that drive bounded rationality decision-making.

Stanovich and West (2000:658) provide further insight into human decision-making by indicating that human decision-makers use two systems in decision-making, which the authors generically refer to as *System 1* and *System 2*. The six-step decision process described by Bazerman and Moore (2012:3), referred to in Section 3.2 of the present study, is a typical decision-making process that would resort under System 2 thinking. System 2 thinking refers to conscious analytical processing employed by human decision-makers to reach a decision (Stanovich & West, 2000:658). System 2 thinking takes longer and requires more effort from the decision-maker before a decision is reached (Milkman, Chugh & Bazerman, 2009:380). However, due to the volume of decisions that human decision-makers have to face, they cannot only rely on System 2 thinking as this would be too exhausting and would take too long (Bazerman & Moore, 2012:3-4). As a result, human decision-makers regularly rely on System 1 thinking, which is intuitive, requires low effort and is largely automatic (Stanovich & West, 2000:658). System 1 thinking is more influenced by emotion because it largely depends on contextualisation (Stanovich & West, 2000:659). While System 1 thinking frequently leads to good decision-making, it is susceptible to biases that result from human cognition (Milkman *et al.*, 2009:380).

The limitations of memory, intelligence and perception abilities, as identified by Simon (1957:198), were investigated by psychologists to better understand how decisions are actually made. The prospect theory emerged from investigations into this limited processing, perception and attention capabilities of human decision-makers in complex situations involving uncertainty (Tversky & Kahneman, 1992:297). Psychologists also state that human decision-makers employ simplification strategies to deal with complex decision environments. These simplification strategies are referred to as *heuristics* (Tversky & Kahneman, 1974:1124) and certain researchers link their use to System 1

thinking (Milkman *et al.*, 2009:380). The prospect theory and resultant frame dependence in human decision-making are discussed in the next two sections, followed by a discussion of heuristics employed in human decision-making.

3.3 PROSPECT THEORY

While normative theories describe what human decision-makers are rationally expected to do, descriptive theories observe actual decision preferences of human decision-makers. From such observations, Kahneman and Tversky (1979:263) describe systematic and predictable deviations in human decision-making from the rational maximisation of expected utility. From the findings of these studies, Kahneman and Tversky (1979:274) developed the prospect theory. Just more than a decade after they initially proposed the prospect theory, Tversky and Kahneman (1992:300) expanded it into a cumulative prospect theory to account for decisions involving uncertainty and risk with more than two possible non-zero outcomes. In this study, reference to prospect theory includes cumulative prospect theory, where applicable. Along with their findings on cumulative prospect theory, Tversky and Kahneman (1992:316) provide further evidence from experiments and related research in support of the prospect theory in general.

Trepel, Fox and Poldrack (2005:37) note the following differences between the prospect theory and the expected utility theory:

- the utility function regarding absolute states of wealth is replaced by a value function regarding the valuation of gains and losses to a relative reference point (usually the status quo);
- probabilities are replaced by decision weights to weight the possible outcomes (gains or losses); and
- the framing of a problem is explicitly incorporated into the prospect theory to allow for the observation that different descriptions of the same problem may result in different decisions being made by the decision-maker.

Some of the key elements of the prospect theory (Trepel *et al.*, 2005:39) are as follows:

- Curve of the value function.

  The value function is concave for gains and convex for losses. This means that the value of the gain or the loss diminishes relative to an increase in the size thereof.

- Loss aversion.

  The slope of the loss section of the value function is steeper than the slope of the gain section. The steeper slope for losses than for gains means that decision-makers are more averse to losses than to gains (the disposition effect). This steeper slope also indicates that risk-seeking is more prominent for losses while risk aversion is more prominent for gains.

- Curve of the decision weighting function.

  The decision weighting function is inversely S-shaped indicating a tendency to overweight low probabilities and a tendency to underweight medium to high probabilities.

Therefore, it should be noted that the prospect theory has two clear aspects which it combines in its attempt to explain human decision-making behaviour. The first is the value function and the second is decision weights. Each is discussed in the following section.

Figure 3.1 is a graphical representation of a typical of a typical value function of the prospect theory and Figure 3.2 is a graphical representation of a typical decision weighting function in the prospect theory.

Markowitz (1952:156) states that human decision-makers value the possible outcomes of risky or uncertain decision as gains or losses relative to their current state of wealth as a reference point. Kahneman and Tversky (1979:276) refined this hypothesis into the **value function** of the prospect theory. However, the reference point for gains and losses of the value function of the prospect theory is not necessarily the decision-maker's current state of wealth, as it can be influenced by the formulation of the prospects that are offered (Kahneman & Tversky, 1979:274).

Figure 3.1: Typical value function in the prospect theory
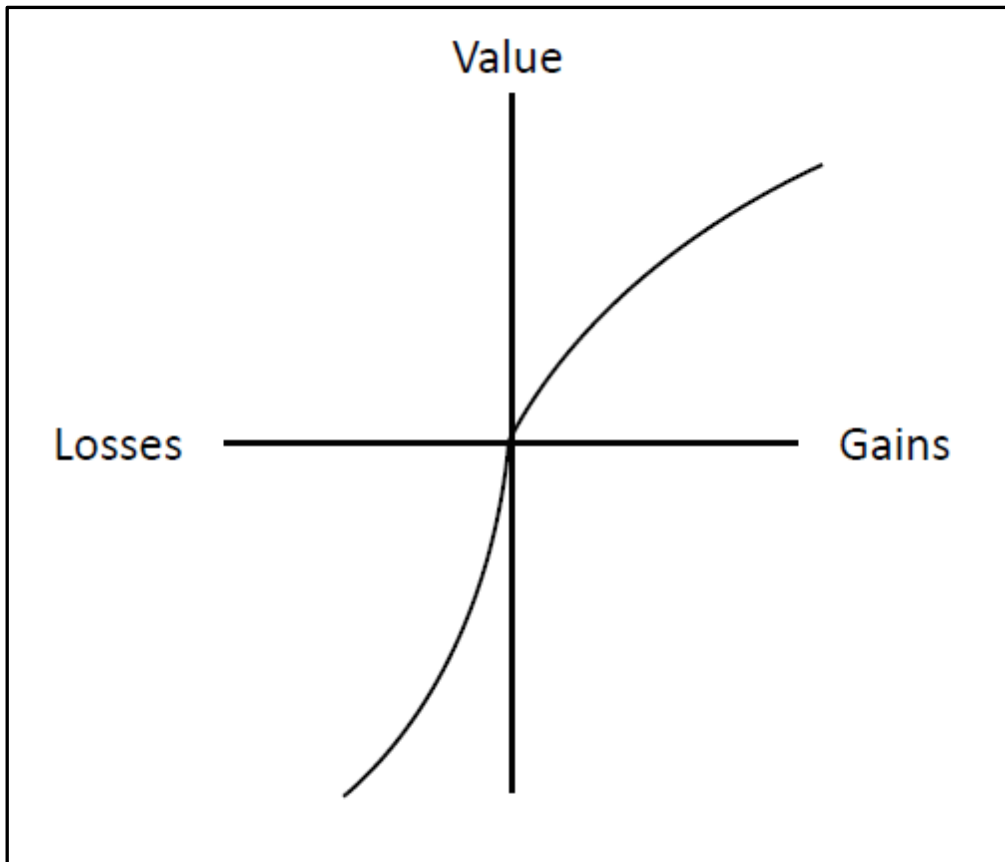
Source: Adapted from Kahneman and Tversky (1979:279)

The value function developed by Kahneman and Tversky (1979:278) is concave for gains and convex for losses. This curvature of the value function translates into lower marginal values as the size of the gains or losses increases away from the reference point (Masiero & Hensher, 2010:349). The lower marginal values for gains and losses account for the observed phenomenon that human decision-makers are less sensitive to differences between higher-value deviations from the reference point (irrespective of whether the values represent gains or losses) than they are to differences between lower-value deviations from the reference point, even if the differences are of the same monetary value. Tversky and Kahneman (1992:303) refer to the decreasing sensitivity when moving further away from the reference point as the principle of diminishing sensitivity.

The slope of the value function is steeper for losses from the reference point than for gains from the reference point. Kahneman and Tversky (1979:279) argue that human decision-makers are more sensitive to losses than they are to gains of similar value. Tversky and Kahneman (1991:1057) attribute their findings, namely that human decision-makers weight negative outcomes relatively higher than similar positive outcomes, to living organisms experiencing pain as requiring more urgent attention than pleasure. Although the exact extent of loss aversion is complex to measure, Harinck, Van Beest, Van Dijk and Van Zeeland (2012:462) conclude that the existence thereof is widely supported by empirical studies.

Figure 3.2: Typical decision weighting function in the prospect theory
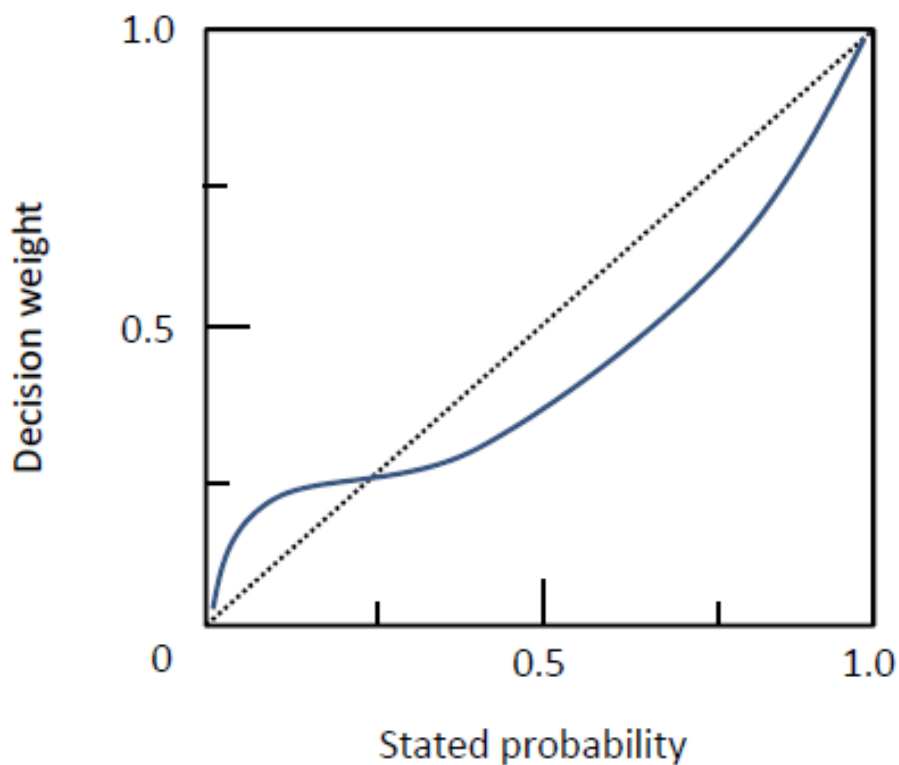
Source: Adapted from Tversky and Kahneman (1992:313)

The prospect theory hypothesises that a decision-maker multiplies each of the possible value function-based outcomes of the decision by a **decision weight** that the decision-

maker assigns to that outcome (Kahneman & Tversky, 1979:280). Although decision weights serve a function comparable with probabilities in the expected utility theory, they do not represent statistical probabilities based on likelihoods. Decision weights are subjective weightings assigned by the decision-maker based on psychological scaling of probabilities (see Figure 3.2), which may be edited for desirability of the particular outcome and any ambiguity that may be present (Kahneman & Tversky, 1979:280).

When the decision weighting function is compared with the stated probabilities of possible decision outcomes, the decision weighting function tends to be inversely S-shaped. The curvature of the weighting function indicates that human decision-makers tend to overweight outcomes with low probabilities and tend to underweight outcomes with medium to high probabilities. According to Tversky and Kahneman (1992:316), the underweighting of high probability of gains as opposed to sure gains, translates into risk aversion for gains in that a human decision-maker will rather accept a lower sure gain than a higher (in terms of expected value) probable gain. Tversky and Kahneman (1992:316) also argue that the curvature accounts for risk-taking by human decision-makers for losses, in that decision-makers will tend to prefer a higher (in terms of expected value) probable loss due to underweighting than a lower sure loss.

Abdellaoui (2000:1497-1498) performed an experiment on undergraduate and PhD students in economics to attempt to determine the utility and weighting functions used by these human decisions-makers. Abdellaoui (2000:1510) found decision-making behaviour that was in accordance with the prospect theory as opposed to prescriptive models, in terms of the curvature of the value function of the prospect theory, as well as in terms of the inverse S-shape of the weighting function. Glöckner and Pachur (2012:29) compared the prospect theory with other decision-making models, including the expected utility theory, by performing an experiment to test the predictive power of each of the models for decision-making by actual human decision-makers. Glöckner and Pachur (2012:29-30) found that the prospect theory constantly outperformed the other models in predicting decision-making behaviour. However, Glöckner and Pachur (2012:29) did not find the curvature of the weighting function to increase predictability of decision-making behaviour. Tversky and Kahneman (1981:454) acknowledge that the value function and the decision weight function

are not necessarily representative of decision-making by all decision-makers, but is a trend that commonly emerges from general human decision-making behaviour. This common trend in human decision-making has been widely accepted and applied to investigations into human decision-making behaviour in various fields of research (Barberis, 2012:6, 9-16).

With the perspective that the prospect theory provides, Tversky and Kahneman (1981; 1986; 1991; 1992) continued to study behaviour in decision-making. From the continued study of decision-making behaviour, the authors published research on how the framing of a decision problem and the frame of reference of the decision-maker affect a decision made by the decision-maker. Because the objective of the present study is to investigate the effect of the behavioural aspects of decision framing, as well as heuristics and biases, on decision-making by management accounting professionals, frame dependence is discussed in further detail in the following section.

3.4 FRAME DEPENDENCE

A specific problem for which a decision needs to be made may be presented and perceived in different ways. In terms of normative theories, the different presentations of the same problem should not change the outcome of the decision (Arrow, 1982:4), because decision-makers should always make the decision that maximises their utility. However, research undertaken in line with the prospect theory states that the way the problem is presented does indeed influence the outcome of the decision (Tversky & Kahneman, 1981:453).

In the decision process, Tversky and Kahneman (1986:257) distinguish between two phases; the first is the framing and editing of the decision problem and the second is the evaluation of prospects. The framing and editing stage refers to an initial analysis of the decision problem during which the acts, contingencies and outcomes of the decision problem are framed. The frame of the decision is influenced by the way in which the decision problem is presented, as well as by the personal characteristics of the decision-maker (Lowies, Hall & Cloete, 2013:808). Tversky and Kahneman (1986:257) specifically point out the "norms, habits and expectancies" as characteristics of the decision-maker that have an influence on the way the decision frame is perceived. Editing actions that are carried out

during the first stage of the decision process, according to Tversky and Kahneman (1986:257), include cancellation of common components of the problem and elimination of prospects that are seemingly dominated by other prospects. In the second phase of decision-making, namely the evaluation phase, the prospects with the highest value are selected by either detecting a prospect that dominates or by selecting the prospect with the highest values.

It is the first phase of the decision process described by Tversky and Kahneman (1981:454) that is of particular interest in terms of frame dependence in decision-making by human decision-makers. Tversky and Kahneman (1981:453) report that human decision-makers are found to reverse their preference between outcomes of a decision, based on how the decision problem is framed. The authors argue that the framing of the decision influences the decision, because the decision frame affects the neutral reference point from which the decision-maker evaluates the decision. In turn, the reference point could affect whether a particular outcome is perceived as a loss or a gain, as well as the marginal value of the outcome, in the second phase of the decision-making process.

Tversky and Kahneman (1981:453) group their discussion of frame dependence into framing of acts, framing of contingencies and framing of outcomes. Regarding the framing of acts, Tversky and Kahneman (1981:454) demonstrate the influence of risk aversion for gains and risk- seeking for losses on the decision, based on the decision frame in which it is presented. When a pair of concurrent decisions, one between loss prospects and the other between gain prospects, is evaluated as two separate decisions due to the influence of framing, decision-makers select outcomes which are not optimal. Shefrin (2002:26) argue that, although concurrent decisions present a "decision package", most human decision-makers fail to identify the 'package' and separate the various decisions to deal with each decision individually. In their discussion of the framing of contingencies, Tversky and Kahneman (1981:455) illustrate how the high weighting given to certain outcomes and the subsequent underweighting of the probable outcomes are influenced by the decision frame. The authors provide multiple stage contingencies as an example of where a certain outcome for a later stage in the contingency is perceived by the decision-maker in the same manner as a certain outcome for the whole contingency. The framing of insurance as full coverage for a specific

risk, rather than only providing coverage for one of the various risks facing the insured, is provided as an example of how framing is used by insurers to influence the decision of prospective clients. With reference to the framing of outcomes, Tversky and Kahneman (1981:456) discuss how the reference point from which the outcomes of a decision are evaluated may be adjusted by a difference in framing. The adjustment of the outcome frame may, for example, result in sunk cost influencing the decision. Shefrin (2002:32) indicates that adjustment of the outcome frame may be a result of how the decision problem is initially presented, or the adjustment may be made by the decision-maker to make the outcomes seem more attractive. Human decision-makers may alter the frame in an attempt to make the outcome of the decision appear less unpleasurable or more pleasurable to the decision-maker.

Findings by Mishra, Gregson and Lalumière (2012:94) confirm that adjustment of the reference point influences decision-making by humans. It should be noted that when the frame of a decision is transparent, decision-makers tend to make rational choices. However, when the frame is not transparent, Tversky and Kahneman (1986:272) found that decisions made by decision-makers deviated from the rational choice.

3.5   HEURISTICS AND BIASES

Section 3.2.2 referred to human decision-makers having to make decisions in complex environments, where certain limitations prohibit these decision-makers from calculating and selecting the optimal solution. Tversky and Kahneman (1974:1124) argue that human decision-makers rely on judgemental **heuristics** when making decisions in situations of uncertainty. Bazerman (1994:6) defines judgemental *heuristics* as simplification strategies employed by decision-makers to deal with complex decisions under time and information constraints. Shefrin (2002:14) argues that human decision-makers develop these judgemental heuristics when solving problems by inferring "rules of thumb" from the information at their disposal. The use of judgemental heuristics is not limited to laymen, but is also employed by experts when making decisions in complex and uncertain decision environments (Tversky & Kahneman, 1974:1130). This study will hereafter refer to judgemental heuristics simply as *heuristics*. The development of heuristics and biases will

be discussed at length in the following section, followed by a brief reference to elements of criticism of this research area that have emerged.

3.5.1   Heuristics and biases research

Tversky and Kahneman (1974:1131) state that the use of heuristics is economical, intuitive and that it regularly leads to good decision-making. Milkman *et al.* (2009:380) assert that human decision-makers are more likely to rely on heuristics when using System 1 thinking as classified by Stanovich and West (2000:658). However, Milkman *et al.* (2009:381) acknowledge that research indicates that decision-makers continue to make use of heuristics when faced with uncertainty, even when they are encouraged to consider the decision problem carefully (see Section 3.2.2 of this study for a discussion of System 1 and System 2 thinking). Although the application of heuristics generally results in good decisions being made, Tversky and Kahneman (1974:1124) contend that under certain conditions, these heuristics lead to cognitive biases that result in systematic and predictable errors in decision-making. Bazerman and Moore (2012:7) suggest that decision-makers apply heuristics to situations for which the heuristics are not appropriate, because decision-makers are generally not aware that they make use of these heuristics. According to Bazerman and Moore (2012:7), misapplication of heuristics induces *biases* that lead to erroneous decision-making. Tversky and Kahneman (1974:1131) describe three types of heuristics which decision-makers employ to asses probabilities and predict values of outcomes, namely representativeness, availability, and adjustment and anchoring.

Human decision-makers may have to judge whether a specific object or event belongs to a certain class, or whether a specific object or event is produced by or will be produced by a certain process. In assessing the decision problems referred to above, human decision-makers judge probabilities based on the stereotypes of the specific objects, events and processes (Bazerman & Moore, 2012:8). The level to which the specific object or event is representative of the stereotypes of the "certain class" will determine the probability that the decision-maker assigns to the possibility that the object or event belong to the "certain class". Similarly, the level to which the specific object or event is representative of the "certain process" will determine the probability which the decision-maker assigns to the possibility

that the "certain process" has produced or will produce the specific object or event. Tversky and Kahneman (1974) termed this heuristic, which is based on representation of stereotypes, the **representativeness** heuristic. Although the use of representativeness should lead to sensible judgement in most situations, human decision-makers ignore other important information when applying the representativeness heuristic (Tversky & Kahneman, 1974:1124). Ignoring other important information can result in the decision-maker making biased decisions (Bazerman & Moore, 2012:9). The biases that are induced by the representativeness heuristic, as described by Tversky and Kahneman (1974:1124-1127), are discussed below.

The first important piece of information, mentioned by Tversky and Kahneman (1974:1124), that decision-makers tend to ignore when applying the representativeness heuristic is the prior prevalence or base rate frequency associated with the relevant objects or events. The ignorance of base rate frequencies results in the bias of *insensitivity to base rates* or base rate neglect. Insensitivity to base rates is illustrated by the following example:

> Assume a population consists of 70% of Object A and 30% of Object B. If a single object sample is extracted and described, decision-makers will focus on the description of the object, rather than on the base rate frequency of 70% of A and 30% of B, to determine whether the object is from the A or B population subsection. The tendency to rely on the description persists, even if the description is based on stereotypes that are explicitly stated as being not relevant.

In the absence of descriptive information, decision-makers utilise base rate frequencies correctly (Tversky & Kahneman, 1974:1125).

The second bias that Tversky and Kahneman (1974:1125) discuss as being induced by the reliance on the representativeness heuristic, is *insensitivity to sample size.* Human decision-makers assume that any sample drawn from a population should closely represent the population from which it was drawn, irrespective of the size of the sample. Statistically, however, the smaller the sample size, the less accurately the sample may represent the population (Bazerman & Moore, 2012:40).

Tversky and Kahneman (1974:1125) mention a third bias that emanates from applying the representativeness heuristic, namely *misconceptions of chance*. This term refers to the expectation by human decision-makers that a sequence of data or events resulting from a random process should be representative of the characteristics of that process, irrespective of the length of the sequence. Tversky and Kahneman (1974:1125) refer to the flip of a coin as an example, where human decision-makers would expect a sequence of flips to result in a fairly equal number of heads and tails, spaced fairly evenly. This may not be a statistically valid expectation if the sequence is relatively short (Bazerman, 1994:45). Research literature on heuristics and biases (Ackert & Deaves, 2010:95; Bazerman & Moore, 2012:41; Tversky & Kahneman, 1974:1125) regularly refer to misconceptions of chance as being an explanation for the so-called "gambler's fallacy", where the gambler expects, for example, that a run of black is now due (or even just a single black fall) after a run of a few red falls on the roulette wheel.

> *'Chance is commonly viewed as a self-correcting process in which a deviation in one direction induces a deviation in the opposite direction to restore the equilibrium. In fact, deviations are not corrected as a chance process unfolds, they are merely diluted'* (Tversky & Kahneman, 1974:1125).

Insensitivity to predictability is a further bias that Tversky and Kahneman (1974:1126) relate to the representativeness heuristic. The *insensitivity to predictability bias* relates to the observation that human decision-makers may rely on data that does not provide any information that is relevant for prediction purposes when making future predictions (Ackert & Deaves, 2010:95). Tversky and Kahneman (1974:1126) indicate that a favourable description, even if irrelevant in terms of predictability, tends to result in favourable predictions being made by human decision-makers.

Related to overestimation of predictability, human decision-makers derive confidence in terms of accuracy of predictions when the predicted outcomes from a process seem to represent the inputs to a process. Tversky and Kahneman (1974:1126) provide the following example to explain the *illusion of validity* bias:

Human decision-makers have greater confidence in predicting the final-year grades of a student, who obtained only B grades in his or her first year, than in predicting the final-year grades of a student who obtained a combination of A and C grades in his or her first year.

Tversky and Kahneman (1974:1126) clarify that consistent patterns tend to occur when variables are highly correlated. Highly correlated variables result in a redundancy of variables that should, in fact, lower predictability.

The last bias that is induced by reliance on the representativeness heuristic, according to Tversky and Kahneman (1974:1126), is *misconceptions of regression to the mean*. Human decision-makers are of the opinion that the outcomes of predictions should represent the extremity of the inputs. However, outcomes tend to regress back to the mean from previous extreme values. Outlier outcomes from a previous event, irrespective of whether the outliers are to the positive or negative side in relation to the mean, will tend to reform back closer to the mean in subsequent events. In terms of the misconceptions of regression to the mean bias, human decision-makers expect the outliers from a recent event to remain equally extreme in subsequent events (Bazerman & Moore, 2012:58).

According to Tversky and Kahneman (1974:1127), a second heuristic human decision-makers employ is the **availability** heuristic. The availability heuristic is employed when human decision-makers have to judge the frequency of occurrence of an event, the probability of an event taking place, or the likely causes of an event (Bazerman, 1994:7). In terms of the availability heuristic, human decision-makers rely on the availability of similar events in the memory of the decision-maker as a deemed indicator of the frequency or probability of the event taking place. Similarly, the availability of causes of similar events in the memory of decision-makers is deemed to be an indicator of possible causes leading to a current event. The availability heuristic leads to correct frequency, probability and cause assessments in many situations, because the availability of information in human memory is partly influenced by the frequency of events and causes. However, the availability of information in memory is also influenced by other factors that bias the assessments of

human decision-makers (Tversky & Kahneman, 1974:1127). These biasing factors and the resulting biases are discussed in the following paragraphs.

Two of the examples of biases induced by reliance on the availability heuristic that Tversky and Kahneman (1974:1127) discuss relate to the ease with which occurrences of events can be recalled or constructed in memory. Bazerman and Moore (2012:34) suggest the ease of recall bias, which this study uses as a practical grouping for the two related examples of Tversky and Kahneman (1974:1127). The *ease of recall* bias is defined by Bazerman and Moore (2012:58) as the tendency by human decision-makers to assess events that recently occurred, or events of a vivid nature, to occur more frequently than events with similar frequency, which occurred less recently or which are less vivid. Recent and more vivid events tend to be more easily recalled from human memory. The first example discussed by Tversky and Kahneman (1974:1127) directly relates to the retrievability of events from human memory due to the decision-maker's familiarity with the event or due to the vividness of the event. The second example which relates to the ease of recall bias (Tversky & Kahneman, 1974:1127) is the imaginability of an event. Imaginability does not relate to events specifically stored in memory, but the ease with which an instance of such an event can be constructed. The easier the decision-maker can construct a similar event, the higher the probability or frequency of such an event is judged to be (Tversky & Kahneman, 1974:1127).

The second bias that is induced by the use of the availability heuristic is the *retrievability* bias. The frequency of events as judged by human decision-makers is affected by how the information is stored in human memory (Bazerman & Moore, 2012:58). Events that are easier to search for are judged to occur more frequently. Tversky and Kahneman (1983:295) administered a questionnaire in which participants were required to judge the frequency of the occurrence of the suffix '-ing' in seven-letter words on the pages of any given novel. Participants were consequently asked to judge the frequency of occurrence of seven-letter words containing the letter 'n' as the second last letter in the word. The judgement of the prevalence of the suffix '-ing' in seven-letter words was higher than the judgement of the prevalence of the letter 'n' as the second last letter in seven-letter words. However, clearly all seven-letter words containing the suffix '-ing' also have the letter 'n' as the second last

letter. Accordingly, the prevalence of seven-letter words with 'n' as the second last letter would, in actual fact, be higher. It is, however, more difficult for the human decision-makers to search for seven-letter words containing 'n' as the second last letter than to search for seven-letter words ending in the suffix '-ing' (Tversky & Kahneman, 1983:295).

Illusionary correlations is a third example of a bias that the use of the availability heuristic induces (Tversky & Kahneman, 1974:1128). Human decision-makers judge the frequency with which two events co-occur, or the probability that they will co-occur, based on the associative bond between the two events. If experience or social influence results in the availability of a stronger association between the events in the memory of the decision-maker, the higher the frequency of co-occurrence or the probability of co-occurrence is judged. Tversky and Kahneman (1974:1128) refer to the earlier study by Chapman and Chapman (1967:193), which required inexperienced undergraduate students to make psychological diagnoses. Students were required to make diagnoses based on drawings hypothetically drawn by patients suffering from mental illnesses. The students made strong associations based, for example, on drawings of peculiar eyes and diagnosis of suspiciousness, notwithstanding other information that was provided, which contradicted such a diagnosis (Chapman & Chapman, 1967:198). Bazerman (1994:21) suggests that these associations are formed by social lore rather than by factual correlations.

Human decision-makers regularly make estimates by starting with an initial value which they then adjust based on the available information before they arrive at a final answer. This is referred to by Tversky and Kahneman (1974:1128) as **anchoring and adjustment**. The initial value may be selected from a historical precedent, may be present in the way in which the decision is presented, or may be based on random information available to the decision-maker (Bazerman, 1994:8). The *anchor* itself will bias the decision because different starting points result in different estimates arising from the decision (Tversky & Kahneman, 1974:1128). Adjustments, based on new or additional information, are made to the initial anchor, meaning that a different initial anchor may lead to a different final estimate.

In addition to the anchor biasing the decision, human decision-makers make insufficient adjustments to their initial anchors when new or additional information becomes available (Tversky & Kahneman, 1974:1128). Slovic and Lichtenstein (1971:693) initially labelled this bias 'conservatism' in their discussion of insufficient adjustment by human decision-makers when using Bayesian principles to make probability estimations. Some authors also later referred to this bias as 'conservatism' (Lowies, 2012:95; Shefrin, 2002:18). In accordance with these authors, this study will henceforth refer to this as the *conservatism bias* or the *conservative adjustments bias*. Slovic and Lichtenstein (1971:693) argue that human decision-makers deem new information to be less diagnostic than what the information warrants and, as a result, make conservative adjustments to their initial anchor. Ackert and Deaves (2010:98) provide two possible explanations from the literature for why human decision-makers make insufficient adjustments to their anchoring values. The first possible explanation is that, given new information, human decision-makers move away from their initial anchor only until they enter what they perceive to be the plausible region and not until they reach the middle of the plausible region. When uncertainty is greater, the perceived plausible region also tends to be greater and the adjustment away of the anchor will accordingly tend to be more insufficient because the plausible range is entered more quickly. The second possible explanation is that cognitive effort is required on the part of the decision-maker to move value judgements away from the anchor. This cognitive effort is deemed to regularly result in the decision-maker stopping too early when moving away from the anchor to limit the effort required.

Bar-Hillel (1973:403-405) states that human decision-makers overestimate the probability of outcomes that are dependent on multiple events occurring in conjunction with each other, and underestimate the probability of outcomes that are dependent on a single event occurring out of many events. Tversky and Kahneman (1974:1129) explain this *conjunctive and disjunctive events* bias in terms of the anchoring and adjustment heuristic. According to Tversky and Kahneman (1974:1129), the probability of one event occurring provides a natural anchor from which the downward adjustment for the probability of events occurring conjunctively is insufficient in relation to the statistical decrease in probability. The same applies to disjunctive events, where the anchor of the single event's probability is insufficiently adjusted upwards in relation to the increase in statistical probability. The

experiment undertaken by Bar-Hillel (1973:396) from which this bias was discovered required participants to make a selection from a series of gambles based, *inter alia*, on an urn containing 90% coloured and 10% white marbles. Bar-Hillel (1973:399) found that human decision-makers overestimated the probability of drawing coloured marbles seven times in succession (conjunctive event), and underestimated the probability of drawing a white marble once in seven attempts (disjunctive event).

Representativeness, availability and anchoring and adjustment are the initial heuristics, with their resultant biases, presented by Tversky and Kahneman (1974:1131). The number of heuristics and biases has been expanded in literature and the influence of heuristic-induced biases has been investigated in various decision-making research fields. This study will investigate two additional heuristics, namely overconfidence and affect. These additional heuristics are introduced in the following paragraphs.

Tversky and Kahneman (1974:1129) indicate that human decision-makers provide overly narrow probability distributions around an anchoring value, which reflects that human decision-makers have more confidence in their probability distribution judgement than can be justified by the knowledge they possess of the relevant topic. Bazerman and Moore (2012:15) argue that the *overconfidence bias* does not only relate to the anchoring and adjustment heuristic, but that it facilitates many of the other biases. In his review on literature related to overconfidence in decision-making by human decision-makers, Bazerman (1994:38) defines the **overconfidence** heuristic as the tendency of human decision-makers to be extremely confident in the correctness of their own answer to decision problems. The author also points out that research indicates that the confidence of human decision-makers does not decrease in correspondence with a decrease in their knowledge of the decision problem.

Interestingly, Moore and Healy (2008:504) argue that confidence by individuals in their ability, *when compared with others*, decreases when the difficulty of the decision problem increases. However, Moore and Healy (2008:512) state that even though the confidence by the decision-makers in their *general ability* to provide a reasonable solution increases with an increase in the difficulty of a problem, the decision-makers' confidence in their *ability to*

outperform others decreases with an increase in the difficulty of the decision. Consequently, Moore and Healy (2008:502) differentiate between three aspects of overconfidence, namely overestimation, overplacement and overprecision. *Overprecision* is defined as the tendency of human decision-makers to be overconfident in their judgement, even in the presence of mildly contradictory evidence. *Overestimation* is defined as the tendency of human decision-makers to consider themselves to be better, over a number of spheres, than they actually are. *Overplacement* refers to human decision-makers considering themselves better than they actually are, in competitive relation to others. It should be noted that the distinction between overestimation, overplacement and overprecision is not yet widely present in the literature (for a recent example by regularly cited authors see Daniel & Hirshleifer, 2015:62). Therefore, the discussion of the literature will not specifically be categorised according to this distinction, except where it is clearly present.

With reference to overconfidence bias in general, Oskamp (1965:261) argues that beyond an early stage in the process of gathering information for a decision that needs to be made, the predictive accuracy of the information gathered reaches a maximum. However, decision-makers continue to become more confident as more information is gathered, resulting in decision-makers becoming overconfident in their decisions. In his study of overconfidence in judgement by psychologists, Oskamp (1965:262) found support for his arguments about overconfidence. Psychologists became more confident as more information was presented, although the accuracy of their judgements did not increase in the same proportion. A recent study by Kausel, Culbertson and Madrid (2016:27) demonstrates the effect of a decrease in predictive accuracy beyond a certain point in the context of hiring decisions. Kausel *et al.* (2016:40) found that conducting unstructured interviews with possible job candidates increased (over)confidence on the part of the hiring managers, but decreased the probability of the managers selecting the best candidate, as opposed to selecting the best candidate on selection test scores only. Continuing to conduct selection interviews after gathering the selection test scores therefore increased overconfidence but decreased predictive accuracy.

Holding on to highly improbable beliefs without modifying such beliefs in the face of new information is influenced by emotional concerns (Broyd, Balzan, Woodward & Allen, 2017:102). Accordingly, Ackert and Deaves (2010:177) argue that affective or emotional

reactions also influence the cognitive judgement of decision-makers. The authors claim that affective reactions allow for less effort when evaluating the advantages and disadvantages of a particular scenario. The possibility for increased efficiency based on the reliance on affective reactions mirrors the definition of heuristics as simplifying decision strategies. Accordingly, Finucane, Alhakami, Slovic and Johnson (2000:3) define the **affect** heuristic as the influence of emotional stimuli on human decision-making. Again, under certain circumstances, affect can result in suboptimal and biased decision-making behaviour (Slovic, Finucane, Peters & MacGregor, 2007:1347).

3.5.2   Criticism of heuristics and biases research

Although research on heuristics and biases continues to proliferate, it has also received some criticism. The main issues raised by scholarly critics are discussed in this section. Criticism against the heuristics and possible resultant biases summarised by Tversky and Kahneman (1974:1124) mainly consists of the following two arguments: firstly, that the information which is presented to experimental subjects ignores the context-rich details that would be associated with actual decision scenarios from the real world, and secondly, that the normative or correct decision, against which the resultant biases are identified, is based on the incorrect statistical principles (Gigerenzer, 1991:83). This criticism school of research continued to develop its own view of heuristics referred to as *fast and frugal* heuristics (Hafenbrädl, Waeger, Marewski & Gigerenzer, 2016:215).

The first argument relating to the limited information is indeed an issue to consider within research experiments using scenario-based questionnaires. However, in the field of behavioural finance, actions by investors in formal securities exchanges can be investigated *post facto*, resulting in investigations into decisions taken in context-rich environments. Such real-world decision-based research continues to confirm the presence of heuristics and the resultant biases in investor decision-making behaviour. See De Bondt, Mayoral and Vallelado (2013:99) and Section 4.4 of this study for overviews of this research. The heuristics and biases identified in the context-poor questionnaires were therefore confirmed in real-world decision research, providing assurance of the validity of questionnaire scenarios to test for biases.

The second argument criticises the use of probability statistics to evaluate the responses of experimental participants. Gigerenzer (1991:107-108) argues that it is inappropriate to use frequency-based probabilities to evaluate single-event decisions where the decision-maker is aware that the event is a once-off event. Gigerenzer (1991:83) adapted many of the scenarios and questions referred to by Tversky and Kahneman (1974:1124) to perform experiments in an attempt to illustrate that the biases disappear when decision-makers are presented with the information in frequency terms. It should be noted that scenarios in the real world will very rarely be encountered in such a clearly presented manner. Therefore, the adapted scenarios and questions developed by Gigerenzer (1991:83) led participants into making the correct decisions. In a comprehensive discussion of the criticism against heuristics and biases research, Gilovich, Griffin and Kahneman (2002:13) argue that human cognition results in decision-makers dealing with scenarios containing uncertainty (once-off events) as if they were probabilities (frequently occurring events). To support their argument, Gilovich *et al.* (2002:15) refer to various studies in which the biases remained, despite the scenarios being framed in the manner suggested by Gigerenzer (1991:83).

Lastly, the fast and frugal heuristics view originated from the investigation into context-based decision-making (Hafenbrädl *et al.*, 2016:215). This view of heuristics suggests that human decision-makers develop a toolbox of context-specific heuristics to assist in making decisions in situations of uncertainty (Hafenbrädl *et al.*, 2016:218). This view therefore suggests that there is no single set of heuristics for all situations, but rather a different decision tool for each different scenario. Decision-makers can be provided with predeveloped decision-making rules to assist in enhancing their decision-making tool set for a specific scenario (Hafenbrädl *et al.*, 2016:218). An example of such decision-making rules is a fast-and-frugal decision tree on how to judge whether a patient visiting the emergency room due to experiencing vertigo, possibly suffered a brainstem or cerebellar stroke (Hafenbrädl *et al.*, 2016:226). Developing such decision rules is not in conflict with heuristics and biases research but falls outside the scope of the present research study.

3.6 SUMMARY

Human decision-makers are influenced by psychological factors, also referred to as behavioural aspects, when making decisions. Management accountants are becoming more involved in business-related decision-making. Accordingly, management accountants must become aware of the influences of cognitive processes on decisions made by them and others in the complex business environment. In this chapter, research into human decision-making behaviour was discussed. Prescriptive and descriptive decision-making research was deliberated on. The prospect theory was discussed as being a descriptive decision theory, meaning that it is based on investigations into how human decision-makers make decisions. Investigations into decision-making by human beings indicate that the frame in which the decision problem is presented as well as the frame of the decision-maker, based on his or her characteristics, influences the decision made by the decision-maker. Accordingly, frame dependence was discussed. Research has also illustrated how human decision-makers rely on simplifying rules of thumb to make decisions in uncertain and complex situations. These simplifying rules of thumb are referred to as heuristics. The next chapter discusses investigations into how these behavioural aspects influence financial decisions and business-related decisions.

CHAPTER 4: BEHAVIOURAL ASPECTS IN FINANCIAL AND MANAGERIAL DECISION-MAKING

4.1 INTRODUCTION

Chapter 3 reviewed research indicating the influence of behavioural aspects on human decision-making. However, behavioural aspects also influence financial and managerial decision-making by human beings.

The aim in this chapter is to review literature on the influence of behavioural aspects on financial and business decision-making. Two relevant research fields that have developed on the influence of behavioural aspects are referred to briefly in the following section. The findings of the research on behavioural aspects in these fields that are relevant to this study will be discussed in the subsequent sections to demonstrate that an appropriate theory base exists for the study. The discussion in the chapter will then be narrowed to research about the influence of behavioural aspects in the field of management accounting.

4.2 BEHAVIOURAL FINANCE AND JUDGEMENT IN MANAGERIAL DECISION-MAKING

The influence of psychology-based behavioural aspects on financial decision-making has been extensively researched, resulting in the development of the following fields of research relevant to the proposed study:

- behavioural finance; and
- judgement in managerial decision-making.

Barberis and Thaler (2003:1055) define *behavioural finance* as departing from the rational theories-based approach for investigating financial markets to a descriptive approach, which uses investigative models that take into account that some agents do not act fully rational. According to Barberis and Thaler (2003:1054), behavioural finance is structured around two precepts, namely the limits to arbitrage and psychology. The authors define the *limits to arbitrage* as the difficulties for investors that act rationally to correct the disorders that

develop in the markets due to the irrational trading actions of other traders. The authors further state that psychology outlines the departures from rationality that can be expected due to the influences of human cognition on decision-making by traders.

A recently developed subfield of behavioural finance is behavioural corporate finance, which investigates the influences of behavioural aspects on managerial decisions related to corporate finance, including appraisal of investments, capital structure decisions and decisions related to the dividend policy of companies (Fairchild, 2010:277). Accordingly, behavioural corporate finance relates to high-level corporate management decision-making by managers in companies (Ackert & Deaves, 2010:279). Because behavioural corporate finance relates to decision-making by managers, it links to the second field of research, namely that of judgement in managerial decision-making.

Judgement in managerial decision-making investigates the influences of behavioural aspects on decision-making by managers of businesses (Bazerman & Moore, 2012). This field of research is not limited to corporate finance-related decisions, but investigates behavioural influences in a variety of managerial decisions.

A comprehensive literature review by Cristofaro (2017:1-33) indicates that various and continually evolving subfields can be classified into the subfields listed in this study. Nonetheless, it is not the purpose of the study to comment on the different classifications that could be applied, but to draw on the relevant knowledge that resorts under these fields, irrespective of the classification method applied.

Research in behavioural finance and judgement in managerial decision-making was used to assist in developing the research instrument for the present study and to serve as a theory base with which to compare and contrast the findings of the study. Therefore, research on the influence of framing and heuristics on financial decision-making, as emerged from studies in behavioural finance and judgement in managerial decision-making, is discussed in the following sections.

4.3 FRAME DEPENDENCE IN FINANCIAL DECISION-MAKING

Decision-making by human decision-makers is influenced by the frame in which the decision problem is presented, as well as the frame of the individuals making the decision. In Section 3.5 the development of research on frame dependence in decision-making flowing from the prospect theory was discussed. In the current section, the focus is on research regarding the influence of frame dependence on financial decision-making. The effects of loss aversion, including the disposition effect, are discussed. The effect of the framing of concurrent decisions, as well as effects of creating the perception of certainty, referred to as pseudo-certainty, is also discussed. Discussion related to the effect of owning a good, referred to as the endowment effect, is followed by a discussion of mental accounting and how mental accounting may influence human decision-makers to take sunk cost into account when making decisions. Lastly, myopic loss aversion resulting from too frequent evaluation of mental accounts is discussed and related to the disposition effect in the business environment. The discussion in this section forms part of the focus of Research Question 2 of the study.

The prospect theory argues that human decision-makers are more sensitive to losses than to gains of similar value, as can be derived from the slope of the typical prospect theory value function. Tversky and Kahneman (1992:298) define **loss aversion** as the inconsistency in sensitivity to losses as opposed to gains by human decision-makers. Haigh and List (2005:531) argue that most experimental studies on loss aversion which preceded their study are open to criticism because the participants in these previous studies were undergraduate students. However, in their study, the authors investigated loss aversion by professional share traders and students, and found that professional share traders were more acutely loss averse than undergraduate students.

In a study of decisions by newspaper vendors on ordering inventory from suppliers, Wang and Webster (2009:102) found loss aversion to be present in the order management processes of these vendors. The authors found greater loss aversion by risk-averse vendors than by risk-neutral vendors, which was illustrated by risk-averse vendors ordering fewer

newspapers than risk-neutral vendors did when shortage cost was low. However, when shortage cost was high, risk-averse vendors ordered more newspapers than risk-neutral vendors did. With reference to similar inventory control decisions, Tokar, Aloysius, Waller and Hawkins (2016:306) found loss aversion tendencies among experienced inventory controllers of a large retail firm in the United States of America. Tokar *et al.* (2016:306) found that education and experience did not mitigate the effects of loss aversion on inventory controllers.

A study by Ma (2009:65) of equity incentivised chief executive officers indicates that loss aversion may differ, depending on the competence of the managerial decision-maker. Ma (2009:65) found that competent chief executive officers who owned equity as an incentive were prepared to take the risks required to maximise utility. However, less competent chief executive officers were loss and risk averse when owning company equity as an incentive.

A specific effect of loss aversion is termed the disposition effect by Shefrin and Statman (1985:778). The **disposition effect** is the tendency of investors to hold on to poorly performing shares too long due to an aversion to realise a loss, while selling shares that perform well too early due to an eagerness to realise the gain. In an analysis of trading records, Odean (1998a:1797) reports that investors realise investments on which they will be making a profit at a much higher rate than investments on which they are incurring losses, indicating that the investors are averse to realising losses. The author argues the loss aversion results in lower returns, partly due to the tax effect of realised profits and unrealised losses. According to Odean (1998a:1795), these results provide a "significant indication" of the presence of the influence of the disposition effect on the behaviour of share investors.

Statman and Caldwell (1987:10) argue that the disposition effect may be present in the capital budgeting decisions of managers. The authors refer to the findings of Staw (1976:39), namely that the commitment of a manager escalates when the manager has been assigned a higher level of responsibility for a project and results in the manager continuing to invest in a poorly performing project, even when it is clear that the project should be abandoned. Liang, Kale and Cherian (2014:157) performed experiments on MBA students from the United States of America and from the Peoples' Republic of China to identify whether the

disposition effect is influenced by the culture of a decision-maker. Liang *et al.* (2014:160) found evidence of escalation of commitment to poorly performing product development projects by participants from both countries. However, escalation of commitment to poorly performing projects was found to be more pervasive among Chinese participants. The authors argue that Chinese participants were more likely to be influenced by non-financial contextual factors than their American counterparts.

Lowies *et al.* (2013:811) found that property fund managers were also influenced by the disposition effect. The South African property fund managers surveyed by the authors indicated a higher despondency towards not selling poorly performing properties soon enough than towards selling properties that performed well too soon. Lowies *et al.* (2013:811) argue that the influence of the disposition effect on property fund managers results in these managers not investing in properties that may result in future gains due to a fear of regretting the investment if it turns out to result in a loss.

Tversky and Kahneman (1981:454) demonstrate that, under certain circumstances, the framing of a set of **concurrent decisions** in two parts, rather as a combined single decision problem, leads to irrational decision-making. Shefrin (2002:26) explains that most human decision-makers fail to evaluate the separate parts of the concurrent decisions as a single package. Bazerman and Moore (2012:86) point out that business managers are expected to encounter many such "interconnected decisions", such as "portfolio selection, budgeting and funding for new projects" in separate parts, when fulfilling their managerial duties. Sebora and Cornwall (1995:50) presented undergraduate and graduate strategic management students with such a pair of concurrent decisions in a business scenario and found that the framing of the concurrent decisions in separate parts resulted in irrational decision-making.

Human decision-makers view a decrease in the probability of a decision outcome from certainty to a mere probable level as being more important than an equal decrease in probability of an outcome that was initially only probable and not certain. Similarly, the increase in the probability of an outcome to a certainty level is viewed as being more important by human decision-makers than an equal increase in probability to a higher level,

but still below 100%. The effect that a change from or to certainty carries higher decision weight than other changes in probability was originally documented by Allais (his earlier writings were in French, but see Ramrattan and Szenberg (2011:104-122) for an English summary of his work). Tversky and Kahneman (1981:455) refer to the phenomenon documented by Allais as the **certainty effect**. Ramrattan and Szenberg (2011:144) uphold the Allais paradox (the certainty effect) and state that it withstood criticisms and scrutiny by researchers. However, Fan (2002:419) argues that the certainty effect may not hold where the gains or losses from the outcomes are relatively small.

Bazerman and Moore (2012:88) explain how the framing of the decision outcomes may manipulate the decision-maker's perception of certainty being present by referring to how the same insurance policy could be framed as coverage against one of a number of events (framed as a probability of being covered against events), or as full coverage for a specific event (framed as certain coverage for the specific event). A similar form of coverage against harm, namely vaccination against a disease, was investigated by Slovic, Fischhoff and Lichtenstein (1982:24). Slovic *et al.* (1982:24) found that participants in their study were more likely to pursue voluntary vaccination when the vaccination was framed as full coverage for a less common disease than as partial coverage for a somewhat more common disease. Tversky and Kahneman (1981:455) define **pseudo-certainty** as the manipulation of framing to create a perception of certainty. Tversky and Kahneman (1981:455) demonstrated the pseudo-certainty effect in the setting of contingencies, which required participants to assume they were taking part in a game and to make a choice that was contingent on the participant reaching the second stage of the game. The choice options created a perception of certainty, which did not exist, because the outcomes were contingent on the participant progressing past the first stage of the game. Tversky and Kahneman (1981:455) found that participants tended to treat the choice as if certainty existed. Sebora and Cornwall (1995:53) adapted the contingency setting to a business scenario regarding an acquisition decision involving contingencies, and found that the pseudo-certainty effect was also present in a managerial context.

Kahneman, Knetsch and Thaler (1991:194-197) summarise research that indicates that the value of a good increases in the frame of a human decision-maker, once the decision-maker

owns the good. The authors define the **endowment effect** as the subjective increase in the value of a good when it is owned by a decision-maker. Ackert and Deaves (2010:46) explain that the endowment effect is consistent with the principles of the prospect theory because the loss of the good is experienced more acutely than the attainment of the good. Kahneman *et al.* (1991:197) note that research indicates that the primary cause of the endowment effect is the pain of losing the good and not the enhanced appeal of the good due to ownership. Based on a series of experiments, Weaver and Frederick (2012:696) contend that the endowment effect is caused by an aversion to trade on unfavourable terms, rather than by aversion to lose or part with goods. However, in an extensive review of literature, Ericson and Fuster (2014:557) argue that loss aversion continues to provide the best explanation for the endowment effect, provided that it is adjusted to incorporate multiple reference points into valuing the relevant goods.

Glöckner, Tontrup and Bechtold (2015:224) suggest that the endowment effect resulting from loss aversion may be partly responsible for breakdowns in co-operation by companies in situations where negotiations on fragmented rights to a common resource take place (referred to as *anticommons*). The findings by Glöckner *et al.* (2015:232) indicate that the endowment effect may be decreased by certain conditions of the negotiations. However, Glöckner *et al.* (2015:224) indicate that the endowment effect may also be present in the business environment where the goods are owned by the business at which the human decision-maker is employed.

Thaler (1999:183) provides further insight into understanding the adjustment of the decision frame by human decision-makers. He argues that human decision-makers employ cognitive operations to organise, evaluate and monitor financial activities. The author defines these cognitive operations as **mental accounting**. Ackert and Deaves (2010:51) group mental accounting into three main components, namely the assignment of financial activities to cognitive accounts, periodic evaluation of each cognitive account, and finally, the closure of a cognitive account. Human decision-makers construct a set of mental accounts based on their own judgement. The sources and uses of funds are allocated to the respective mental accounts to which the decision-maker deems the funds to belong to. Human decision-makers evaluate these mental accounts on a periodic basis, the period of which may differ

between decision-makers, as well as between different mental accounts. A specific mental account is balanced and closed by a decision-maker when the decision-maker deems the time fit to do so. A specific financial decision will be treated based on the conventions that the decision-makers developed for the specific mental account to which the funds of the decision are allocated. Accordingly, the frame of a decision-problem is influenced by the account to which a decision-maker allocates the funds flowing to or from the possible decision outcomes (Thaler, 1999:185).

In a study about human decision-making behaviour on retirement savings plan investment and allocation of funds, Benartzi and Thaler (2007:92-93) observe that investors are less probable to adjust allocation of funds that they have already accumulated than they are to adjust allocation of funds that they are to contribute in the future. They ascribe this phenomenon to investors having different mental accounts for accumulated funds than for future contributions. They propose that the reference point for accumulated funds is past performance, while the reference point for new funds still has to be set.

Chen, Kök and Tong (2012:436) investigated the relationship between payment schemes and inventory level decisions by newspaper vendors from a mental accounting perspective. They state that inventory levels of newspaper vendors are the highest when they finance inventory themselves, optimal when inventory is financed by the supplier by way of delayed payments, and lowest when the customer finance inventory by paying in advance. The differences in inventory levels in relation to payment method are ascribed by Chen *et al.* (2012) to mental accounting, where vendors segregate payments received from payments made based on timing differences, and prefer to pay for inventory in order to mentally account for payments received as income owning to themselves.

Thaler (1999:198) argues that the phenomenon of human decision-makers tending to let **sunk cost** influence their risk-taking is also due to the effects of mental accounting. An example of the manifestation of higher risk-taking due to consideration of sunk cost is the increase in betting on the long shot in the last horse race of the day, resulting from bettors attempting to make up for money lost on the earlier races (Tversky & Kahneman, 1981:456). According to Thaler (1999:198), human decision-makers tend to take sunk cost into account

for unclosed mental accounts. Once the mental account is closed, sunk cost will no longer be taken into account. In the business setting, this phenomenon relates to the *disposition effect.* Based on the sunk cost already invested in a project, a manager may not be willing to close a project, even though it may be performing poorly and should be closed.

Thaler (1999:185) suggests that human decision-makers treat decisions related to the individual mental accounts in accordance with the principles of the prospect theory. Human decision-makers will therefore, *inter alia*, be loss averse when evaluating a mental account. Thaler, Tversky, Kahneman and Schwartz (1997:648) support findings by Benartzi and Thaler (1995:90) that human decision-makers frame their mental accounts too narrowly, causing the decision-makers to make suboptimal decisions due to the effects of loss aversion. *Narrow framing* is defined as segregating funds more extensively into different accounts instead of combining it into portfolios, and evaluating accounts too regularly. Benartzi and Thaler (1995:75) define **myopic loss aversion** as the effects of narrow framing of mental accounts. The authors explain that a share investment carrying a higher risk due to having a higher standard deviation will seem more attractive to an investor if the investor evaluates the investment infrequently, because the deviations are averaged out over time. However, regular evaluation of the investment will highlight the deviations to the risk-averse investor. Benartzi and Thaler (1995:75) investigated the inexplicable size of the premium of equity returns over bond returns from a myopic loss aversion perspective. The authors found that myopic loss aversion provided a possible explanation for the large size of the premium of equity returns above bond returns, if it was assumed that investors evaluate their investments annually.

Samuelson (1963:50-51) provides an example which is relevant in clarifying myopic loss aversion in a more general sense. Samuelson (1963:50) offered some of his colleagues a 50:50 bet of gaining $200 or losing $100 depending on the outcome. A specific colleague mentioned that he will not take the single bet, but that he is willing to take the bet in a series of 100 similar bets. Bazerman and Moore (2012:87) explain that the colleague of Samuelson (1963:50) erred by viewing the bet as a single event not related to other similar gambles in life (separate mental accounts). He would face multiple similar gambles in life and by

accepting positive expected value gambles when they arise should result in maximising his utility in the long run because all the gambles average out to the expected value.

Chrisman and Patel (2012:977) investigated research and development expenditure by family-owned and -managed businesses in contrast to publicly owned and independently managed businesses, from a behavioural perspective. Chrisman and Patel (2012:990) found that family-owned businesses, in which longer-term (possible generation spanning) goals enjoyed priority, invested more in research and development because the longer planning and evaluation horizon evaded the effects of myopic loss aversion related to the risk taken in investing in research and development. Shavit and Adam (2011:210) suggest that myopic loss aversion may also affect the propensity of the management of a company to invest in corporate responsibility. Shavit and Adam (2011:210) argue that myopic loss aversion may result in management being unwilling to invest in corporate responsibility beyond the minimum legal requirements in the short term, because the possibility of future benefits to the company of the current and future corporate responsibility investment in the long term is not incorporated into the decision.

The frame dependence effects discussed above represent the framing effects that are most pervasive in the literature. Other framing effects have also emerged and are still continuing to emerge; however, these effects and influences fall outside the scope of this study. Some previous studies investigated possible relationships between demographic variables associated with particular individuals and their susceptibility to framing-related bias. The main literature on these possible relationships is reviewed in the following section.

4.3.1 Possible indicators of higher susceptibility to framing-based bias

The investigation into possible associations between demographic variables and susceptibility to frame dependence-related bias focuses largely on loss aversion. The discussions in Section 4.3 indicated that the other frame dependence-based biases are closely related to loss aversion. Consequently, demographic relationships to higher susceptibility to the framing effects of loss aversion are deemed to also apply to the other

framing effects, unless previous literature explicitly indicates the contrary for a particular framing effect.

Schmidt and Traub (2002:233) conducted an experimental study which investigated the prevalence of loss aversion in accordance with the cumulative prospect theory. A subsection of their study considered possible differences in the level of loss aversion based on *gender*. Schmidt and Traub (2002:246) found evidence of higher loss aversion by women than by men. Schmidt and Traub (2002:245) indicate that the higher level of loss aversion by women may be linked to the comparatively higher level of risk aversion by women. Studies by Pompian and Longo (2004:12) and Eckel and Grossman (2008:14) confirm the higher level of risk aversion exhibited by women. Interestingly, Adams and Funk (2012:220) found that women in high-level management positions, specifically the board of directors of a company, were somewhat more risk loving than male directors. This is in contradiction to the findings on differences in risk aversion between men and women in the general population. Gender may therefore be an indicator of higher proneness to loss aversion in women than in men. However, some uncertainty exists as to whether the general findings indicating proneness to the effects of framing will hold for management accounting professionals in higher-level managerial positions.

In their study of outcomes of decisions taken by participants to a game show, Johnson and Gleason (2009:247) argue that the literature indicates higher risk aversion exhibited by women should also manifest in higher susceptibility to the certainty effect bias. However, Johnson and Gleason (2009:247-258) found no conclusive evidence of the presence of the certainty effect in their sample in either gender. The authors argue that their study was subject to a number of limitations that could be the cause of the lack of evidence regarding the certainty effect, including significant self-selection bias, which characterised game show participation in general (Johnson & Gleason, 2009:258-259). Nonetheless, based on the arguments by Johnson and Gleason (2009:247), women may be more prone to certainty effect bias. Based on the close relationship between the certainty effect and the pseudo-certainty effect, women may therefore also be more prone to the pseudo-certainty effect. The following hypotheses (numbered with reference to the main hypotheses in Chapter 1) are presented with reference to the discussion of the preceding literature:

Hypotheses – *Gender* and susceptibility to frame dependence-based biases:

Women respondents in this study's sample are more susceptible to the biasing effects of the following frame dependence-based biases than the men that responded:

- *Loss aversion –* **Hypothesis 3.1**
- *Concurrent decisions framing –* **Hypothesis 4.1**
- *Certainty effect –* **Hypothesis 5.1**
- *Pseudo-certainty effect –* **Hypothesis 6.1**
- *Mental accounting –* **Hypothesis 7.1**
- *Endowment effect–* **Hypothesis 8.1**

Differences in *age* may also indicate possible differences in the level of influence that behavioural aspects may have on the decision-making of individuals. Shefrin (2008:187) states that risk aversion increases with age until about 70 years of age (u-shaped with the lowest tolerance between 50 and 70 years of age). In accordance with the earlier discussion of the possible linkages between risk aversion and loss aversion, it may be possible that the proneness to be influenced by the effects of framing may increase with age. This suggestion is corroborated by a study by Mather, Mazar, Gorlick, Lighthall, Burgeno, Schoeke and Ariely (2012:810), who investigated the difference in loss aversion between younger and older adults. Mather *et al.* (2012:814) found that older adults exhibited a higher weighting for certainty than younger adults, which the authors argue indicated that older adults were more prone to certainty effect bias than younger adults.

Hypotheses – *Age* and susceptibility to frame dependence-based biases:

Older respondents in this study's sample are more susceptible to the biasing effects of the following biases emanating from frame dependence than younger respondents:

- *Loss aversion –* **Hypothesis 3.2**
- *Concurrent decisions framing –* **Hypothesis 4.2**
- *Certainty effect –* **Hypothesis 5.2**
- *Pseudo-certainty effect –* **Hypothesis 6.2**
- *Mental accounting–* **Hypothesis 7.2**
- *Endowment effect –* **Hypothesis 8.2**

Barberis (2012:8) states that the dominant view in the literature indicates that a higher level of *experience* does not significantly lower susceptibility to the effects of frame dependence bias. A regularly cited exception is the study by List (2011:316) (also see the earlier studies by List), which argues that susceptibility to framing-based biases is significantly reduced in the behaviour of experienced market investors when compared with their novice counterparts. In a recent study of inventory holding decisions, Tokar *et al.* (2016:306) confirm that framing-related loss aversion is not influenced by experience. However, with specific reference to mental accounting, Sebora and Cornwall (1995:56) argue that their findings indicate that experience may mitigate the preference reversal influence of mental accounting-based bias. Nevertheless, the dominant view in the literature currently remains that experience does not mitigate framing-based bias susceptibility (Barberis, 2012:8; Tokar *et al.*, 2016:306).

Hypotheses – *Experience* and susceptibility to frame dependence-based biases:

There is no difference in susceptibility to the biasing effects of frame dependence between less and more experienced respondents in this study's sample for the following biases:

- *Loss aversion –* **Hypothesis 3.3**
- *Concurrent decisions framing –* **Hypothesis 4.3**
- *Certainty effect –* **Hypothesis 5.3**
- *Pseudo-certainty effect –* **Hypothesis 6.3**
- *Mental accounting –* **Hypothesis 7.3**
- *Endowment effect –* **Hypothesis 8.3**

The level of preference a decision-maker exhibits for supporting information may be influenced to some extent by risk aversion. An individual's level of risk aversion is reported to be related to the individual's level of loss aversion (Schmidt & Traub, 2002:246). A preference for evidence-based rather than intuition-based decision-making can logically be expected to result in a relatively higher level of anxiety in making intuition-based decisions. According to Rzeszutek (2015:77), this anxiety may indicate a higher level of susceptibility to behavioural bias.

Hypotheses – Level of *preference for* basing decisions on ample *supporting information* as opposed to basing decision on intuition, and susceptibility to frame dependence-based biases:

Respondents who indicate a higher level of preference for supporting information are more susceptible to the biasing effects of the following frame dependence biases than respondents who indicated a preference for making intuition-based decisions:

- *Loss aversion –* **Hypothesis 3.4**
- *Concurrent decisions framing –* **Hypothesis 4.4**
- *Certainty effect –* **Hypothesis 5.4**
- *Pseudo-certainty effect –* **Hypothesis 6.4**
- *Mental accounting –* **Hypothesis 7.4**
- *Endowment effect –* **Hypothesis 8.4**

The personality traits of individuals who select management accounting as a career generally exhibit a preference for making decisions based on extensive supporting information (Harris, 1994:14; Pierce & O'Dea, 2003:276). The findings by Adams and Funk (2012:220) suggest that the position for which an individual apply, and indeed may be selected for, is influenced by the individual's personality traits. Pierce and O'Dea (2003:282-283) indicate that general business management decisions, which may be related to the non-traditional positions occupied by the management accounting professional, regularly require the use of judgement.

Hypotheses – *Position* employed in and susceptibility to frame dependence-based biases:

Respondents in traditional management accounting positions in this study's sample are more susceptible to the biasing effects of frame dependence than respondents in general managerial positions:

- *Loss aversion –* **Hypothesis 3.5**
- *Concurrent decisions framing –* **Hypothesis 4.5**
- *Certainty effect –* **Hypothesis 5.5**
- *Pseudo-certainty effect –* **Hypothesis 6.5**
- *Mental accounting –* **Hypothesis 7.5**
- *Endowment effect –* **Hypothesis 8.5**

Classification of *country cultures* according to the Hofstede model (Hofstede, 1980:42; 2011:3) is a further possible demographic variable that could influence the susceptibility of an individual to the influence of behavioural aspects (Hens & Wang, 2007:11). However, Ladbury and Hinsz (2009:187) found that the relationship between uncertainty avoidance and treatment of financial risk decisions was very complex. Uncertainty avoidance was found to have some predictive power with reference to risky decisions which entailed possible gains, but no significant findings were evident from decisions related to possible losses. To statistically investigate culture as a demographic variable in bias susceptibility, a sample with adequate representation from a number of countries with different uncertainty avoidance scores is required. Additionally, the literature indicates a complex relationship between culture and behavioural aspects (Ladbury & Hinsz, 2009:187). Due to extensive sample size requirements and the complex nature of the relationship between culture and susceptibility to behavioural biases, no hypotheses regarding the possible influence of the culture of respondents on their susceptibility to frame dependence-based bias were generated for investigation. This relationship remains an avenue for future research.

Another interesting avenue for future research is the possible bias-reducing effect of considering financial decision problems in a language other than an individual's first language. Keysar, Hayakawa and An (2012) found from a series of experiments that the use of a *foreign language*, i.e. not the decision-maker's first language, eliminates loss aversion bias. This finding is supported by Costa, Foucart, Arnon, Aparici and Apesteguia (2014:251) (also see Costa, Foucart, Arnon, Aparici & Apesteguia, 2015:363), who found evidence to support the view that thinking in a foreign language reduces behavioural bias and results in a higher level of logical consistency, especially in decisions influenced by emotional connotations.

The following section further discusses behavioural influences on financial decision-making by human decision-makers through a review of research into the heuristics employed by human decision-makers in financial decision-making.

4.4 HEURISTICS AND BIASES IN FINANCIAL DECISION-MAKING

An introduction to heuristics and biases in human decision-making was provided in Section 3.5. Research on the influences of these heuristics on financial decision-making and the possible biases that result is presented and reviewed in this section. The discussion in this section forms part of the focus of Research Question 3 of the study.

Much research on the influence of heuristics focuses on investors and share traders. However, Chugh (2004:217) argues that managers of businesses need to make high volumes of ambiguous decisions while under time constraints. According to Chugh (2004:217), this makes managers susceptible to the influence of bias in their decision-making. When the rapid pace at which managers need to make cognitively challenging decisions is examined in the light of the research by Stanovich and West (2000:658), it becomes clear that managers regularly need to rely on System 1 thinking, which is more susceptible to bias, according to Milkman *et al.* (2009:380).

Busenitz (1999:336) found application of the **representativeness** heuristic in a business setting when the author investigated whether differences existed in the use of heuristics by entrepreneurs in comparison with business managers. Busenitz (1999:332) provided both entrepreneurs and business managers with two strategic investment decisions, and required participants to explain the reasons for their respective decisions. Coding analysis revealed that both groups relied on the representativeness heuristic in decision-making. However, entrepreneurs were found to make significantly more use of this heuristic. In the coding analysis, Busenitz (1999:332) interpreted the reasoning of participants in identifying whether statistical reasoning or rules of thumb, related to representativeness, was used. Accordingly, Busenitz (1999:335) only identified the use of the representativeness heuristic and did not attempt to test for the presence of a particular bias emanating from the use of this heuristic.

The possible influence of the *insensitivity to base rates* bias on share prices in share markets was investigated by Ganguly, Kagel and Moser (1994:675). The authors provided graduate and senior undergraduate business students with a scenario containing base rate information regarding the success of a company which was dependent on project

investment, supplemented with information regarding predictions by a notional analyst. The probability of success in the project which should then result in company success formed the base rate. Information on the ability of the analyst to predict correct outcomes in the past, and the prediction of the analyst for the companies presented in the scenario, served to induce insensitivity to the base rate of project success. The scenario produced significant bias and Ganguly *et al.* (1994:693-694) found that the market price of the shares in their experiment was influenced by the insensitivity to base rate bias.

Clark, Caerlewy-Smith and Marshall (2006:96) compared the susceptibility of undergraduate students to the insensitivity to base rate bias with the susceptibility of pension fund trustees to this bias. Clark *et al.* (2006:104) found that pension fund trustees were more susceptible to the insensitivity to base rate bias than undergraduate students. Although the bias elicitation scenarios used were not financial decisions, the findings of Clark *et al.* (2006:104) complemented the findings of Ganguly *et al.* (1994:693-694) in that they indicated that experienced investors were even more prone to the insensitivity to base rate bias than students.

Joyce and Biddle (1981b:339) investigated whether auditor judgement was subject to the insensitivity to base rate bias through a series of experiments. One of the experimental scenarios was a relevant financial decision scenario, namely judgement on the recoverability of an outstanding credit balance for a particular customer, and the related decision on the level of provision for bad debt. Joyce and Biddle (1981b:341) found that auditors were susceptible to the insensitivity to base rate bias in this scenario.

Simon, Houghton and Aquino (2000:113) investigated the possible reasons why such a large number of individuals started businesses, despite the significant risk of failure. Simon *et al.* (2000:114) argue that because past research indicates that entrepreneurs do not have a higher risk propensity than other individuals, entrepreneurs may not correctly assess the level of risk involved in starting a new business. Simon *et al.* (2000:125-126) found that entrepreneurs did not correctly assess the risks involved, due to behavioural biases, including the *insensitivity to sample size bias.* The authors argue that entrepreneurs are likely to rely on smaller samples for feedback on their business idea to judge the possible

success thereof, without recognising the possibility that the smaller sample may not be representative of the population at large.

With reference to the *misconceptions of chance bias*, Huber, Kirchler and Stöckl (2010:447) identified the presence of the gambler's fallacy in investor decisions by performing an experiment in which investors invested in the outcomes of the coin flip. Huber *et al.* (2010:457) found that after a sequence of either heads or tails outcomes from coin tosses, the belief among investors that another similar outcome would occur decreased significantly.

Tversky and Kahneman (1974:1126) provide a financial decision example in their discussion of the *insensitivity to predictability bias*. The authors state that human decision-makers may judge the probability that a company would make a profit, based on a description of the company which contains no information that is valid for profit prediction purposes. Tversky and Kahneman (1974:1126) contend that a higher probability of profit would be assigned by human decision-makers when confronted with a favourable company description than would be assigned when confronted with a mediocre description, irrespective of the reliability of the description or its validity for profit prediction purposes. However, no study which investigated the response by human decision-makers to such a scenario could be found.

Shanmugam and Bourke (1992:12) argue that the insensitivity to predictability bias could be present in creditworthiness assessments. The authors provide the example of a creditworthiness assessment of a company that was very successful ten years ago, but has subsequently been sold. According to Shanmugam and Bourke (1992:12), the success in the distant past may influence the creditworthiness decision, despite it now having limited value for estimation of current creditworthiness. However, this example was not empirically tested.

The *confirmation bias* is related to the illusion of validity bias by Einhorn and Hogarth (1978:395). In an earlier series of studies (Wason, 1960; 1969), Wason (1960:139) indicates that human decision-makers tend to look for information to confirm a statement and neglect to search for information that disconfirms a statement. Subsequently, Einhorn and Hogarth (1978:399-400) tested for the presence of confirmation bias in decision-making by

statisticians. The authors provided the statisticians with a scenario involving a claim by a share market consultant that when the particular consultant predicted a rise in the market, the outcome was consistently correct. The statisticians had to select the evidence required to confirm this statement from four options. The statisticians could choose one or a combination of the options. The results indicated that even statisticians were influenced by the confirmation bias, albeit to a lesser extent than the students in the experiment by Wason (1969:475). Solt and Statman (1988:53) argue that the confirmation bias may be the reason that professional investors continue to consider the sentiment index (bullish or bearish) as an indicator of imminent market changes, despite empirical evidence that the index does not correlate for forthcoming market changes (Solt & Statman, 1988:47). Menkhoff and Nikiforow (2009:322) confirm the presence of confirmation bias in the decision-making behaviour of fund managers in Germany. Fund managers who endorsed the theories of behavioural finance regarding investors' decision-making behaviour, as well as fund managers that did not acknowledge the relevance of the field of behavioural finance, indicated that they noted a tendency by other fund managers to particularly search for information confirming their investment decisions (Menkhoff & Nikiforow, 2009:322).

De Bondt and Thaler (1985:804) studied representativeness in the setting of the New York Stock Exchange and found that share portfolios that were labelled as 'losers' by the market due to recent poor past performance outperformed share portfolios that were labelled as 'winners' due to recent past performance, in the years following the time the portfolios were given their respective labels. In a follow-up study, De Bondt and Thaler (1987:597) account for various suggestions proposed in research as alternative explanations for the phenomenon of incorrect labelling of share portfolios by the market, and confirm that the representativeness heuristic is partially responsible for the phenomenon. Share portfolios labelled as 'past losers' and share portfolios labelled as 'past winners' tend to regress back to the mean. Accordingly, if investors rely on past performance as an indicator of similar future performance, they will commit the *misconceptions of regression to the mean bias*. This bias was found by Lowies (2012:124) to also influence the decisions of property fund managers, because a survey indicated that the property investment decisions of these fund managers tended to be based on recent past performance of the properties.

Bazerman and Moore (2012:35) report the experience that an MBA student shared in relation to a decision error that the student made, due to reliance on the **availability heuristic**. The student explained that when he was employed as a purchasing agent, he had to choose a supplier for a specific purchase. The student selected the supplier whose name sounded most familiar to him and later discovered that the name of the specific supplier sounded familiar due to recent adverse publicity that cited the supplier for extorting funds from its customer companies. The MBA student committed the *ease of recall bias* emanating from the use of the availability heuristic. A study of perceived product failure estimates by Folkes (1988:13) echoes the error committed by the MBA student. Folkes (1988:14) provided participants with failure rates for different hypothetical product brands. Some brands had typical brand names, while others had atypical brand names. The ratio of failure rates reported was manipulated for the typical, as well as for the atypical brands. Folkes (1988:14-15) found that participants made higher estimates than warranted when the failing product brands had atypical brand names than when the failing products had typical brand names. The author ascribes the higher estimates for the atypical brand names to the ease with which atypical brand names can be recalled in relation to typical brand names.

Barber and Odean (2008:785) conducted a study to investigate whether the behaviour of individual share investors was influenced by the ease of recall bias. Their study focused on abnormal trading volumes of shares to identify a possible link to news reports of those specific shares on the day of the abnormal trading volumes. Barber and Odean (2008:813) state that individual investors are net buyers of shares on the days that the specific company's shares are mentioned in the news, irrespective of whether the news is favourable or adverse. Institutional investors are found to be net sellers of shares on these days because they consider more factors in their investment decisions and are accordingly less affected by the salience of reports on a company (Barber & Odean, 2008:813). The ease of recall bias was also investigated by Kliger and Kudryavtsev (2010:51) by comparing market reactions to analyst upgrade or downgrade recommendations on specific companies during periods of good general market performance, to market reactions during periods of poor general market performance. The authors controlled for the possible influences of various variables and found that, consistent with the findings of Barber and Odean (2008:813), the

ease with which good or poor general performance (being the general market performance) can be recalled influenced market reactions to analyst recommendations.

The influence of the *illusionary correlations* bias that originates from the availability heuristic increases in situations where the decision-maker has less control (Whitson & Galinsky, 2008:117). Accordingly, Whitson and Galinsky (2008:116) state that when investors perceive the share market to be volatile, they will be more susceptible to identifying illusionary patterns. Participants to the study were presented with information on two companies. The ratio of positive *versus* negative reports for both companies was 2:1. However, the number of reports for one of the companies was double that for the other company. Participants who were influenced to perceive the share market to be volatile overestimated the number of negative reports (the lower reported class than the positive reported class) for the company with a lower number of reports. Whitson and Galinsky (2008:116) ascribe this to participants forming an illusionary correlation between the infrequently reported class (negative reports) for the infrequently reported class (the company with fewer reports).

The **anchoring and adjustment** heuristic was investigated by Whyte and Sebenius (1997:82) in a scenario where firms needed to negotiate a price for an unexpected order for parts in the motor vehicle industry. Initial prices were introduced as anchors and in one instance it was made clear that the specific anchor was from an unreliable source. The participants to the study were MBA students in one group and experienced managers in the other. Significant anchoring was found for both groups of participants, which did not significantly decline for the instance where the unreliable anchor was explicitly highlighted to participants.

The influence of a possible anchor is not always acknowledged by the decision-maker. Northcraft and Neale (1987:84) conducted a study in which both undergraduate business school students and experienced real estate agents were required to estimate a suitable selling price for an actual property, based on extensive information provided to the participants. However, the different experimental groups received a different listing price for the property. Northcraft and Neale (1987:94) found that the listing price provided significantly

influenced the price estimates of both the inexperienced students and the experienced real estate agents. The inexperienced students acknowledged that they were influenced by the listing price as initial anchor for their estimates, while the experienced agents vehemently denied that they were influenced by the listing price (Northcraft & Neale, 1987:95).

The *conservatism bias* was investigated by Kudryavtsev and Cohen (2010:172), who studied anchoring behaviour by MBA students when having to recall actual economic and financial indicators. They state that the influence of the initial anchor increases in line with an increase in difficulty of the decision problem. Accordingly, human decision-makers make more conservative adjustments to the initial anchor as their knowledge about a specific subject decreases. The increased effect of the conservatism bias is also supported by the findings of the study by Cen, Hilary and Wei (2013:47). Cen *et al.* (2013:73) state that share market analysts anchor their forecasts for earnings of companies on the industry mean. Accordingly, the analysts underestimate earnings forecasts for companies with high earnings relative to the industry mean, and overestimate earnings forecasts for companies with earnings below the industry mean. Consequently, Cen *et al.* (2013:73) found greater earnings surprises for companies with earnings forecasts that were relatively higher than the industry mean than for companies with earnings forecasts that were relatively low. The effect of the anchoring on the industry mean and the resultant conservative adjustment were also more pronounced when 'market participants are less sophisticated' (Cen *et al.*, 2013:73). Lowies, Hall and Cloete (2016:59) presented property fund managers with a pair of questions which the authors developed, based on the previous work of Edwards (1982:361) and Shefrin (2002:20). The pair of questions were based on a hypothetical property investment decision and designed to identify whether property fund managers were influenced by anchors, as well as by the conservatism bias. In accordance with the other studies mentioned above, Lowies *et al.* (2016:60) found that property fund managers behaved conservatively when new information was introduced to the scenario, and did not change from their initial anchored decision.

Joyce and Biddle (1981a:133) presented experienced auditors with a product development scenario to ascertain whether the *conjunctive and disjunctive events bias* influenced the estimations by these auditors of the probability of successful product development. Although

Joyce and Biddle (1981a:125) found that auditors were affected by an anchoring bias in another experiment, and also found that auditors judged the probability of the conjunctive event to be higher than the statistical probability, they expressed concern over the level of independence of the underlying events in their conjunctive scenario and were reluctant to indicate that the findings supported insufficient adjustment by the auditors (Joyce & Biddle, 1981a:138).

Overconfidence bias has been shown to have negative consequences in economic terms. Szyszka (2010) investigated the influence of behavioural aspects on investor decisions leading up to, and during, the 2008 financial crisis. Szyszka (2010:127) found that a general optimism in financial markets before the financial crisis served as an anchor for investors. New information on risk that started to emerge thereafter was insufficiently adjusted for as a result of overconfidence by investors. In an earlier study, Odean (1998b:1916) states that overconfident share traders trade too regularly as they are overconfident in their ability to interpret new information. However, Odean (1998b:1916) demonstrates that the regular trading behaviour of overconfident share traders are at the expense of their expected utility from these trades and actually reduces market efficiency in general. In a survey of professional fund managers in Germany, Menkhoff and Nikiforow (2009:325) found clear evidence that fund managers valued their investment decision-making performance as superior to that of other fund managers. However, Fuertes, Muradoglu and Ozturkkal (2012:519) state that the level of overconfidence bias of investors differ, based on certain traits of investors. Most notably, investors that are experienced in providing investment advice, or that also trade professionally, are more overconfident than other financially educated or older investors. The possible negative economic effects of overconfidence may also extend to firm performance. In their investigation into the manner in which the effects of overconfidence and other heuristics differ between entrepreneurs and managers, Arend, Cao, Grego-Nagel, Im, Yang and Canavati (2016:15) found that overconfidence was correlated with poorer firm performance in general. However, Arend *et al.* (2016:18) found that the effect of overconfidence on firm performance could also be positive in more dynamic less stable business environments where entrepreneurs operated and risk-taking was regularly warranted.

The presence of overconfidence in decision-making on the part of chief financial officers was investigated by Ben-David, Graham and Harvey (2007:1; 2013:1547). The authors found overconfidence to be prevalent in general market predictions by these managers (Ben-David *et al.*, 2013:1559), and also with reference to the prediction of the financial prospects of the specific firm at which each chief financial officer was employed (Ben-David *et al.*, 2013:1572). Ben-David *et al.* (2007:29; 2013:1577) state that overconfidence influences a wide range of policy decisions by top executives leading them to use a lower discount rate in cash flow evaluations, use more debt and make more acquisitions, among others things. Alarmingly, Meikle, Tenney and Moore (2016:129) argue that overconfidence in accounting-related earnings forecasts places executives under pressure in subsequent reporting years, resulting in fraudulent misrepresentation of organisational performance. Meikle *et al.* (2016:129) further point out that literature indicates that higher overconfidence in executives could be linked to a higher propensity for accounting misstatement in general.

The last heuristic that the proposed study aims to investigate is **affect**, also referred to as **emotion**. In their investigation into the influences of emotion on capital budgeting decision, Kida, Moreno and Smith (2001:480) define affect as states of emotion or mood, which include affective reactions such as joy, frustration, regret and anger. They found a tendency among managers to reject decision alternatives that evoked negative emotional responses in them, even if such alternatives exhibited higher expected financial values.

MacGregor, Slovic, Dreman and Berry (2000:110) state that when investors have limited information related to a particular company, they may base investment decisions on their affective reactions to the image of the industry to which the company belongs. In another study, Hirshleifer and Shumway (2003:1028) observe that stock returns per day are highly correlated to sunshine days. The authors argue that the weather, especially sunshine, affects the moods of investors, resulting in increased trading and thus increased returns on sunshine days.

With reference to auditor judgement, Chung, Cohen and Monroe (2008:154) also state that an auditor's mood influences the particular auditor's inventory evaluation decision. Particularly, when in a positive mood, auditors tend to make less conservative and wider-

ranging inventory valuations, as compared with when they are in a negative mood. Therefore, affect or emotion, both as emotional associations and state of mood, has an influence on the judgement of decision-makers when having to make financial decisions.

Peters (1993:387) argues that multiple heuristics may indeed influence decision-making behaviour on any particular decision. In support of this argument, Peters (1993:388) discusses the example of a decision regarding the prediction of the potential for bankruptcy of a particular firm. The decision is based on accounting and other data. In identifying the relevant information for this decision, Peters (1993:388) argues that the availability heuristic may influence the decision by considering the likelihood of failure of similar firms. The anchoring and adjustment heuristic could sway the decision by considering the base rate of failure of similar firms, and then adjusting this decision when considering the specific factors relevant to the specific organisation. The representativeness heuristic may also be present if the decision-maker considers the key attributes of the firm to be associated with failure. Subsequently, the importance of identifying which heuristics are present in a particular population of decision-makers should assist in understanding how these decision-makers may behave when confronted with more complex scenarios such as the example provided by Peters (1993:388).

The decision heuristics and associated biases discussed above do not form an exhaustive list of behavioural decision heuristics and biases. However, these heuristics represent heuristics that are most prevalent in the research literature, and most appropriate to research on management accounting professionals. Some studies investigated whether relationships exist between some demographic variables and higher susceptibility to biases resulting from the use of decision heuristics. This literature is reviewed in the next section.

4.4.1 Possible indicators of higher susceptibility to heuristic-based bias

Bazerman and Moore (2012:15) suggest that overconfidence bias facilitates many of the other heuristic-based biases, as discussed in Section 3.5. The literature seems to indicate that this is not necessarily true for influences of the anchoring and adjustment heuristic, and the affect heuristic. Malhotra, Morgan and Zhu (2016:9) argue that higher levels of

overconfidence, which result in more trust in one's own estimations, should result in a lower tendency to rely heavily on anchors. Therefore, possible indicators of susceptibility to heuristic-related biases are complex and may differ between the various biases. Literature indicating possible relationships between demographic variables and higher susceptibility to heuristic-based biases is reviewed in greater detail in the following paragraphs.

With reference to *gender*, Pompian and Longo (2004:12), as well as Barber and Odean (2001:289), found that men were significantly more overconfident than women. Correspondingly, in a study involving auditing students, Chung and Monroe (1998:275) found that the men in their sample were significantly affected by the confirmation bias while the women in the sample sought disconfirming evidence and were therefore not affected by this bias. Based on a review of literature, Croson and Gneezy (2009:21) argue that women are expected to be more affected by emotions-based affective reactions in decision-making than men, because psychological literature indicates that women experience emotions more acutely than men. However, Kudryavtsev and Cohen (2010:169) report that the influence of the anchoring heuristic is stronger in women than in men. This finding supports the argument by Malhotra *et al.* (2016) regarding the inverse relationship between overconfidence and anchoring. Accordingly, the following hypotheses (numbered with reference to the main hypotheses in Chapter 1) are generated from the previous discussions regarding the relationship between gender and susceptibility to heuristic-based biases:

Hypotheses – *Gender* and susceptibility to heuristic-based biases:
The men who responded to this study's questionnaire are more susceptible to the biasing effects of the following heuristic biases than the women who responded:
- *Representativeness-related biases* – **Hypothesis 9.1.1 to 9.3.1**
- *Overconfidence* – **Hypothesis 10.1**

The women respondents in this study's sample are more susceptible to the biasing effects of the anchoring and affect heuristics than the men who responded:
- *Anchoring and conservative adjustment* – **Hypothesis 11.1**
- *Affect* – **Hypothesis 12.1**

In terms of *age*, Kovalchik, Camerer, Grether, Plott and Allman (2005:82) as well as Arend *et al.* (2016:15) state that younger individuals are more overconfident than older individuals. Peters, Finucane, MacGregor and Slovic (2000:149) argue that older adults will more probably use the representativeness heuristic extensively, and are also more susceptible to its biases, due to a higher tendency to rely on schematic knowledge than younger adults. Additionally, Peters *et al.* (2000:153) suggest that older adults value the affective influence of emotions more highly than younger adults. However, Peters *et al.* (2000:153) acknowledge that direct evidence to support their suggestion regarding affect is still lacking. Findings by Kudryavtsev and Cohen (2010:170) indicate that older individuals are also more prone to relying on anchors.

Hypotheses – *Age* and susceptibility to heuristic-based biases:
Younger respondents to this study's questionnaire are more susceptible to the following bias than the older respondents:

- *Overconfidence –* **Hypothesis 10.2**

Older respondents to this study's questionnaire are more susceptible to the following biases related to the use of heuristics than the younger respondents:

- *Representativeness-related biases –* **Hypothesis 9.1.2 to 9.3.2**
- *Anchoring and conservative adjustment –* **Hypothesis 11.2**
- *Affect –* **Hypothesis 12.2**

Tversky and Kahneman (1986:274) initiated discussions of the possible decreasing effects that learning through *experience* may have on the level of susceptibility of a decision-maker to behavioural decision bias. The authors suggest that learning from experience should decrease bias levels, but that this should only be the case where feedback is accurate and immediate. Tversky and Kahneman (1986:274) rightly indicate that such feedback is rare in the business environment. Meyvis, Ratner and Levav (2010:587) confirm that decision-makers tend to misremember their original forecasts at the time that the actual outcome is known, significantly reducing the possible debiasing effects of learning from experience. Bazerman and Moore (2012:214-215) argue that various decision biases remain pervasive despite opportunities to learn from immediate feedback, citing findings by Ball, Bazerman

and Carroll (1991) and Bereby-Meyer and Grosskopf (2008), which investigated a specific bias, namely winner's curse (a bias not covered in the current study). Importantly, Bazerman and Moore (2012:76) indicate that experienced managers exhibit similar levels of bias to those of less experienced decision-makers. Arnold *et al.* (2000:129) found a similar lack of decrease in recency bias, stemming from the availability heuristic, in relation to increased experience of professional decision-makers in the accounting field. Indeed, the findings by Clark *et al.* (2006:104) and Ganguly *et al.* (1994:693-694) indicate that experienced investors may be more prone to the insensitivity to base rates bias related to the representativeness heuristic than more inexperienced investors. The notion that experienced decision-makers remain prone to biasing influences related to the use of the representativeness heuristic is reinforced by the various studies in the literature that indicate that experienced decision-makers are also prone to the confirmation bias (see Section 4.4). With reference to the anchoring and adjustment heuristic, Whyte and Sebenius (1997:82) found significant anchoring effects for both MBA students and experienced managers. Similarly, Northcraft and Neale (1987:94) found significant anchoring for both inexperienced students and experienced real estate agents in terms of property valuations.

Contrary to the above, some studies indicate that more experienced decision-makers may be less biased. In a study into heuristic biases and the effects of learning and experience on the decision-making behaviour of wealthy individuals who invested their skills and money in private companies, Harrison, Mason and Smith (2015:19) found preliminary indications that more experienced individuals were less susceptible to the biasing effects of the representativeness, and anchoring and adjustment heuristics. Mota, Moreira and Cossa (2015:21) also found lower anchoring and adjustment bias, as well as lower levels of loss aversion, by more experienced and educated young Mozambicans in comparison with their less experienced and less educated counterparts. Harrison *et al.* (2015:19) correctly suggest that the possible lower susceptibility of experienced decision-makers to biasing effects of the representativeness and the anchoring and adjustment heuristic requires further research. With reference to affective (emotional) reactions in judgements by auditors, Bhattacharjee and Moreno (2002:371) found that less experienced auditors were significantly influenced by irrelevant information that resulted in affective reactions, while the possible influence of such information was not significant with reference to experienced

auditors. Despite some studies indicating a difference in susceptibility to biases from the representativeness heuristic, and the anchoring and adjustment heuristic, based on experience, the main view in the bulk of the literature is that experience does not result in lower susceptibility to the biases of these heuristics. However, with reference to affect, the research indicates that less experience seems to be correlated with higher susceptibility to the bias (see Bhattacharjee & Moreno, 2002:371 as an example).

Hypotheses – *Experience* **and susceptibility to heuristic-based biases:**
There is no difference in susceptibility to the heuristic-related biases listed below between less experienced and more experienced respondents in the sample:

- *Representativeness-based biases –* **Hypothesis 9.1.3 to 9.3.3**
- *Overconfidence –* **Hypothesis 10.3**
- *Anchoring and adjustment –* **Hypothesis 11.3**

Less experienced respondents to this study's questionnaire are more susceptible than more experienced respondents to the biasing effects of the heuristic listed below:

- *Affect –* **Hypothesis 12.3**

With reference to an individual's position in an organisation's management hierarchy, Meikle *et al.* (2016:127) argue that promotion practices result in *higher-level managers* exhibiting higher overconfidence than persons in lower-level positions. According to Meikle *et al.* (2016:127), individuals who have achieved success from risky and overconfident behaviour are regularly promoted to higher-level managerial positions. This situation is exacerbated by promotion committees looking for confident individuals to act as leaders in the organisation, even though confidence may not always be an indication of ability (Meikle *et al.*, 2016:127). In accordance with the discussion in Section 4.3.1 on the possible influence of personality traits on the appointment of management accounting professionals to the various positions listed (Adams & Funk, 2012:220; Pierce & O'Dea, 2003:276), management accounting professionals in traditional management accounting positions may be more susceptible to heuristic-based biases in general (Rzeszutek, 2015:77) than management accounting professionals in other managerial positions.

Hypotheses – *Position* and susceptibility to heuristic-based biases:

Respondents in managerial positions are more susceptible to the following bias than respondents in the traditional management accounting position:

- *Overconfidence –* **Hypothesis 10.4**

Respondents in traditional management accounting positions in this study's sample are more susceptible to the biasing effects related to the use of the following decision-heuristics than respondents in general managerial positions:

- *Representativeness –* **Hypothesis 9.1.4 to 9.3.4**
- *Anchoring and adjustment –* **Hypothesis 11.4**
- *Affect –* **Hypothesis 12.4**

Respondents who indicated a higher preference for making decisions based on ample supporting information when answering Question 4 in the business decision-making involvement section of the questionnaire were less comfortable with making judgement-based decisions. Accordingly, these respondents may be more susceptible to the biasing effects resulting from the reliance on decision heuristics (Rzeszutek, 2015:77). However, Bazerman and Moore (2012:29) argue that individuals that are more susceptible to overconfidence bias exhibit a higher level of certainty that their opinions are correct, and would be less inclined to confirm their opinions by investigating supporting information (Bazerman & Moore, 2012:15). Even though the finding of Rzeszutek (2015:77) is in contrast with the view of Bazerman and Moore (2012:29), the literature review by Bazerman and Moore (2012:14-30) supports the premise that a high level of trust in one's own intuition is probable to be based on overconfidence bias.

Hypotheses – *Preference for supporting information* and susceptibility to heuristic-based biases:

Respondents who indicated a higher level of preference for supporting information are more susceptible to the biasing effects of the following decision heuristics than respondents who indicated a preference for making intuition-based decisions:

- *Representativeness –* **Hypothesis 9.1.5 to 9.3.5**
- *Anchoring and adjustment –* **Hypothesis 11.5**
- *Affect –* **Hypothesis 12.5**

Respondents who indicated a higher level of preference for making intuition-based decisions are more susceptible to the biasing effects of the following decision heuristic than respondents who indicated a high preference for supporting information when having to make decisions:

- *Overconfidence –* **Hypothesis 10.5**

Hens and Wang (2007:8) state that risk-taking behaviour and overconfidence are influenced to a certain extent by uncertainty avoidance and also by the collectivism *versus* individualism score of the respective countries, based on the Hofstede model of *cultures*. For example, individualist cultures are found to be more susceptible to overconfidence bias but to be better at probability estimates than collectivist cultures. Due to the complex nature of the interactions, Hens and Wang (2007:11) suggest this as an area for future research. Because this would require a separate focused study, the current study notes that culture may also be a possible indicator of heuristic-based bias susceptibility and supports the suggestion that this possible indicator be investigated in a future study.

The discussions above indicate that the possible relationships between demographic variables and susceptibility to biases emanating from the reliance on decision heuristics are complex and not consistent with the relationships between demographic variables and susceptibility to frame dependence-related biases discussed in Section 4.3.1.

4.5 BEHAVIOURAL ASPECTS IN MANAGEMENT ACCOUNTING

The aim in this section is to discuss research on the influence of behavioural aspects on decision-making in the field of management accounting. The discussion that follows demonstrates that research has been conducted on the influence of behavioural aspects on decisions, based on information provided by management accounting systems and techniques. However, no comprehensive study of the influence of behavioural aspects on decision-making by management accounting professionals as a group of decision-makers could be found.

In their review of research on human decision-making in the broad field of accounting, Libby and Lewis (1982:259-263) list the studies of judgement by practitioners in the broad accounting field, many of which focused on decision-making by auditors but none focused specifically on management accounting professionals. A recent review of research on judgement in decision-making in the broad accounting field by Mala and Chand (2015:39) highlights the continued focus of behavioural research on the auditing field and encourages behavioural research in the realm of financial accounting.

Scapens (1994:316) argues that management accounting is primarily based on neoclassical economic theory. According to Scapens (1994:302), management accounting consists of techniques and procedures related to optimal economic decision-making, based on the assumption of economic rationality. Due to a lack of focus in previous research on managerial and organisational behaviour, Scapens (1994:316) encourages research in managerial and organisational behaviour. Although Scapens (1994:316) does not explicitly refer to managerial judgement or behavioural finance, his views indicate that behavioural research in management accounting continues to be limited.

Birnberg, Luft and Shields (2006:113) provide a comprehensive summary of research on psychological theories that has been undertaken in the field of management accounting. The authors divide the research into motivation theories, social psychology theories and cognitive psychology theories. Frame dependence and heuristics resort under cognitive psychology theories (Birnberg *et al.*, 2006:123). According to the authors, most research focuses on the effect of management accounting *practices* on the behaviour of human decision-makers, with little research focusing on the influence of human *decision-making behaviour* on management accounting practices. However, no studies investigating the behavioural aspects present in decision-making behaviour by management accounting professionals are listed in the review by Birnberg *et al.* (2006).

Sutton (2006:4) indicates that research is required on the influence of behavioural aspects on management accounting professionals in using and interpreting the output of enterprise resource planning tools. Gerling (2011:1) also indicates that research on the influence of behavioural aspects on decision-making by management accountants is very limited.

Harris (1994:14) argues that management accounting professionals are reluctant to make intuitive decisions, based on the general personality traits of management accounting professionals favouring supportive evidence for decision-making purposes. Consequently, management accounting professionals as a group of decision-makers may rely heavily on heuristics to support their business decisions when limited supporting evidence is available.

The limited research that was obtained on the influence of behavioural aspects in the management accounting field and/or the influence of these aspects on decision-making by management accounting professionals is discussed in the two following sections.

4.5.1 Frame dependence in management accounting

Harwood *et al.* (1991:168) investigated budgeting decisions by graduate business students to identify whether the frame of the budgeting decision influenced decision-making by the participants, and in addition, to identify whether alternative factors influenced the level of frame dependence. Consistent with the prospect theory, the authors found that negative framing of the budgeting decision encouraged participants to select the risky alternative as opposed to the sure alternative. However, in contrast with the prospect theory, the authors found that positive framing of the decision resulted in almost equal selection of the risky alternative and the sure alternative. Another relevant finding by the authors was that the level of accounting and statistics training of respondents did not influence their level of frame dependence.

With reference to standard costing, the influence of the frame of the outcome of variance investigation decisions on the subsequent performance evaluation of the decision-maker who investigated the variances was studied by Lipe (1993:753). The author found that when the outcome of the variance investigation decision indicated that the process was out of control, it showed that the business gained from the variance investigation, resulting in the expenditure to investigate the variance being positively framed as a reduction of the gain from the investigation. Viewing the variance investigation expenditure as a reduction of a gain resulted in a more favourable performance evaluation of the performance of the

decision-maker who made the decision to investigate the variance. On the other hand, if the outcome of the variance investigation decision found the process to have been in control, the expenditure to investigate the variance was viewed as a loss, resulting in a less favourable performance evaluation of the decision-maker who decided to investigate the variance.

In an accounting context, Moreno, Kida and Smith (2002:1331) investigated capital budgeting decisions by managers to identify the influence of behavioural aspects. The findings of the study were in accordance with the prospect theory, namely that participants displayed risk avoidance for gains and risk acceptance for losses.

In a recent study, Alewine *et al.* (2016:28) investigated the influence of positive *versus* negative framing of environmental accounting information on the judgement of business student participants. Value judgements, based on environmental accounting information, differed significantly when based on positively framed information, as opposed to negatively framed information (Alewine *et al.*, 2016:39), with positively framed information resulting in more favourable evaluations. However, Alewine *et al.* (2016:28) also investigated the bias mitigating effect of providing comparative information (*joint evaluation mode*), as opposed to evaluating information on a separate basis (*separate evaluation mode*). It was found that joint evaluation mode had a significant effect on mitigating possible biases. Additionally, it was found that positive framing resulted in more consistent valuations, and accordingly, less bias between evaluation modes (Alewine *et al.*, 2016:39). The authors argue that designers of accounting information systems should take note of the effect that framing has on accounting users' judgement, and should attempt to provide comparative information in situations where comparison with other companies may be difficult due to a lack of standardised reporting guidelines, as is the case with reporting of environmental accounting information.

The choice between a restrictive control system, which ensures honest cash flow reporting, and a permissive control system, which leaves the occasional opportunity to misappropriate cash flow, was investigated by Birnberg and Zhang (2011:170). The permissive system should allow for a higher probability of increased returns, as opposed to the system

restricting the actions of the agent. The focus of the study was on betrayal aversion in different economic conditions. Birnberg and Zhang (2011:185) found that, despite a higher expectation of dishonest behaviour after an economic downturn, participants in their study selected the more permissive control system in such conditions. The authors ascribe the choice of a more permissive system after the occurrence of an economic downturn to loss aversion. Birnberg and Zhang (2011:185) explain that an economic downturn results in greater loss aversion on the side of the manager due to the poorer economic outlooks, which reduces the relative importance of betrayal aversion in the judgement of the manager. Accordingly, the manager selects the more risky permissive control system to attempt to avoid losses by selecting the option with a higher probability of increased returns.

From an investigation into the differences in the influence of the sunk cost effect on groups of individuals, Tan and Yates (1995:313-316) derived three relevant findings: firstly, participants with both accounting and non-accounting backgrounds were affected by sunk cost in a personal decision-making scenario; secondly, that participants with accounting backgrounds were less affected by the sunk cost effect in a business-related decision scenario which contained no explicit information related to future cash-inflows; and thirdly, that if projected future cash inflow information was explicitly presented, neither of the groups of participants were significantly influenced by sunk costs in their business-related decision-making. These findings indicate that the influence of behavioural aspects on decision-makers with accounting backgrounds may differ from the influence of these factors on non-accounting decision-makers in certain scenarios.

4.5.2   Heuristics and biases in management accounting

Issues raised by Peters (1993) remain prevalent in heuristics-related research in the accounting field, as well as in the related management accounting field. Peters (1993:402) argues that research in the accounting field which focuses on specific accounting tasks suffers from a lack of ability to accurately describe the decision-making behaviour of individuals when performing the accounting tasks, due to the difficulty of validating the findings by means of statistical techniques. As mentioned in Section 4.4, Peters (1993:288) cites the possibility that multiple heuristics may influence a specific accounting task as one

of the key issues associated with the difficulties experienced in analysing behaviour when performing accounting tasks. Accordingly, the present study shifts the focus from the task to the decision-maker by the development of a questionnaire from previously validated research studies. The discussion below refers to some of the main studies on heuristic-related decision-making in the management accounting field, all of which focus on specific management accounting tasks.

The presence of the influence of the representativeness heuristic in variance investigation decisions was investigated by Lewis, Shields and Young (1983:280). The authors found that most participants used a strategy that was in line with the representativeness heuristic. The use of a control chart to investigate only the variances that differ from the norm by more than one standard deviation is categorised by the authors as comparable with the representativeness heuristic.

Brown (1981:67) also investigated the variance investigation decision, but from an anchoring and adjustment perspective. The author states that human decision-makers revise their judgement of the probability that a process is in control, based on their previous anchor regarding the process. Additionally, the author maintains that human decision-makers make conservative adjustments in relation to their anchors.

The study by Frederickson, Peffer and Pratt (1999:151) on how previous experience regarding performance evaluation systems influences the subsequent judgement of performance by accountants, does not relate to a specific heuristic. However, Mala and Chand (2015) contend that the findings of Frederickson *et al.* (1999:162), which indicate that prior experience influences the judgement of accountants, are an example of a systematic bias within an accounting context. A bias emanating from past experience of a particular performance evaluation system can be argued to relate to the anchoring and adjustment heuristic, because the evaluation of subsequent performance outcomes is anchored on the system experienced in the past and is insufficiently adjusted for the difference in performance. Performance evaluation systems in the accounting field are particularly relevant to management accounting.

Komakech (2009:281) investigated capital budgeting decisions by managers and management accounting professionals and found that past projects were used as reference points in decision-making. The author refers to using past projects as reference points to indicate the use of the anchoring and adjustment heuristic. Komakech (2009:253) also found evidence that industry rules of thumb were used extensively in capital budgeting-related decision-making. The use of industry rules of thumb can indicate reliance on the representativeness heuristic. The investigation by Komakech (2009) was limited to identifying whether heuristics were used as decision aids, and did not deal with the possible biases that may result from reliance on heuristic-based reasoning.

Emmanuel *et al.* (2008:2) summarised their research on capital budgeting decisions of management accounting professionals, which is related to the earlier phases of the study by Komakech (2009). Emmanuel et al. (2008:2) state that heuristics and framing influence capital budgeting decision-making by management accountants. However, Emmanuel *et al.* (2008) do not clearly distinguish between the various heuristics and framing effects described by Tversky and Kahneman (1974; 1981) and also do not discuss any biases.

In another investigation into capital budgeting decisions, Moreno *et al.* (2002:1344) found that the influence of affective reactions in the capital budgeting decision resulted in managers selecting investments with lower expected values. The authors argue that this phenomenon demonstrates that considering the influence of behavioural aspects on decision-making in accounting contexts is very relevant.

4.6 SUMMARY

Research into the influence of behavioural aspects on financial and business decision-making by human beings was discussed in this chapter. Two research fields, namely behavioural finance and judgement in managerial decision-making, were highlighted. Research from these fields which is relevant to the behavioural aspects being investigated in the present study, was discussed to provide a theory base for the interpretation of the findings of the study. The discussion of research on the influence of behavioural aspects in the management accounting field illustrates that there is a gap in the literature regarding the

influence of behavioural aspects on management accounting professionals as a population of decision-makers. No comprehensive study of the influence of behavioural aspects on financial decision-making by management accounting professionals was identified. The present study aims to contribute to the body of literature on this topic by filling this gap.

CHAPTER 5: RESEARCH DESIGN AND METHODS

5.1   INTRODUCTION

The increased involvement of management accounting professionals in business decision-making due to their changing role was outlined in Chapter 2. Chapter 3 continued by indicating that human judgement in decision-making is influenced by behavioural aspects due to human psychology. Research conducted on the influence of behavioural aspects on financial decision-making was discussed in Chapter 4 to illustrate that a theory base exists to assist in the interpretation and comparison of the findings of this study. Chapter 4 also indicated that research regarding the effect of behavioural influence on decision-making by management accounting professionals as a group of decision-makers was limited.

The research problem that is investigated in the present study revolves around the susceptibility of management accounting professionals, as human decision-makers, to behavioural influences that may lead them to make suboptimal business decisions. The expected increase in the decision-making duties of management accounting professionals in their emerging role as business partners may expose their particular susceptibility to the influence of behavioural aspects in business-related decision-making.

The research questions posed in the present study in the investigation of the abovementioned research problem are as follows:

Research Question 1:   Are management accounting professionals becoming more involved in business-related decision-making?

Research Question 2:   Which behavioural aspects from a list of frame dependence factors identified from the literature are present in the decision-making behaviour of management accounting professionals?

Research Question 3:   Which behavioural aspects from a list of behavioural heuristics identified in the literature are present in the decision-making behaviour of management accounting professionals?

In the current chapter, the research methods used in the study are described. The research philosophy is discussed next, followed by discussion of the research design. The research method section discusses the research instrument and its development, the population and sampling, data collection and data analysis methods. Thereafter ethical considerations are discussed, followed by the limitations resulting from the research methods and finally, a chapter summary is provided.

5.2 RESEARCH PHILOSOPHY

The research into the behavioural aspects of framing (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981) and heuristics (Tversky & Kahneman, 1974) was developed by means of a quantitative research approach. The quantitative research approach continues to proliferate within behavioural finance and judgement in decision-making research (Misra, Sumita & Kumar, 2018:5). The research by the present study into the behaviour of management accounting professionals derives its origin from previous quantitative studies in the behavioural decision-making field, as discussed in the literature review chapters and the rest of the research design and methods chapter (e.g. Section 5.4.2). Consequently, a post-positivist paradigm was employed in the execution of this study. The positivist paradigm and related post-positivist paradigm are rooted in objective enquiry and are regularly applied to quantitative research in the broader field of social sciences (Aliyu, Bello, Kasim & Martin, 2014:82). In agreement with positivism, post-positivism assumes that one true reality exists (Ponterotto & Grieger, 2007:410). However, in contrast with positivism, post-positivism assumes that this reality can only be understood imperfectly. The post-positivist approach is well suited to research into behavioural decision-making, which seeks to better understand, from an objective point of view, the decision-making behaviour of individuals, as opposed to prescriptive decision research, which attempts to suggest how decisions should optimally be made (see Section 3.2 for more information on these two methods of research into decision-making behaviour).

The reasoning approach of the current study is deductive in nature, because the theories and findings of previous research form the starting point from which to develop expectations regarding the decision-making behaviour of management accounting professionals. Observations of their behaviour are then gathered by means of the research instrument to serve as data to be analysed to confirm or refute these expectations. Trochim (2006) explains that deductive reasoning in research begins from theory, which forms the basis of hypothesis generation, which is then confirmed by attaining observations. In contrast, inductive reasoning in research starts with observations, which are analysed to draw tentative hypotheses with the ultimate aim of developing new theories.

5.3   RESEARCH DESIGN

Camerer, Loewenstein and Rabin (2011:9) state that, although the development of behavioural economic research relied to a large extent on experiments, application of other research approaches would add significant value to the field. Where data of past decisions exists, the available archival data is regularly analysed for case studies and correlation-based research (De Bondt & Thaler, 1985:795; Fuertes *et al.*, 2012:502; Hirshleifer & Shumway, 2003:1015). Surveys have been employed as a research tool by Kahneman and Tversky (1979:263), also see Tversky and Kahneman (1981:453), when investigating the influence of behavioural aspects on human decision-making. Surveys have also recently been used as a research approach when investigating the influence of behavioural aspects on financial decision-making (Ahmad, Ibrahim & Tuyon, 2017:5; Komakech, 2009:99; Lowies, 2012:89). Komakech (2009:71) indicates that surveys are used extensively as a research method in the field of management accounting. For the purposes of the present study, a survey research method was selected. The motivation for the selection of a survey-based approach is discussed in detail in the following paragraphs.

Businesses do not publicly disclose the preferences, opinions and contributions of the individual members of management during consideration of actual business decisions. As a result, no information is available regarding past business-related decisions of management accounting professionals in their developing role as business partner. Furthermore, Section 4.5 of this research study indicates that, according to the knowledge of the

researcher, no comprehensive study exists on the influence of behavioural aspects on business decision-making by management accounting professionals. Therefore, primary data had to be collected to study the decision preferences of these professionals.

The population of management accounting professionals from around the world (CIMA members from the UK and other countries with British ties, IMA members from the USA and other countries with American ties, as well as other management accounting professionals worldwide) required an international sample. Due to location and cost considerations, such a large and dispersed sample rendered the investigation of decision-making behaviour by means of an experiment impracticable.

Evans and Mathur (2005:208) and Brandon, Long, Loraas, Mueller-Phillips and Vansant (2013:2) suggest that online surveys are best suited to research, *inter alia*, where possible respondents come from a geographically widely dispersed population. Leedy and Ormrod (2013:195) indicate that surveys are regularly used in research into human activity. Hofstee (2006:122) confirms that surveys are regarded as a valuable means to investigate human preferences and actions. The survey design is therefore considered to be the most applicable and logical approach to study the research problem and to provide insight into answering this study's research questions.

Respondents would only be surveyed once. Accordingly, the present study is cross-sectional in nature (Trochim, 2006). Therefore, the decision-making involvement and decision-making behaviour of management accounting professionals, as measured in this study, were valid at the time of conducting the research, but may change over time.

5.4   RESEARCH METHOD

The details regarding application of the survey design to this particular study are discussed in this section. Development of the research instrument opens the discussion, followed by details regarding the collection of the data, including the population and sample. This is followed by notes on how the data analyses were conducted to assist the reader in better comprehending the results presented in Chapters 6, 7 and 8. The section is concluded by a

discussion of a particular issue identified during the initial preliminary analysis of the data. This discussion includes information on how the particular issue was dealt with.

5.4.1 Research instrument

The data for this survey-based study was collected by means of a questionnaire. According to Lewis, Thornhill and Saunders (2007:244), using questionnaires when conducting descriptive research into human behaviour allows for the identification and description of differences in behaviour. Except where archival decision data exists, questionnaires are regularly used to investigate decision preferences within behavioural finance and judgement in managerial decision-making, both for experimental and survey designs (as examples, see Komakech, 2009:75; Lowies *et al.*, 2016:58; Tversky & Kahneman, 1981:453). Brandon *et al.* (2013:21) suggest researchers in accounting-related behavioural research use online surveys and response generation tools to reach a diverse range of respondents. These authors indicate the efficiency of this approach and the comparatively high level of validity of the results when compared with more traditional data collection approaches. Section 5.3 indicated that no data on past business-related decision preferences of management accounting professionals was available and that the sample size was too large and dispersed to perform a controlled experiment. Therefore, an online questionnaire was selected as an efficient and reliable instrument to use in gathering survey data for the current study.

The questionnaire was developed to gather information in the following four main areas:
- demographical information of each respondent;
- perception of each respondent on his or her involvement in business-related decision-making;
- decision preferences of each respondent based on questions developed with the purpose of identifying the presence, or absence, of framing-related influences on the decisions of respondent; and
- decision preferences of each respondent based on questions developed with the purpose of identifying the presence, or absence, of heuristic-based decision biases.

The ability of the research instrument to measure the theoretical construct that it is intended to measure (validity), and whether it continues to measure the correct construct during different sampling and data collection processes (reliability), are important considerations in any research project (Hofstee, 2006:116). The questionnaire was designed with care to ensure that it provided reliable and valid data for the analysis purposes of the study. Methods to ensure that a questionnaire measures the required issues validly include ensuring that questions are carefully written to effectively elicit the required response, pilot testing the questionnaire to discover and correct possible issues in obtaining the correct data, or using existing questions which have already been validated (Reyers, 2014:79). The main approach of the current study to ensure the validity of the questionnaire was to use existing questions from previous research studies. However, some of the questions had to be amended for the current questionnaire to make it applicable to the context of business decisions. However, other methods, which included obtaining the insights of an expert in the behavioural field and pilot testing the questionnaire, were also employed. The selection of the questions for the questionnaire, possible amendments to questions, as well as the positioning of questions in the questionnaire, are discussed in Section 5.4.2.

An international expert in the field of judgement in managerial decision-making was approached to evaluate the initial questionnaire. Adjustments were made to some of the questions based on the valuable comments made by the expert. The developed questionnaire was then tested by means of a pilot study to ensure that it was clear, understandable, and that it did elicit the required data reliably. Academic staff members of the Department of Financial Management at the University of Pretoria were selected to participate in the pilot study. The academic members were professionals in the fields of management accounting, financial management or investment management. They therefore possessed skills and training, as well as work experience, similar to management accounting professionals that formed the target population for the study. Because behavioural finance represents one of the research focus areas of the Department of Financial Management, some of the pilot study participants also possessed knowledge of questionnaire design in the field of the study and contributed suggestions to improve the quality of the questionnaire. Twelve pilot test respondents completed the questionnaire in

full. The results were analysed and indicated that the questions elicited behavioural differences between respondents.

All pilot study respondents were requested to provide feedback and suggestions. The feedback and suggestions were carefully analysed and changes were made to the questionnaire where it was found to be necessary. The main issue reported by respondents related to the length of the questionnaire. Based on this feedback, the whole questionnaire was scrutinised with the purpose of lowering the word count of the total questionnaire. The outcome of this exercise was a reduction in the total word count of more than 500 words. After the reduction of the word count, two of the pilot test respondents with experience in questionnaire development were requested to review the questionnaire a second time to ensure that the questions remained valid and reliable. The respondents unanimously agreed that the reduction in the word count reduced the time required to complete the questionnaire, but did not alter their grasp of the questions.

Because the population, and accordingly the sample, for the study consisted of management accounting professionals internationally, it was acknowledged that respondents would have varying levels of English proficiency. The services of two professional language editors were enlisted to assist in editing the language of the questionnaire to ensure that the language used subscribed to the conventions of Plain English. *Plain English* refers to English language usage that is designed to be clear in wording and structure to ensure that it is easy for readers to understand (Cutts, 2013:xii).

5.4.2   Contents of the questionnaire

The selection of the questions, possible amendments to questions, as well as the positioning of questions for each of the four main areas on which the questionnaire was designed to obtain data, are discussed in this section. A copy of the questionnaire is attached as Appendix 1.

The first area related to the **demographical** information of each respondent. This area consisted of nine questions. Section 2.4 indicates that the level and timing of emergence of

the business partner role possibly differ based on various demographic variables related to individuals as well as based on the demographic variables of the business at which individuals are employed. Therefore, demographical information on the respondents and the businesses where they were employed, provided valuable analysis opportunities to investigate whether differences in decision-making involvement related to specific demographic variables. Sections 4.3.1 and 4.4.1 also suggest that demographic variables related to the individual may indicate differences in susceptibility to the biases investigated in the present study. Appropriate demographical information therefore also provides valuable analysis opportunities with regard to differences in susceptibility to influence of behavioural aspects. Accordingly, demographical information on the age, gender, work experience, culture, country of employment, and professional associations of each respondent, was requested. Questions on the size of the company at which the respondent was employed, measured in terms of total number of employees as well as in terms of total annual revenue in US dollar, were also included.

The second area of information collected, related to the **role** and **decision-making involvement** of the respondents. This section consisted of six questions. The position of the respondent in the company at which he or she was employed was enquired. Respondents were provided with the definition of business-related decisions for the purposes of the study. Thereafter, their perception of their current level of business decision-making involvement, as well as the level of increase in this involvement within the last decade, was requested. Yazdifar and Tsamenyi (2005:184), Clinton and White (2012:40) and Sorensen (2009:1274) investigated the roles of management accounting professionals by means of similar survey questions. The second last question in this section was self-developed and related to the preference, or not, of the respondent for making decisions based on concrete facts, as opposed to being based on intuition. The final question in this section related to the percentage of business-related decisions that the respondent had to make, where ample supporting information was available at the time that the decision had to be made. This question was only displayed to respondents who indicated that they were involved in business decision-making to some extent.

The third and fourth areas for which data were collected in the questionnaire were related to the **behavioural influence** on business-related decision-making of the respondents. To ensure reliability and validity of the questions in these sections, the questions were based on questions from previous studies. However, some of the questions were adapted to varying degrees to ensure that they fit the description of business-related decisions. The questions are discussed here in the order that they were presented in the copy of the questionnaire in Appendix 1. In the actual questionnaire, the questions in the two behavioural influence areas were provided to respondents in a random order to ensure that fatigue and other factors related to the order of presentation of the questions did not unduly affect the data. However, steps were also taken to ensure that questions that related to the same scenario but which were framed differently, were not presented back to back to any of the respondents.

The decision problems presented to respondents were hypothetical decision scenarios, without actual monetary incentives attached to acting rationally. It was not deemed necessary to offer such incentives to respondents to motivate them to act rationally, because previous studies found that the decision behaviour of respondents and participants did not differ when incentives were provided. In his study of the utility theory that best represented the actual behaviour of human decision-making, Camerer (1989:81) also tested whether preferences between experimental participants differed when they received actual incentives for their choices, as opposed to only answering hypothetical questions with no actual incentives attached. Camerer (1989:82) found that the incentives did not significantly influence participants' decision-making behaviour. Thaler and Johnson (1990:653) also found that participants' risk-taking behaviour did not differ significantly between participants who participated for actual monetary incentives and participants who simply answered hypothetical questions. Previous studies on decision-making behaviour in the field of management accounting (Lipe, 1993:753) and the related auditing field (Guiral, Rodgers, Ruiz & Gonzalo-Angulo, 2015:110) used hypothetical examples in a manner similar to this study.

The possible influence of **frame dependence** on the decision-preferences of respondents was investigated by the third area of the questionnaire. Investigation into the influence of

frame dependence was limited to 11 questions to ensure that the questionnaire did not become too cumbersome.

Questions 1 and 2 in this area investigated possible preference reversal in decision-making by respondents based on the framing effects of *loss aversion*. The question options were, in essence, the same, except for Question 1 being positively framed and Question 2 negatively framed. The two questions were based on work by Bazerman (1983:211), which was later replicated by Miller and Fagley (1991:517).

Questions 3 and 4 tested for possible preference reversals due to the manner in which *concurrent decisions* were framed. The way in which the questions were framed (which was comparable with how decision problems were presented in actual situations) could result in respondents not recognising that the two decisions in Question 4 were a package that was comparable with the decision in Question 3. The questions were based on questions posed in a study by Sebora and Cornwall (1995:51).

Question 5 investigated the possible preference that respondents could have for decision options that provided certainty (referred to as the *certainty effect*), even if these were not the options that maximised expected utility. The question was developed from the ideas of Slovic *et al.* (1982:21-36). Questions 6 and 7 tested for the effect of *pseudo-certainty*, which is a derivative of the certainty effect. The framing of Question 7 created the impression that certainty existed for one of the decision options, although the net effect of the actual decision options was more clearly framed in Question 6. Questions 6 and 7 were also based on questions from the study by Sebora and Cornwall (1995:53).

The tendency of human decision-makers to create a set of *mental accounts* that may affect how expenditure and income decision-options are evaluated was investigated in Questions 8 and 9. The options in Questions 8 and 9 were the same. However, the questions were framed in a manner that could result in respondents classifying the options into different mental accounts, and accordingly possibly treating the two questions differently. The study of Sebora and Cornwall (1995:55) again proved useful as a source of questions that could be adapted for the purposes of the present study.

The last two questions in the third area of the questionnaire, namely Questions 10 and 11, tested whether the *endowment effect* was present in business-related decisions of respondents, where the business was endowed with a particular good. In Question 10, the company owned the good and in Question 11 the company was interested in purchasing a good owned by another party. Ideas by Kahneman *et al.* (1991:194-197) formed the basis from which the questions were developed.

The fourth area of the questionnaire related to possible biased decision-making that could result from a reliance on **heuristics** to make business-related decisions in the face of uncertainty. This area had to be limited to nine questions because the length of the questionnaire could have become a concern with reference to the willingness of respondents to complete the questionnaire on a voluntary basis.

The first three questions in the heuristic area investigated possible decision biases resulting from the *representativeness heuristic*. Question 1 tested whether respondents had a misconception of how chance unfolds and was developed from a base question identified by Bazerman (1994:24). Question 2 related to the confirmation bias of only searching for confirming evidence, as opposed to also searching for disconfirming evidence. The question was identified in a study by Einhorn and Hogarth (1978:399-400). Question 3 investigated the misconceptions of regressions to the mean bias. The question was adapted from a question identified in the study by Lowies (2012:124).

Questions 4 to 7 tested for the possible presence of *overconfidence* in the decision-making behaviour of respondents. Questions 4 and 5 were adapted from questions originally posed by Gort (2009:80) and later adapted by Lowies (2012:95). A similar question was also used by Menkhoff and Nikiforow (2009:323) to investigate the presence of overconfidence bias in the decision-making behaviour of professional fund managers. Questions 6 and 7 were self-developed after a comment by the international expert in behavioural decision research, namely that an additional test for overconfidence in decision-making would add value to the questionnaire. These questions were intended to determine whether possible overconfidence by respondents in their ability, compared with other decision-makers,

decreased when faced with difficult decision-problems, as argued by Moore and Healy (2008:504). Questions 4 to 7 were presented to respondents before any of the other questions on behavioural aspects to ensure that the confidence of the respondents was not unduly influenced by the other behavioural questions.

Question 8 in this area was a scenario that tested for the presence of conservative adjustment from an initial anchor (*anchoring and adjustment heuristic*) that could result in over-estimation bias of the ultimate probability of conjunctive events. The question was adapted from a similar question posed by Joyce and Biddle (1981a:133).

The possible influence of *affective* reactions (also referred to as emotion-based reactions) to decision scenarios was investigated by Question 9. A decision scenario by Moreno *et al.* (2002:1337-1340) formed the basis from which Question 9 was developed.

Questions 8 and 9 had the highest word count and were presented as the last two questions to respondents in an attempt to limit the dropout rate. Upon reaching these two questions, respondents were informed that Question 8 was the penultimate question, and Question 9 the ultimate question.

Based on the discussion above, confidence regarding the validity and reliability of the questions included in the questionnaire was derived from basing the questions on the work of previous scholars, by obtaining input from an international expert and from conducting an initial pilot study. The benefit of having strong methodological control over online questionnaires (Brandon *et al.*, 2013:2; Evans & Mathur, 2005:208) was also realised by controlling the ordering of questions with the aim to ensure minimal influences from fatigue, other questions and timing issues.

5.4.3   Population and sampling

This study is concerned with the decision-making behaviour of the international population of management accounting professionals. Management accounting professionals may be members of various management accounting institutes, yet may also practise management

accounting, without being professionally registered. Accordingly, it was not possible to obtain a complete list of management accounting professionals worldwide. Consequently, a non-probability sampling approach had to be implemented. According to Fogelman and Comber (2002:134-135), convenience sampling, as a method of non-probability sampling, may be used when it is not practicable to obtain a list, including contact information, of the whole population selected for a specific study. *Convenience sampling* is a sample that is convenient to select due to various possible reasons, including the ability to obtain data via the sample (Leedy & Ormrod, 2013:220).

Brandon *et al.* (2013:2) point out that the external validity of convenience samples regularly represents a concern for research scholars. However, Brandon *et al.* (2013:2) also indicate that research shows that convenience samples are often adequate substitutes for probability samples, especially when the population is widely dispersed and difficult to reach. However, the authors suggest that external validity should still be dealt with by other measures. To this effect, Fogelman and Comber (2002:135) state that research studies which employ convenience sampling should provide information about the selection of the convenience sample, as well as about the sample itself, to facilitate readers in evaluating the trustworthiness of the sample in relation to the population. The sample response collection procedures for the current study are described in detail in Section 5.4.4.

Various previous behavioural studies, especially experiment-based studies, regularly relied only on student sample bases (as examples see: Finucane *et al.*, 2000:5; Glöckner & Pachur, 2012:25; Kahneman *et al.*, 1991:1329; Sebora & Cornwall, 1995:46). Yet, Menkhoff and Nikiforow (2009:319) argue that it is advisable to include qualified professionals in the survey target group to ensure that findings are more representative of the population in terms of respondents who understand the importance of proper decision-making in professional environments. The current study aimed to investigate behavioural aspects in decision-making by management accounting professionals in the environment of their changing role, including the change in their decision-making involvement. Therefore, it was essential that the sample largely consisted of practising management accounting professionals from an international population. A convenience sample composed of management accounting professionals from diverse backgrounds was obtained by means of three main response

collection procedures. These three procedures attempted to resolve the issue of external validity by obtaining a wide and demographically diverse sample. The main procedures to collect the sample responses are discussed in detail in the following section.

5.4.4   Data collection

Qualtrics Online Survey software was used as the electronic tool through which to administer the questionnaire. Brandon *et al.* (2013:2) confirm that Qualtrics is a regularly relied upon research instrument delivery platform and encourage its further use in behavioural accounting research. When the questionnaire was activated, Qualtrics created a dedicated stable weblink to the questionnaire. The weblink automatically rooted possible respondents who were supplied with the link to the online questionnaire. The questionnaire was created on Qualtrics to be both desktop and mobile friendly.

Figure 5.1: Pie chart of the source of responses obtained
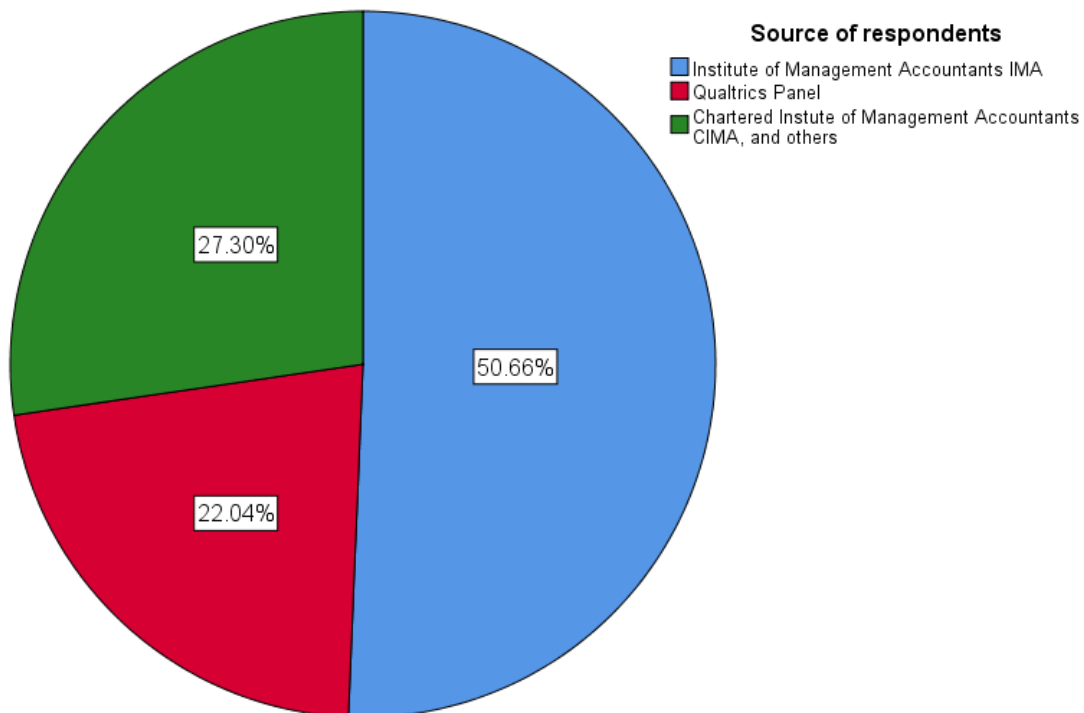
Firstly, the largest portion of responses (50.7%, $n = 154$) were generated with the assistance of the Institute of Management Accountants (IMA), which is based in the United States of America, but has members that are practising management accounting in various countries. An official grant application was submitted to the Director of Research of the IMA as part of the institute's requirements to assess the value of the research which was expected to stem from the distribution of the questionnaire to its members. The application and subsequent distribution of the questionnaire to 5 000 of its members were approved by the IMA Foundation of Directors. A brief description of the research was prepared to accompany the e-mail that the IMA sent out to the sample of members (see Appendix 2 for a copy of the e-mailed brief). The published details were carefully selected to ensure that they did not influence the responses (especially relevant to the questions designed to elicit decision-making behaviour). Response to the e-mail brief was completely voluntary. The IMA undertook to select a sample representative of their member base in terms of demographic diversity (Krumwiede, 2017). The number of actual responses translated to a low response rate of 3.08%. A low response rate is characteristic of online surveys, according to Evans and Mathur (2005:202). Nevertheless, the response rate to the present study compared favourably with the response rate of the study by Clinton and White (2012:41) of 2.38% on the same population. Although the questionnaire of the current study was developed to be thorough in terms of its coverage of behavioural influences, the resulting length of the questionnaire expectedly contributed to the low response rate.

The second main group of response collection procedures related to obtaining responses from management accounting professionals who were mainly members of the Chartered Institute of Management Accountants (CIMA). Of the final combined sample ($n = 304$), 27.3% (being $n = 83$) responses were collected by means of this group of procedures. The questionnaire was marketed by CIMA to its member and student base via various CIMA media and social media platforms. Students were included in the population as it should be noted that management accountants studying to obtain the CIMA-based qualification regularly study part time while already working as management accounting professionals (CIMA, n.d.:6). CIMA's current policies do not permit e-mailing members directly with invitations to participate in the survey. Consequently, the response rate was much lower than for surveys where invitations to participate are sent to possible respondents directly.

CIMA agreed to advertise the survey along with the weblink to their members by means of various CIMA marketing channels including the FM electronic magazine for members, the Insight magazine, CIMA's LinkedIn page and the cimaglobal.com website (Du Toit & Withington, 2015). For this purpose, an article with selected details about this study was written, which was published in whole, or in summary, on the various CIMA media and social media platforms (see Appendix 3). Again the information in the article was carefully prepared to not influence the decision-making behaviour of respondents. In reaction to the low response rate, where possible respondents were not contacted directly, the author promoted the above publications to a network of fellow management accounting professionals, who were mostly CIMA members or students.

The third response collection procedure was to enlist the assistance of Qualtrics response panel services. The responses gained via this procedure represented 22% ($n = 67$) of the final combined sample ($n = 304$). The procedures, described by Brandon *et al.* (2013:10-11), which Qualtrics applied to ensure valid and reliable responses were confirmed in the present study. Qualtrics requested participant screening criteria and applied these to provide the requested panel of respondents. The validity of the claim by Qualtrics Panel respondents that they are management accounting professionals were confirmed by an analysis of Question 1 to the demographics section of the questionnaire. Of the Qualtrics Panel respondents, 55 indicated that they were members of one of the main recognised professional accounting institutes, while only 12 indicated no professional association. Therefore, there may be some concerns regarding the validity of the self-identified claim by these 12 respondents as to whether they indeed did practice management accounting professionally. To remain ESOMAR[1] approved, Qualtrics is required to apply stringent policies to ensure that respondents are valid. As the 12 respondents represent 3.9% of the sample, the influence of any possibly remaining incorrect self-identification as professional management accountant, is considered to be negligible. Additionally, Qualtrics also included attention filters (Sugrue, 2016) to filter out respondents who did not pay the necessary attention when completing the questionnaire. Therefore, Qualtrics panel responses were

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[1] The world association for market, social and opinion researchers.

considered to be a valid alternative to traditional response collection procedures for the present study, in line with the general findings by Brandon *et al.* (2013:11).

In an attempt to encourage participation and increase the number of responses, $200 Amazon.com vouchers were made available to be awarded to ten randomly selected respondents who completed the questionnaire in full. An additional question was added to the end of the questionnaire requesting respondents to indicate whether they were interested in being entered into the random draw. If they were interested, they were required to provide their e-mail addresses to serve as contact details in the event that they were selected for a voucher. Respondents were again assured that the rest of their responses would be treated as anonymous and that the e-mail address would only be used for the random draw. Qualtrics panel respondents were not informed of the draw and were also not entered into the draw, because Qualtrics and its partners had their own respondent recruitment measures in place.

Upon analysis of the wide demographical coverage indicated by the analysis of the demographics of the sample (see Section 5.4.6.1), the external validity of the combined sample was considered to be adequate when compared with more traditional sampling and instrument delivery approaches. The final combined sample therefore formed the subject of the analyses described in the following section.

5.4.5 Data analysis

The quantitative approach of the present study required the use of statistical measures and tests to analyse the data. The statistical measures and tests were mostly conducted on SPSS Statistics package, Versions 24 and 25. However, the Wilson binomial confidence intervals were calculated by means of an online calculator tool (Ausvet, n.d.) developed by Ausvet, a company focused on the animal health and plant life sectors in Australia. This calculator was explicitly based on the research conducted by Brown, Cai and DasGupta (2001) on binomial confidence interval calculations. The tool is regularly used in health and plant life research (Boklund, Dahl & Alban, 2013; Parker, Robson & Bell, 2010; Reiczigel, Földi & Ózsvári, 2010).

The obtained data was mainly either dichotomous or categorical in nature. Behavioural decision-making research data from survey studies regularly denotes dichotomous or categorical data (e.g. see Section 5.4.2). Additionally, the questions on demographical information and decision-making involvement were mostly also structured in a manner which resulted in obtaining categorical data. This was done to lower the time required to complete the questionnaire. As a result, mostly non-parametric analysis techniques could be applied to analyse the data. The relevant techniques are discussed in the following sections.

5.4.5.1 *Descriptive statistics*

In line with previous studies, various descriptive statistics were used to conduct basic analyses with reference to decision-making involvement (Clinton & White, 2012; Hopper, 1980; Montano *et al.*, 2001; Sorensen, 2009) and decision-making behaviour (Bazerman, 1983; Benartzi & Thaler, 2007; Tversky & Kahneman, 1974; 1981). These statistics included the percentage of respondents, mean response, median response and standard deviation. However, more advanced techniques were used where the data allowed. These techniques are discussed in the following sections.

5.4.5.2 *T-tests*

T-tests are used to test whether two means differ significantly from a statistical point of view. All t-tests assume normality; however, deviations from normality for large sample sizes ($n > 30$) are not expected to significantly affect the test (Field, 2013:378; Pallant, 2011:206). T-tests also require the variables with which the means are compared to be on a continuous scale. In the social sciences, t-tests are regularly used to compare Likert-type scale variables. The present study will use t-tests for both continuous and Likert-scale variables, where applicable.

For the purposes of the current study, the effect size of differences in means found to be significant by the t-tests is determined by calculating an eta-squared value. The eta-squared value, which ranges between zero and one, represents the proportion of variance in the

dependent variable that is explained by the independent variable. Cohen (1988:284-287) suggests that a value of around .01 indicates a small effect, .06 indicates a moderate effect and .14 and above indicates a large effect size.

The one-sample t-test is used to compare a hypothetically expected mean with the actual mean of the sample. The paired sample t-test compares means from two responses by the same individuals, while the independent sample t-test compares means from responses by two different groups of individuals.

5.4.5.3 *Binomial confidence intervals*

Some of the questions required the comparison of the actual response proportions between the two possible answers to each question, with the expected proportions. The objective was to identify bias in the decision-making behaviour of respondents, by some respondents selecting the biased option. Accordingly, in the absence of bias, all respondents should be reasonably expected to select the rational option as their response. A fully rational response would therefore result in no respondents selecting the biased option and 100% selecting the rational option. The chi^2 test for goodness of fit is the preferred test for comparing expected and actual proportions. However, the Chi^2 test for goodness of fit is not able to determine the significance of the difference between the expected proportion and the actual proportion if either one of the proportions is 0 or 1 (i.e. 0% or 100%). Accordingly, much of the previous literature which used these questions (Bazerman, 1994:24; Lowies, 2012:124; Shefrin, 2002:20; Tversky & Kahneman, 1974; 1981) only reported the proportions with no calculation for statistical significance for these specific differences.

For the present study, the Wilson binomial interval estimation, identified by Brown *et al.* (2001:115) is used as preferable to the traditional Wald binomial interval estimation, to compare the 95% confidence interval for the actual unbiased response proportion with the 95% confidence interval for the expected 100% unbiased response proportion. Cumming and Finch (2005:171,180) support the use of confidence intervals to determine statistical significance of differences in proportions and indicate that, if there is no overlap between

the confidence intervals of the two proportions, the statistical significance of the difference is less than 1% (indicated as p < .01).

5.4.5.4 *McNemar's test*

When testing for the significance in the preference reversal of respondents between a question framed to induce frame dependence and a clearly framed question, or between two differently framed questions of the same scenario, the chi^2 test for goodness of fit is not appropriate. The chi^2 test for goodness of fit assumes that the two response proportions which are compared are independent. However, the response proportions for both questions are derived from responses provided by the same respondents. Consequently, this assumption is violated. McNemar's test is used to indicate the significance of preference reversals by the same group of respondents (Field, 2013:879). The current study therefore uses McNemar's test, which provides a *p*-value to indicate whether the preference reversal is statistically significant.

5.4.5.5 *Chi^2 test for independence*

There are situations where the results of the binary logistic regression suggest that a demographic variable may indicate a higher level of susceptibility to a specific bias by a certain demographic group. However, the significance of the variable is only indicated to be marginal, due to the limited power of the logistic regression analysis owing to sample size constraints. These situations require the comparison of the demographic variable between two different groups, namely those that were biased and those that were rational. In these situations, Pearson's chi^2 test for independence is used to confirm whether the demographic variable is associated with a higher susceptibility to the particular bias. Where both the dependent and independent variable are dichotomous, Yates' continuity correction is applied to correct for an overestimation of the chi^2 value in a two-by-two contingency table.

5.4.5.6 *Wilcoxon signed rank test*

For the two questions which tested for the presence of the endowment effect bias, respondents had to choose between eight price categories to suggest what they considered to be an acceptable selling or buying price for their company's property. The lowest and the highest price categories were 'smaller than' and 'higher than' categories. Because the categories are not continuous or interval, the paired sample t-test cannot be used to compare the mean responses with the two questions. The non-parametric test, which is appropriate for comparing categorical rank selection for repeated measures, is the Wilcoxon signed rank test. This test converts the categories to ranks and compares the average rank selection between the two questions. The test provides a *p*-value for significance interpretation, but the effect size has to be calculated (referred to as *r*) by dividing the *z*-value by the square root of *n*. In general, it is accepted that .1 indicates a small effect size, .3 a medium effect size and .5 a large effect size.

5.4.5.7 *Mann-Whitney U-test*

Similar to the Wilcoxon signed rank test, the Mann-Whitney U-test is also a non-parametric alternative to the t-test. However, the Mann-Whitney U-test is the non-parametric alternative to the independent sample t-test. In the present study, the Mann-Whitney U-test is used to confirm the non-significance of the difference in preference for supporting information between respondents biased by loss aversion, and those not biased by loss aversion. It is also used to confirm the significance of the difference in susceptibility to the endowment effect, based on individuals' preference for using judgement in decision-making or relying on ample supporting information, as suggested by the logistic regression analysis. The Mann-Whitney U-test provides a significance value, which can be interpreted, but the effect size needs to be calculated based on the same calculation as the effect size for the Wilcoxon signed rank test.

5.4.5.8 *Pearson's product-moment correlation coefficient*

An in-depth analysis of the overconfidence bias affecting management accounting professionals' decision-making ability when answering a difficult decision problem, requires the testing of the correlation between their confidence and the distance of their estimate from the correct value. Pearson's product-moment correlation coefficient is the appropriate parametric test to analyse correlations between continuous variables. The present study uses this test, but applies bootstrapping because the distance from the correct value variable violates the assumption of normality.

5.4.5.9 *Spearman's rho correlation coefficient*

Continued investigation into the overconfidence bias as described in the previous section, results in testing the relationship between the level of overconfidence by respondents, categorised into 10% intervals, and the range of their varying estimates within each of the 10%-point categories. Because the level of confidence in the categorised intervals represents measurements on an ordinal scale, the non-parametric Spearman's rho correlation coefficient is applied to this test. The test is similar to Pearson's product-moment correlation coefficient, except that it first ranks the data before applying correlation testing to the ranks.

5.4.5.10 *Binary logistic regression*

The significance of possible demographic indicators of higher decision-making involvement of management accounting professionals is investigated by means of binomial logistic regression analysis. Similarly, the significance of possible demographic indicators of higher susceptibility to behavioural decision biases is also investigated by applying binary logistic regression analysis. A behavioural decision-making study by D'Angelo, Mustilli and Piccolo (2018:160) recently applied binary logistic regression analyses to research data from a sample with a size similar to the sample of the current study. Hosmer and Lemeshow (2000:ix) confirm that the use of logistic regression has increased significantly in many fields, including in the business and finance field.

Logistic regression represents a type of generalised linear modelling analysis to model the effect of multiple input variables on the outcome variable. Logistic regression is specifically relevant to analyses where the outcome variable is categorical (Hosmer & Lemeshow, 2000:1). A distinction is made between logistic regression analyses where the outcome variable is dichotomous/binary, namely binary logistic regression, and where the outcome variable has more than two categories, namely multinomial logistic regression (Field, 2013:761). In the present study, the analyses of possible predictor variables relate to dichotomous outcome variables, being a higher or lower level of involvement in business decision-making, and being biased or not, by the specific behavioural influence. Consequently, binary logistic regression is the analysis of choice to test the significance of the possible predictor variables in the current study.

In research where a number of predictor variables could potentially be included in the logistic regression analysis to determine their significance to influencing the outcome variable, Hosmer and Lemeshow (2000:91) suggest a theory-informed model development process to ensure the optimal model is attained within the constraints of limited sample sizes. This process is followed in the present study and therefore explained in more detail in the following paragraphs. Reyers (2014:89-92) provides a useful summary of the logistic regression model building process suggested by Hosmer and Lemeshow (2000:91). Both Hosmer and Lemeshow (2000:91-115) and Reyers (2014:89-92) were referred to for the purposes of informing the process description below and during the application of the binary logistic regression analyses conducted in the current study.

The first step in the process is to purposefully identify possible predictor variables which the literature suggests are important. Subsequently, a bivariate logistic regression analysis is carried out for each individual predictor variable to determine each variable's statistical significance as a standalone predictor variable, using the likelihood ratio test and the odds ratio. Each predictor variable which has a significance of $p < .25$ in the initial bivariate analysis is included in the multivariate model. The relatively high p-value is suggested to ensure that all important variables are included, because some may only become significant once other variables are controlled for. It should be noted that for continuous variables, the

assumption of the linearity of the logit should be confirmed (by means of a Box-Tidwell test) before it can be used in the model. In the initial multivariate model, the significance of all variables are reassessed, and all found not to be significant at this stage at the traditional $p < .05$ level of significance are removed from the model. However, the removal of these variables should not have the effect of changing the beta coefficients of the remaining variables by more than 20%, nor significantly affect the likelihood ratio, because one or more of the removed variables then have a significant controlling and moderating influence. If this is the case, the removed variables should be added back in an orderly fashion to identify which variables are responsible for these effects. These variables should then remain in the multivariate model. The last step is to add back all the variables disregarded in the bivariate analysis stage to determine if they are statistically significant in the presence of the other variables remaining in the multivariate model. Those that are, are retained in the final model.

The final model is assessed using the likelihood ratio test. This test is preferred to the Wald statistic as the standard errors of the Wald statistic becomes inflated when the regression coefficient is large. This effect is more pronounced in smaller samples. The goodness of fit of the final model is also assessed to determine how closely the model fits the data. Multiple techniques are used to assess the fit more accurately. These fit measures are each discussed, in turn, in the following paragraphs.

The increase in the classification hit rate is assessed as one of the indicators of model fit. This represents the increase in the proportion of the respondents which the model correctly classifies above the original base proportion in the sample response. In general, a 25% increase in the classification hit rate is considered to indicate a good fit. However, if the original base rate proportion in the sample response is skewed to either side, it becomes difficult to achieve a significantly better than chance hit rate. Accordingly, the proportional by chance method is also used, where the base rate is calculated as the sum of squares of the proportions in each group in the sample response. Another indicator of the accuracy of classification of a model, namely the receiver operating characteristic (ROC) curve is also used as an indicator of model fit. No discrimination is indicated where the area under the curve is 0.5 (i.e. no better than a 50/50 chance). Areas under the ROC curve of 0.6 to 0.7

indicate relatively poor levels of discrimination, areas of 0.7 to 0.8 indicate relatively good discrimination, and areas of 0.8 to 0.9 indicate excellent discrimination.

Two R^2 statistics are included in the goodness of fit tests. These are the McFadden R^2 and the Nagelkerke R^2. It should be noted that due to the dichotomous nature of the outcome variable in binary logistic regression, the interpretation of the R^2 statistic differs from that of normal linear regression. In binary logistic regression, R^2 values of between 0.2 and 0.4 suggest a very good model fit. Additionally, the Hosmer-Lemeshow test assesses the difference between observed frequencies in sample responses and the expected frequencies based on the model. A finding of non-significance indicates that the difference between observed and expected frequencies is not of statistical significance, and therefore indicates a good model fit. The last model fit test which is employed is the standardised residuals test, which indicates residuals for which the model is a poor fit. It is generally accepted that poor model fit is not indicated unless more than 1% of standardised residual scores validly lie outside the -2.5 to +2.5 range, or 5% of standardised residual scores validly lie outside the -2.0 to +2.0 range.

Once the model is accepted, the beta coefficients of all the statistically significant predictor variables are interpreted by means of the odds ratio (which is equal to e^β). The odds ratio is an indicator of how the odds that a particular outcome of the outcome variable would occur increase with a one-unit change in the predictor variable. In the present study, that is the increase in the odds of being involved in business decision-making to a high level, or the increase in the odds of being influenced by a particular bias, due to a unit change in the particular predictor variable.

5.4.6   Data

This section provides a brief overview of the demographic composition of the sample to demonstrate the diversity of the respondents in order to provide assurance on the validity of the sample data to the population. Thereafter, the recoding of the data from the originally captured data, for the purposes of the binary logistic regression analysis, is explained.

5.4.6.1 *Descriptive summary of demographic data*

The demographic composition of the convenience sample is discussed in this section to support the validity of the sample to the population, as suggested by Brandon *et al.* (2013:2). The presentation of the demographic data and the discussion of its validity are divided into two parts. The first deals with the demographic data related to the characteristics of the respondents, while the second deals with the demographic data related to the companies in which the respondents were employed.

Table 5.1: Descriptive summary of demographic data of respondents

Demographic variable	Categories	Frequency (*n*) *N* = 304	Percentage (%)
Gender	Male	200	65.8%
	Female	104	34.2%
Age	20 to 29 years	77	25.3%
	30 to 39 years	118	38.8%
	40 to 49 years	67	22%
	50 to 59 years	32	10.5%
	60 years and above	10	3.3%
Years of work experience	0 to 1 years	23	7.6%
	1 to 5 years	91	29.9%
	6 to 10 years	76	25%
	11 to 15 years	40	13.2%
	16 to 20 years	31	10.2%
	20 years and above	43	14.1%
Regional culture to which respondents subscribe	Africa	54	17.7%
	Asia	86	28.3%
	Europe	44	14.5%
	North America	113	37.2%
	Other	7	2.3%

The demographic data of the characteristics related to the respondents demonstrates appropriate diversity in terms of each variable recorded. With reference to gender, more male management accounting professionals responded to the questionnaire than female professionals. This remains a characteristic of online surveys, even though responses are starting to become more balanced than in the past (Evans & Mathur, 2005:201). Accordingly, the gender balance of the present study ($n = 304$, 65.8% and 34.2%) is more representative than the balance in the study by Montano *et al.* (2001:303) ($n = 214$, 78.5% and 21.5%), which was also conducted on CIMA members. However, the age of respondents in the present study is comparable with the age of respondents documented by Montano *et al.* (2001:303). Montano *et al.* (2001:303) do not provide full details of the age of the respondents in their sample but they indicate that the age of respondents varied from 25 years to 59 years, with a mean age of 40 years ($n = 214$). The median age and mode age of respondents in the current study ($n = 304$) fall in the 30 to 39 years of age bracket, with an estimated mean of 37.2 years. The distribution of the years of work experience variable is well diversified and the trend comparable with the relative age of respondents, suggesting that it is valid with reference to the sample and the population. The regional culture to which respondents subscribe is also well diversified at the aggregate level. The size of the sample limits the ability to analyse responses on a country-based level.

With reference to the demographical representation of the companies in which respondents were employed, the regions were very similar to the cultural regions of respondents. Although not presented here, at country-based level, a little migration from cultural regions towards employment in regions with larger industries could be noticed.

A recent study by Clinton and White (2012) investigated certain changes in the role of management accountants among IMA members and the companies in which they were employed. Despite the lower response rate in the study by Clinton and White (2012:41), than in the earlier study on which it followed (Ganguly *et al.*, 1994), the authors indicated that the responses were representative of the IMA population and its employers. Both these studies reported very similar demographic variables. Accordingly, the employment variables of the current study will be compared with the variables reported by Clinton and White (2012) to support the validity of the sample of the current study.

Table 5.2: Descriptive summary of employment data of respondents

Demographic variable	Categories	Frequency (*n*) N = 304	Percentage (%)
Region currently employed in	Africa	52	17.1%
	Asia	89	29.3%
	Europe	43	14.1%
	North America	114	37.5%
	Other	6	2%
Industries in which respondents are most commonly employed	Financial services and consulting	73	24%
	Manufacturing	57	18.8%
	Information technology	23	7.6%
	Educational services	23	7.6%
	Retail and wholesale	21	6.9%
	Construction	15	4.9%
	Pharmaceutical and health	15	4.9%
	Other	77	25.3%
Size of companies (number of employees) in which respondents are employed	Fewer than 100 employees	81	26.6%
	101 to 1 000 employees	81	26.6%
	1 001 to 5 000 employees	54	17.8%
	5 001 to 10 000 employees	26	8.6%
	10 001 to 50 000 employees	32	10.5%
	More than 50 000 employees	26	8.6%
	Not known	4	1.3%
Size of companies (sales revenue in USD) in which respondents are employed	Less than $10 million	72	23.7%
	$10.1 million to $100 million	74	24.3%
	$100.1 million to $1 billion	52	17.1%
	$1.1 billion to $5 billion	38	12.5%
	More than $5 billion	41	13.5%
	Not known	27	8.9%

The roles or positions in which respondents were employed in companies are discussed in detail in Section 6.2, and therefore not presented and discussed here. However, the position

composition is very similar to the compositions reported by Clinton and White (2012:45) and Garg *et al.* (2003:8).

With reference to the industries in which the respondents in the present study were employed, the financial services and consulting industry was most frequently reported, with employment in the manufacturing industry being second most frequent. This order is the reverse of the order reported by Clinton and White (2012:73), where manufacturing was most frequent and financial and consulting second most frequent. Similar industries to the Clinton and White (2012:73) study were present in the lower percentage range of the current study.

The employment company size variables are strikingly similar to those of the studies by Clinton and White (2012) and Garg *et al.* (2003). With reference to number of employees employed by the company, Clinton and White (2012:74) report the smallest company category to represent 27% of responses (Garg *et al.* (2003) report 22%), comparable with the 26.6% reported in the present study. The other categories are comparable to a similar degree. When analysing the company size in terms of the value of annual revenue (measured in US dollar), Clinton and White (2012:45) found that 45% of respondents in their sample were employed in companies with revenue below $100 million (Garg *et al.* (2003) report 44%), again comparable with the 48% (being 23.7% + 24.3%) of the present study.

The analysis of the demographic variables of the present study with reference to earlier studies on the management accounting population provides strong support for the validity of the current sample. The more diverse composition in terms of regional representation and the level to which the sample was based on professionals in employment as opposed to only on students confirm that the findings of the present study could be valuable to the management accounting profession as a whole.

5.4.6.2   *Data for logistic regression analyses*

With reference to logistic regression, categorical data can be entered as both predictor and outcome variables. Hosmer and Lemeshow (2000:56) indicate that the process for logistic

regression makes use of dummy variables to account for categorical variables with more than two categories. However, Hosmer and Lemeshow (2000:346) also state that the sample size to ensure a reliable and adequately fitted model is determined by the number of parameters (including dummy variables) to be included in the model. Consequently, to ensure a less onerous requirement in terms of sample size, the categories of the selected demographic variables to be included in the logistic regression analyses are combined to result in fewer dummy variables (and accordingly fewer parameters). The new categories that specifically apply to the logistic regression analyses are introduced in the following paragraphs.

With reference to the age of respondents, the age categories are combined into three new categories, as follows:

- young, respondents aged between 20 and 29 years;
- midlife, respondents aged between 30 and 49 years; and
- older, respondents aged 50 years and above.

Secondly, with reference to years of experience, the categories are also combined into the three following categories:

- little experience, by combining 0 to 5 years' experience into one category;
- moderate experience, by combining 6 to 15 years' experience into one category; and
- experienced, by combining all categories of above 15 years into one category.

Thirdly, the positions in which management accountants were employed are combined into the following three categories:

- the traditional management accounting position, including its equivalents of financial manager, accountant and controller;
- the top management accounting position of financial director, including its relative equivalents of chief financial officer and vice president of finance; and
- business management position, by combining the positions of managing director, including its relative equivalents of chief executive officer and president, as well as operational manager.

Positions not fitting into the categories above are treated as missing values for the logistic regression analyses.

Fourthly, the variables of company size relevant to the logistic regression analyses related to the level of business decision-making involvement are also combined into three categories each. For company size in terms of sales revenue in US dollar, the categories are as follows:

- small, combining all categories of $10 million and less in annual sales revenue;
- medium, combining all categories between $10.1 million and $1 billion in annual sales revenue; and
- large; combining all categories of companies with more than $1 billion annual sales revenue.

For company size in terms of number of employees, the categories are as follows:

- small, all companies with 100 and less employees;
- medium, all companies in the categories between 101 and 5 000 employees; and
- large, all companies in the categories with more than 5 000 employees.

Lastly, the categories of the outcome variables for level of decision-making involvement are combined into two variables. For level of current decision-making involvement, the categories are as follows:

- low level of involvement, by combining 'No' and 'Limited decision-making involvement' categories; and
- high level of involvement, by combining the 'Moderate', 'Comprehensive' and 'Constant' business decision-making involvement categories.

For level of increase in business decision-making involvement during the past decade, the categories are as follows:

- low level of increase, which combines 'No' and 'Limited' levels of increase in business decision-making involvement; and
- high level of increase, which combines the 'Moderate', 'Extensive' and 'Comprehensive' levels of increase in business decision-making involvement categories.

The level to which a particular respondent preferred to have supporting information to support the decisions in which that individual was involved, as opposed to being comfortable with relying on intuition or judgement, is used as a continuous variable in the logistic

regression analyses of possible indicators of higher susceptibility to behavioural biases. However, for the purposes of the analyses, the scale is reversed to ensure that the higher end of the 11-point scale indicates a higher preference for supporting information and the lower end of the scale indicates a higher preference for relying on intuition. This is required in accordance with logistic regression principles to ensure that a higher score correlates with a higher preference for supporting information which, based on the supporting theory, should correlate with a higher susceptibility to decision bias.

Neither the culture of the country in which a particular responding individual was employed, nor the culture of the particular individual could form part of the analyses due to the limitation of the sample size. Any combination of cultures to the level required to accommodate the sample size would be arbitrary in nature.

5.4.7 Impact of irrational responses to clearly framed questions

Some previous studies (Sebora & Cornwall, 1995:49-51; Tversky & Kahneman, 1981:454) included a transparently framed question for specific framing-related behavioural bias test questions to serve as a comparative response to the bias test question. Other studies (Bazerman, 1983; Fan, 2002:413-414; Lowies, 2012) did not include such a transparently framed question, because the optimal options to be selected in the bias tests can be calculated by means of the expected utility theory. If no transparently framed question was included, it could be assumed that the rational option, according to the expected utility theory, would be selected if participants or respondents were indeed rational. With reference to survey-based studies, this practice results in shorter questionnaires, which accordingly are less onerous to complete.

The current study did include such a transparently framed question to serve as a comparison when analysing the concurrent decisions framing-based bias test, as well as a transparently framed question alternative for the pseudo-certainty framing-based bias test (see Section 5.4.2 for more information). The pseudo-certainty transparently framed question consisted of two options, namely a higher probability of a lower-value outcome, as well as a lower probability of a higher-value outcome. The calculation of an expected value would indicate

that one of the options had a higher expected value than the other. However, the alternating aspects of probability and value could bias a respondent's decision to select a specific option, based on the respondent's risk appetite and tolerance. For this reason, the clearly framed alternative serves as a better comparison to identify the true effect of framing-induced pseudo-certainty bias. With reference to the transparently framed alternative for the concurrent decisions; however, the probabilities of the outcomes are equal with only the value differing. For both the probabilities of the gain as well as the loss, Option B is superior. Sebora and Cornwall (1995:49) therefore argue that Option A is clearly inferior and should not normally be selected by a participant. Nevertheless, 7% of the participants in the study by Sebora and Cornwall (1995:49) selected the inferior option. The authors suggested three possible reasons for this selection, namely computational error, misreading of the question or purposeful misrepresentation.

Table 5.3: Inferior option selection in the transparently framed alternative

	Full sample		Respondents obtained via IMA and CIMA		Respondents obtained via Qualtrics Panels	
	N	%	N	%	N	%
Percentage of respondents selecting the inferior option	304	12.8%	237	7.2%	67	32.8%

In the current study, 12.8% of respondents selected the inferior option (represents 15.9% of the respondents who responded to this specific question). This warrants further investigation. Table 5.3 presents an analysis of the source of the respondents who selected the inferior option. The inferior option selection rate by the respondents obtained via alternative sampling means is comparable with the selection rate encountered by Sebora and Cornwall (1995:49). However, the inferior option selection rate by respondents obtained via Qualtric's panel services is substantially inflated. The effect of the high rate of inferior option selection on the perceived validity of the respondents obtained via Qualtrics panel services requires additional analysis to confirm two aspects. The two aspects are whether the responses by any of the Qualtrics panel respondents could be considered to be valid, and whether the rest of the responses by the respondents that responded by selecting the inferior response could be considered to be valid.

Engagement with Qualtrics on the issue generated the following feedback (Sugrue, 2016). Qualtrics included an attention filter to filter out respondents who did not pay proper attention when completing the questionnaire. The attention filter resulted in 16 respondents being disregarded and not included in the responses provided by Qualtrics panel services for the purposes of this study. Additionally, Qualtrics indicated that it ensured that all its panel services projects were ESOMAR[2]-approved to provide assurance regarding the quality of the projects and responses. Brandon *et al.* (2013:10-11) confirm the usability of Qualtrics panels when attention filters are in place. Brandon *et al.* (2013:10) reported an average response usability rate of 71% across seven previous studies. The present study had a response usability rate of 80.7% [being 67/(16+67)]. Accordingly, the responses by respondents obtained via Qualtrics panel services that responded by selecting the superior option in the transparently framed concurrent decision question alternative could reasonably be accepted as valid.

However, the other responses by the respondents obtained via Qualtrics panel services that selected the inferior option, were analysed and compared with the rest of the sample. With reference to the decision-making involvement section of the questionnaire, the responses by this particular group of respondents did not differ materially from the responses by the rest of the sample. Accordingly, the findings of the analysis of the decision-making involvement data remain similar irrespective of whether the responses of the particular group of respondents under investigation are included, or not. However, with reference to the behavioural aspects sections of the questionnaire, the responses by this group of respondents were inconsistent with the responses by the rest of the sample for some of the questions. The responses did not differ systematically because for some behavioural aspect questions, the responses were similar to the rest of the sample and for others, a definite difference could be noted. In the context of this study, which contained a comparatively lengthy and onerous questionnaire, it is argued that the selection of the inferior option in the transparently framed alternative of the concurrent decisions test was a result of fatigue.

After careful consideration, the researcher decided to present the decision-making involvement-related findings only for the **full sample**, in accordance with the consistency of

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[2] The world association for market, social and opinion researchers.

the responses to this area between respondents, as described in the previous paragraph. However, the behavioural aspects analysis is presented for both the full sample and a narrow sample. The **narrow sample** excludes all respondents who selected the inferior option of the transparently framed concurrent decisions alternative, whether obtained via Qualtrics panel services or otherwise. The results from the full and the narrow samples for the analysis of the behavioural biases do not differ materially in terms of the findings for any of the biases (presented in Chapters 7 and 8). Consequently, the binary logistic regression analyses, which are more dependent on sample size than the analyses used for analysing the behavioural biases, are conducted on the full sample only.

The inclusion of the transparently framed alternative question to the concurrent decision frame question, and the analysis of the resulting responses, improve the quality of the present study by controlling for possible fatigue. The limited differences in the findings indicate that fatigue did not materially influence any of the final findings. Behavioural aspects and behavioural finance-based surveys regularly do not include such an option and would therefore regularly not identify the issues discussed above.

5.5   RESEARCH ETHICS

The questionnaire contained questions based on hypothetical scenarios with the aim to investigate whether behavioural aspects influenced the decision-making of management accounting professionals. As such, the questionnaire did not require the respondents to divulge sensitive information about the businesses at which they were employed. Neither did the questionnaire require the identity of the respondents. However, the random draw incentive did require, on a voluntary basis, the contact details of respondents in the form of an e-mail address. Respondents were assured that the e-mail addresses would only be used for the purposes of the random draw. Accordingly, the contact details were removed from the data sets that were analysed for the purposes of this study. Due to the requirement of the University of Pretoria that data collected for research purposes must be stored, the e-mail addresses were stored in a separate file from the other data and protected by means of password protection.

An application for ethical clearance for the study, including the contents of the questionnaire and details of the random draw incentive, was submitted to the Research and Ethics Committee of the Faculty of Economic and Management Sciences at the University of Pretoria. The committee approved the study and accompanying details on 24 February 2016.

5.6 LIMITATIONS

Research is conducted within the constraints of the practically achievable, which limits the research from being perfect (Hofstee, 2006:117). The present study is no exception and the following limitations should be kept in mind when noting the findings of the present study.

Capturing the decision-making involvement, the behavioural influence of decision framing and the behavioural influence of decision heuristics resulted in the questionnaire being relatively long and being relatively time-intensive to complete. The advantage of capturing the amount of data which was collected is accompanied by the following disadvantages resulting from the length of the questionnaire. Firstly, fatigue may have impacted on the responses of respondents when answering the last part of the questionnaire. This limitation was mitigated to some extent by presenting respondents with the questions in random order (apart from the limited exceptions discussed in Section 5.4.2). The analysis of the responses to the transparently framed concurrent decision scenario question discussed in Section 5.4.7 provides further corroboration that the influence of fatigue was limited. Secondly, the number of responses was limited by the indication of the expected amount of time the questionnaire might take to complete presented in the communication to possible respondents. Provision of an indication of the time which the completion of a questionnaire may take is considered customary for various valid reasons. The final sample size limited the power of the binary logistic regression analyses to identify additional indicators of bias susceptibility. Future studies could therefore identify further valid indicators to those found in the current study. Thirdly, a number of respondents did not answer all of the questions and ceased their responses at some stage. Due to the random presentation of the questions, the response attrition was spread over the different questions. All questions therefore had enough responses to analyse.

Sections 5.4.3 and 5.4.4 indicated that it was not possible to randomly sample the international population of management accounting professionals. The reliance on the convenience sampling method represents a limitation to the current study in terms of the validity of the sample to the population. The attainment of responses from various avenues (see Section 5.4.4) and the comparability of the demographical information of respondents in the current sample to those in previous research samples (see Section 5.4.6.1) provide support for the validity of the present study's sample. However, generalisation of the findings should be considered with the provision that future research could supplement the current findings.

The decision-making involvement of management accounting professionals was investigated by including questions in the questionnaire that asked respondents to report on their business decision-making involvement. Leedy and Ormrod (2013:196) suggest that responses to such self-report questions may be subject to perception bias. Section 5.4.2 explained the procedures taken to limit this bias and indicated that various previous studies also investigated the changing roles of management accounting professionals in a similar manner. However, the change to the business partner role is idealised, for instance, in Siegel *et al.* (2003) and Vaivio and Kokko (2006), which may bias self-report questions towards overstating decision-making involvement. Therefore, the findings of this study with reference to business decision involvement should be treated as preliminary, and would benefit from being supplemented with case study-based future research.

Considerations related to the length of the questionnaire limit the number of behavioural aspects that can practically be investigated in a single study. This study only investigated and considered the behavioural decision influences explicitly indicated in the study. Definite influencing effects of some of the selected behavioural aspects were identified. However, there may very well be additional behavioural influence in decision-making by management accounting professionals that did not form part of the focus of this study.

5.7 SUMMARY

The methods used to investigate the research problem in the study were outlined in this chapter. The study applied a quantitatively focused survey design to a post-positivist philosophy. Important aspects relating to the development and deployment of the questionnaire were presented to provide assurance of the reliability and validity of the research instrument. Practical restrictions resulted in the selection of a non-probability convenience sample from the international population of management accounting professionals. The extent to which the convenience sample limited the generalisability of the findings was mitigated by selected procedures and analyses to support an acceptable level of validity of the sample to the population. Statistical procedures that the study employed to quantitatively analyse the data were justified and explained to assist the reader in understanding the analyses and the rationale behind applying each analysis. The nature of the study did not result in any material ethical dilemmas. The limitations of the study were highlighted and procedures to resolve each limitation discussed. The non-probability sampling technique, the limited sample size and possible fatigue in answering the questionnaire resulting from its length, all represented limitations of the study. However, Chapter 5 outlined the rigour applied in the research process and in addressing the identified limitations. Therefore, the methods applied to this study are considered the optimal approach, within the confines of practicality, by which to address the research problem indicated in Chapter 1. Chapters 6, 7 and 8 follow, and present the results from the application of the methods outlined above to the data set described.

CHAPTER 6: RESULTS AND DISCUSSION OF BUSINESS DECISION-MAKING INVOLVEMENT

6.1 INTRODUCTION

The significance of the main focus of this study, namely an investigation of the possible presence of behavioural influences and biases in decision-making by management accounting professionals, is highlighted by the literature on the changing role of the management accountant, as discussed in Chapter 2. The relevance of the changing role to the decision-making behaviour of management accounting professionals relies on increased business-related decision-making being a fundamental part of the emerging business partner role of the management accountant. However, the literature discussed in Chapter 2 only implies increased involvement in business decisions without investigating it empirically. Consequently, in Chapter 6, the investigation of the decision-making involvement and related matters is presented by means of analyses of the responses to the relevant questions in the questionnaire by the management accounting professionals in the sample.

Firstly, the various roles of the respondents with reference to their positions in their respective employing companies are analysed and discussed. Secondly, the responses regarding the level to which responding management accounting professionals indicated that they were involved in making business decisions are investigated. Thirdly, the possible level to which respondents indicated that their involvement in business decisions has increased in the recent past (during the past decade) is discussed.

Since behavioural influences specifically relate to the use of judgement when making decisions, the investigation of the possible averseness of management accounting professionals to base decisions on judgement, the percentage of business decisions which these professionals are required to base on judgement, and a comparison of the two preceding findings, are presented in the last three sections of the chapter (excluding the chapter summary).

6.2   ROLE IN TERMS OF POSITION IN THE COMPANY

Question 1 in the role and decision-making involvement section of the questionnaire requested respondents to specify their position in the company by selecting from five applicable options, or a sixth 'Other' option if their position did not fit into one of the five listed position descriptions. Table 6.1 presents a summary of the findings.

Table 6.1: Position in the company

Position type	Position	Frequency	Percentage
'Traditional' management accounting positions	Controller, Accountant, Financial Manager	188	61.8%
	Chief Financial Officer (CFO), Financial Director (FD), Vice-president (VP) Finance	46	15.1%
Positions with inherent business decision-making involvement	Chief Executive Officer (CEO), Managing Director (MD), President	17	5.6%
	Chief Operating Officer (COO)	4	1.3%
	Operational Manager	34	11.2%
Other		15	4.9%

Table 6.1 indicates that 61.8% of the respondents in the full sample specified that their position in the company was that of management accountant, controller, accountant, or financial manager. This can be considered as the 'traditional' position for management accountants in a business. A further 15.1% of respondents specified that they were in the top accounting-related position of chief financial officer (CFO), vice-president of finance (VP finance), or financial director (FD). Accordingly, traditional management accounting positions were occupied by 76.9% of respondents in the sample. This figure is higher than the 52% in the study by Clinton and White (2012:45), and also the 68% in an earlier study by Garg *et al.* (2003:8). However, in these two studies, the role of CFO was grouped along with the roles of chief executive officer (CEO), chief information officer (CIO) and chief operating officer (COO). If only the traditional management accounting position is compared with the previous studies, 61.8% compares well with both the previous studies.

Continuing with reference to Table 6.1, apart from 'Other', the remaining three position options relate to positions that inherently require extensive business decision-making involvement. The respondents that responded by selecting 'Other' as their position, were requested to provide their own description of their position. These descriptions were scrutinised to identify which of these position descriptions related to positions that inherently entailed business decision-making involvement. Only one description (0.3% of the sample) fitted this profile, namely that of enterprise risk planning consultant. This response was reclassified to reflect the position of operational manager and is presented as such in Table 6.1. Consequently, based on the full sample, 18.1% of positions that respondents occupied inherently entailed extensive decision-making involvement. However, management accounting professionals in the traditional positions may also be more involved in business decision-making, as argued by recent research in this area (Goretzki *et al.*, 2013:59; Järvenpää, 2007:100; Sorensen, 2009:1291).

If the classification of Clinton and White (2012:41) and Garg *et al.* (2003:8) between decision-makers and decision enablers is adopted, 33.2% of respondents in the current study can be classified as decision-makers (being the 15.1% of respondents in the top management accounting position added to the 18.1% above). This compares favourably with the 31% indicated in both previous studies. However, the previous studies focused exclusively on members of the IMA and did not distinguish between management accounting-related decision-making and more general business decision-making.

In the following section, the investigation of the decision-making involvement of management accountants is presented, followed by an investigation of the premise that management accounting professionals in their traditional positions are also becoming more involved in business decision-making.

6.3 BUSINESS-RELATED DECISION-MAKING INVOLVEMENT

Question 2 in the role and decision-making involvement section of the questionnaire requested respondents to indicate, based on a five-point Likert scale, the level to which they

were involved in making business decisions, after being provided with a detailed definition of business-related decision-making relevant to the study. The responses are presented graphically in Figure 6.1.

Figure 6.1: Level of business decision-making involvement
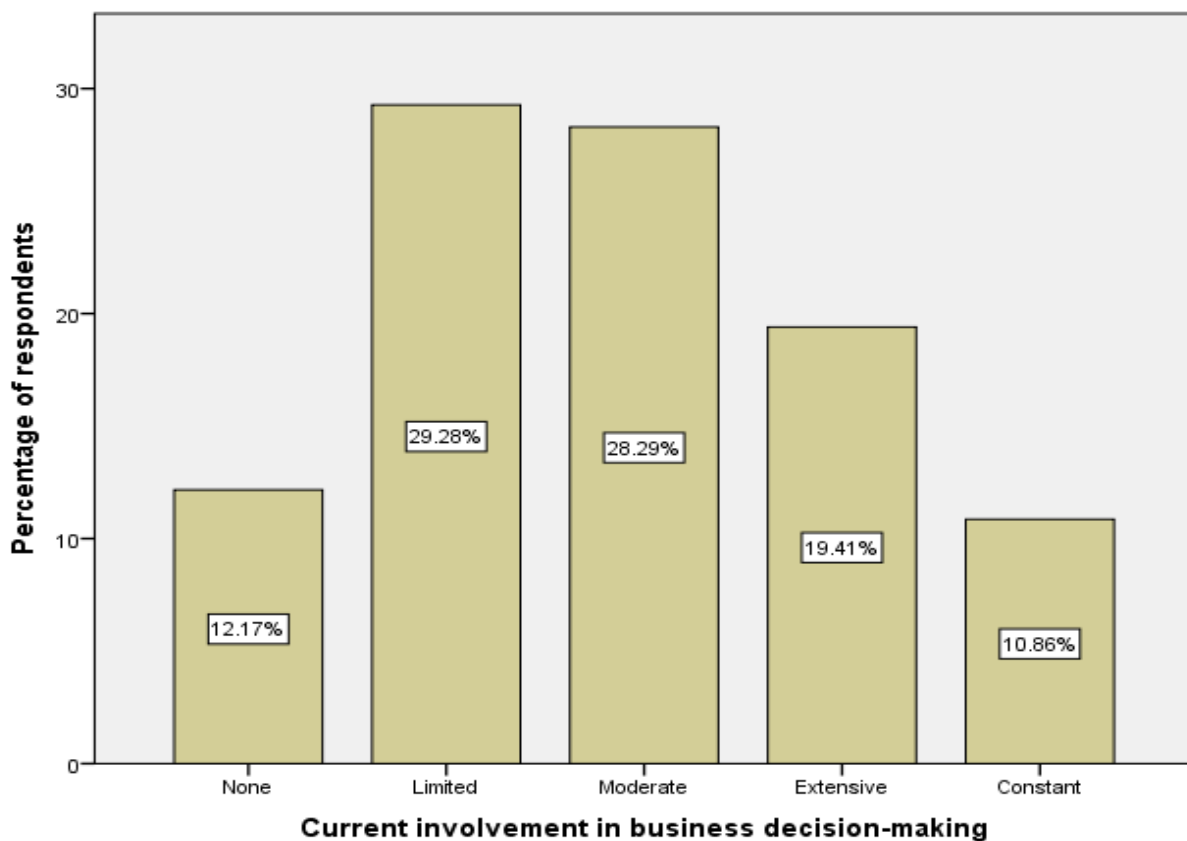
For the sample, a total of 58.6% of respondents indicated a moderate to constant involvement in business decisions, while only 12.2% reported no involvement in business decisions. For the purposes of statistical analysis, the responses based on the Likert scale are recoded into a numerical ordinal scale. The response of 'None' is recoded to 1, 'Limited' to 2, 'Moderate' to 3, 'Extensive' to 4, and 'Constant' to 5. The full sample response confirmed that management accounting professionals were regularly involved in business decision-making ($n = 304$, $M = 2.88$, $SD = 1.182$). The responses are analysed in more detail in Table 6.2.

Table 6.2: Level of business decision-making involvement per position

Subsample description		N	Mean	SD	Min	Max
Full sample		304	2.88	1.182	1	5
'Traditional' management accounting positions	Controller, Accountant, Financial Manager.	188	2.54	1.081	1	5
	Chief Financial Officer (CFO), Financial Director (FD), Vice-president (VP) Finance.	46	3.83	0.973	1	5
Positions with inherent business decision-making involvement	Chief Executive Officer (CEO), Managing Director (MD), President.	17	4.12	0.781	3	5
	Chief Operating Officer (COO)	4	4.00	1.414	2	5
	Operational Manager	34	2.94	1.013	1	5
Other		15	2.27	0.961	1	4

Table 6.2 indicates that all positions considered to relate to inherent business decision-making involvement reported a higher level of business-related decision-making involvement than reported by respondents in the traditional management accounting position denoted by either controller, accountant (including management accountant) or financial manager. The mean business decision-making involvement of the 18.1% of respondents employed in positions with inherent business decision-making involvement ranged from moderate to extensive involvement, indicating that these respondents were indeed already performing general business management as indicated by the description of their employment position.

However, Goretzki *et al.* (2013:55) found that, in their sample, some management accounting professionals employed in more traditional management accounting positions also started to consider themselves to enact general business management to some extent. In the current study, the top management accounting position (n = 46) of CFO, FD, or VP Finance reported a significant level of business decision-making involvement (M = 3.83), relatively constantly among respondents in this position (SD = 0.973). This is surpassed only

by management accounting professionals in the general top management positions of CEO, managing director (MD), or president ($n = 17$, $M = 4.12$, $SD = 0.781$), and the position of COO ($n = 4$, $M = 4.00$, $SD = 1.414$). The findings with reference to the business decision-making involvement of the top management accounting position support the emergence of the business partner role (Sorensen, 2009:1291).

As can be expected when looking only at the traditional position of the management accountant, the respondents in this position reported a lower level of decision-making involvement ($n = 188$, $M = 2.54$, $SD = 1.081$) than the average of the full sample ($M = 2.88$). However, a more in-depth analysis of the decision-making involvement of management accounting professionals in the traditional position of controller (management accountant), accountant or financial manager will shed greater light on how this traditional position is used by business with reference to decision-making involvement. Accordingly, a separate bar chart analysis was done of respondents who indicated that they were employed in the traditional management accounting role (see Figure 6.2).

It is encouraging to note that 46.81% of management accounting professionals in traditional management accounting roles indicated a moderate to constant involvement in business decisions. It should be noted that the percentage of respondents that reported extensive (10.61%) and constant (6.38%) business decision-making involvement was substantially lower than for the full sample (19.41% and 10.86% respectively). The comparatively lower degree of business decision-making involvement of management accounting professionals in traditional positions corroborates the conflict in the literature regarding pervasiveness of the business partner role of management accountants, supporting the premise by Nielsen *et al.* (2015:16) that the roles of management accountants in businesses are varied and intricate. The finding that 15.96% and 37.23% of the respondents in traditional management accountant positions indicated no or limited business decision-making involvement respectively (53.19% when combined) supports the statement by Lambert and Sponem (2011:566) that indeed "not every firm yearns for a business partner". This investigation into the distinction between the business decision-making involvement of management accounting professionals in the various organisational positions extends the current literature to provide an enhanced understanding of the emerging role of the business

partner. Accordingly, institutes, trainers and educators should take note that the more traditional management accounting role of controller, and financial information accumulator and analyst, still remains valid for a large number of management accounting professionals.

Figure 6.2: Level of business decision-making involvement – management accounting position
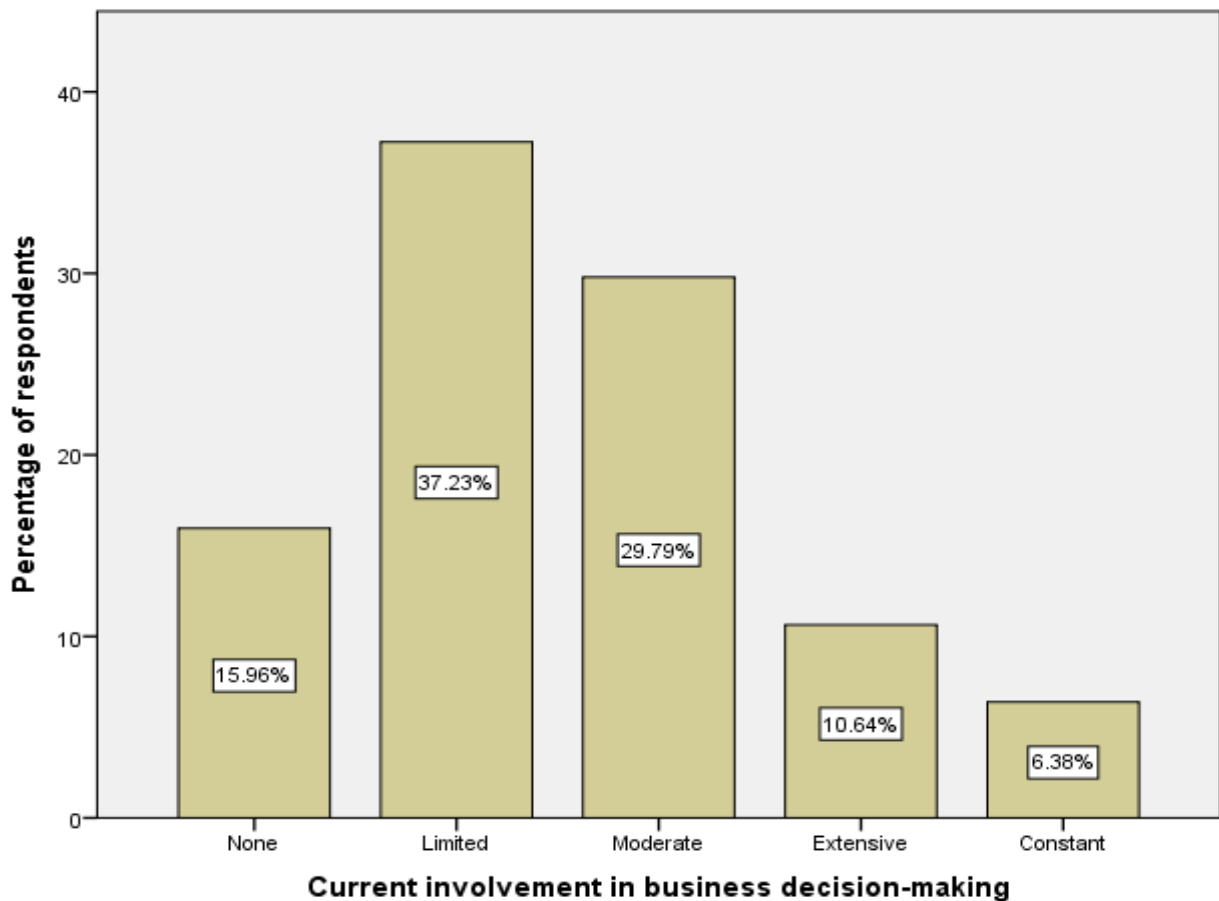
In the following section, results from analyses to determine, on a preliminary basis, the possible characteristics which are correlated with a higher or lower degree of decision-making involvement are presented. First, the hypotheses are summarised and the required analyses conducted, after which a second section summarises the findings with reference to the hypotheses.

6.3.1 Analysis of indicators of business-related decision-making involvement

Possible theoretical demographic indicators which may be associated with management accounting professionals that are more extensively involved in business decision-making were discussed in Section 2.4 of the literature review on the emerging business partner role of management accounting professionals. The possible statistical significance of these suggested indicators is tested on the sample data according to the hypotheses developed in the literature review. These six hypotheses are as follows:

Hypothesis 1.1 – Decision-making involvement and *position*:
The level of business decision-making involvement by management accounting professionals is significantly associated with the position these professionals occupy in their employing firm.

Hypothesis 1.2 – Decision-making involvement and *gender*:
Women are not as involved in business-related decision-making as men.

Hypothesis 1.3 – Decision-making involvement and *age*:
Age is correlated with a higher level of business decision-making involvement.

Hypothesis 1.4 – Decision-making involvement and *experience*:
Experience is correlated with a higher level of business decision-making involvement.

Hypothesis 1.5 – Decision-making involvement and *company size*:
Management accounting professionals employed in smaller companies are more involved in business decision-making than management accounting professionals in larger companies.

Hypothesis 1.6 – Decision-making involvement and *preference for supporting information*:

Management accounting professionals who indicated a higher level of preference for supporting information are less probable to be involved in business decision-making, than management accounting professionals who indicated a preference for making intuition-based decisions.

Logistic regression analyses are conducted, in accordance with the predictor selection and model building method discussed in Section 5.4.5.10, to test the hypotheses stated above. Two analyses are conducted. The first analysis focuses on the full sample, irrespective of the positions occupied by the management accounting professionals. The second analysis focuses only on management accounting professionals employed in the 'traditional' position of financial manager, accountant, management accountant or controller. The second analysis is more comparable with previous research on the role of the management accounting position (Byrne & Pierce, 2007; Goretzki *et al.*, 2013; Lambert & Sponem, 2011; Pierce & O'Dea, 2003).

To facilitate ease of reference, the description, composition and abbreviations used for the variables in the bivariate logistic regression analyses are presented in Table 6.3. For a more detailed discussion of the variables, see Section 5.4.6.2.

Tests for possible multi-collinearity between the Company size (sales USD) and Company size (employees) variables were performed. All the tests indicated correlations which is below the tolerance values (correlations between categories are below 0.7 and the Tolerance and VIF values are below suggested cut-off values). Consequently, both these variables were included in the analyses to follow. According to Hosmer and Lemeshow (2000:141), multi-collinearity would also be identifiable from larger than expected standard errors in the output from the analyses. No such large standard errors were identified.

Table 6.3: Variable composition and convention for decision-making involvement logistic regression analyses

Description of variable	Abbreviated name for analysis *(dummy variable convention in italics, where applicable)*
Gender of respondent	Gender
Age of respondent: • Young, respondents aged between 20 and 29 years; • Midlife, respondents aged between 30 and 49 years; and • Older, respondents aged 50 years and above.	Age *Age* *Age 1* *Age 2*
Years of work experience of respondent: • Little experience, 0 to 5 years' experience; • Moderate experience, 6 to 15 years' experience; and • Experienced, more than 15 years' experience.	Experience *Experience* *Experience 1* *Experience 2*
Position occupied by the respondent: • The traditional management accountant position, including its equivalents of financial manager, accountant and controller; • The top management accounting position of financial director, including its relative equivalents of chief financial officer and vice president of finance; and • Business management position, by combining the positions of managing director, including its relative equivalents of chief executive officer and president, as well as operational manager.	Position *Position_MA* *Position_FD* *Position_BM*
The size of the company in which the respondent is employed, measured in terms of sales revenue in US dollar: • Small, $10 million or less annual sales revenue; • Medium, $10.1 million to $1 billion annual sales revenue; and • Large; more than $1 billion annual sales revenue.	Company size (sales USD) *Company size (sales USD)* *Company size (sales USD) 1* *Company size (sales USD) 2*
The size of the company in which the respondent is employed, measured in terms of number of employees: • Small, 100 or less employees; • Medium, 101 to 5 000; and • Large, more than 5 000 employees.	Company size (employees) *Company size (employees)* *Company size (employees) 1* *Company size (employees) 2*
The level to which a respondent prefers to have supporting information to support the decisions, as opposed to relying on intuition or judgement	Pref_supp_info

The first analysis, based on the full sample of respondents employed in any of the positions consists of 304 responses (*n*). With reference to the dependent variable, 126 respondents (41.4%) reported a low level of decision-making involvement, and 178 (58.6%) reported a high level of decision-making involvement. Descriptive statistics of the relevant categorical and scale variables for this analysis is provided in Appendix 4 (Tables A4.1 and A4.2). The results of the bivariate predictor selection logistic regression analysis with reference to possible indicators of a higher level of decision-making involvement of management accounting professionals in all positions are presented in Table 6.4. Only variables with a significance below the cut-off value of $p < .25$ are included in the initial model.

Table 6.4: Summary of bivariate analysis – indicators of current business decision-making involvement

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model ($p < .25$)		
Gender	4.728 (1) $p = .030$	4.738 (1) $p = .030$
Age	7.879 (2) $p = .019$	7.957 (2) $p = .019$
Experience	7.998 (2) $p = 0.18$	8.071 (2) $p = .018$
Position	30.454 (2) $p < .001$	39.226 (2) $p < .001$
Company size (sales, USD)	7.129 (2) $p = .028$	7.554 (2) $p = .023$
Company size (employees)	4.773 (2) $p = .092$	4.885 (2) $p = .087$
Pref_supp_info	3.006 (1) $p = 0.83$	3.054 (1) $p = .081$
Not to be entered into initial model ($p > .25$)		
None		

Based on Table 6.4, all variables are entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in only 'Position' remaining significant at $p ≤ 0.05$. However, the removal of the other variables significantly affects the likelihood ratio. Careful analysis reveals that the optimal final model is obtained by only removing the 'Company size' (measured by number of employees) variable. The fit and significance of the final model derived from the model building process are provided in Table 6.5.

Table 6.5: Model fit statistics – indicators of current business decision-making involvement

Statistic	Value	Finding
Likelihood ratio	49.281 ($df = 10$), p < 0.001	Highly significant fit
Classification hit rate increase:		
- Maximum by chance	23.38%	
- Proportional by chance	40.45%	Acceptable improvement*
Area under ROC curve	0.745	Acceptable discrimination
R^2:		
- McFadden	.138	Moderate fit
- Nagelkerke	.23	
Hosmer & Lemeshow test	5.036 ($df = 8$), $p = .754$	Good fit
Studentised residuals above 2	1.97%	Good fit

* Base rate proportion is 58.6%

An assessment of the model fit statistics indicates that the model is an acceptable fit for the data and that the findings of the final model for indicators of higher current decision-making involvement, based on all positions, can be interpreted. A summary of the information derived from the final model is presented in Table 6.6.

Table 6.6: Final logistic regression model – indicators of current business decision-making involvement[3]

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Position_MA			21.033 (2) $p < .001$			
Position_FD	2.005	0.522	14.756 (1) $p < .001$	7.422	2.669	20.641
Position_BM	1.167	0.396	8.685 (1) $p = .003$	3.214	1.478	6.986
Company size (sales USD)			7.476 (2) $p = .024$			
Company size (sales USD) 1	-0.873	0.363	5.774 (1) $p = .016$	0.418	0.205	0.851
Company size (sales USD) 2	-1.013	0.399	6.454 (1) $p = .011$	0.363	0.166	0.793
Age			3.352 (2) $p = .187$			
Age 1	0.478	0.426	1.26 (1) $p = .167$	1.612	0.7	3.712
Age 2	-0.26	0.635	0.167 (1) $p = .682$	0.771	0.222	2.679
Experience			2.024 (2) $p = .363$			
Experience 1	0.397	0.385	1.065 (1) $p = .302$	1.487	0.7	3.162
Experience 2	0.686	0.492	1.943 (1) $p = .163$	1.985	0.757	5.204
Gender	-0.259	0.301	0.739 (1) $p = .390$	0.772	0.428	1.382
Pref_supp_info	-0.46	0.054	0.705 (1) $p = .401$	0.955	0.859	1.063

Source: Adapted from SPSS output

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[3] The results of the regression analysis in Table 6.6 contain no significantly inflated standard errors, indicating that possible multicollinearity between age and experience did not present a problem in the analysis (Hosmer & Lemeshow, 2000:141).

Table 6.6 indicates that the only significant indicators are 'Position', and 'Company size (sales USD)'. The other variables serve as controlling and moderating variables on the two significant variables to enhance the model fit. The final model confirms the univariate analyses in Section 6.3, which preliminarily indicated a difference in decision-making involvement based on the position occupied, as well as earlier suggestions from literature (Clinton & White, 2012:41; Garg *et al.*, 2003:8), namely that the position in which a management accounting professional is employed may serve as a significant indicator of the level of involvement in business decision-making which the professional reports.

A management accounting professional employed in the position of FD (or its equivalents of VP finance, or CFO) is 7.422 times (Wald χ^2 = 14.756 (1), $p < .001$) more likely to report high business decision-making involvement than a management accounting professional employed in the traditional management accountant (or equivalent of financial manager, accountant, controller) position. Management accounting professionals employed in positions with inherent business decision-making involvement are 3.214 times (Wald χ^2 = 8.685 (1), $p = .003$) more likely to report a high level of business decision-making involvement than their counterparts in traditional management accounting positions. The findings of the present study therefore confirm the suggestions by Clinton and White (2012) and Garg *et al.* (2003) that the positions in which management accounting professionals are employed serve as an indicator of their decision-making involvement. The findings of the current study provide empirical evidence to support these previous suggestions. Additionally, it also separates the top management accounting position from other positions with inherent decision-making involvement to provide richer information on the decision-making involvement of the top management accounting position.

The second significant predictor indicates that management accounting professionals employed in medium- and larger-sized companies, as classified by the sales revenue of these companies, are less likely to report high business decision-making involvement than their colleagues employed in smaller-sized companies. Particularly, management accounting professionals in medium-sized companies are 2.392 times (Wald χ^2 = 5.774 (1), $p = .016$) less likely to report high decision-making involvement, and those employed in large-sized companies are 2.75 times (Wald χ^2 = 6.454 (1), $p = .011$) less likely than

management accounting professionals in smaller companies to report high decision-making involvement. These findings provide some of the additional insight requested by Byrne and Pierce (2007:490) and Yazdifar and Tsamenyi (2005:196) into the association between the size of a company and the role of the management accounting professionals. The current findings provide limited support of a difference in decision-making involvement between medium-sized and large-sized companies as suggested by Byrne and Pierce (2007:489), but indicate a significant difference between smaller-sized companies, and medium and larger companies when classified by sales revenue. It is interesting to note that company size in terms of number of employees is found not to contribute to the model in the present study. The differences in the role of the management accountant between medium and larger companies suggested by Byrne and Pierce (2007:475) relate to the traditional management accountant position. Accordingly, the findings of the next analysis may be more comparable with their study.

Waweru *et al.* (2004:694) suggest that a need exists for management accounting professionals in their traditional position of management accountant, financial manager, accountant or controller to become more involved in business decision-making. Much of the research into the emerging role of management accounting professionals also focuses on this traditional position (Byrne & Pierce, 2007; Clinton & White, 2012; Järvenpää, 2007; Lambert & Sponem, 2011; Pierce & O'Dea, 2003; Siegel *et al.*, 2003). Accordingly, possible indicators of a higher level of business decision-making involvement by management accounting professionals in this traditional position are investigated in a separate focused analysis.

For the second analysis, conducted to investigate possible indicators of high business decision-making involvement of management accounting professionals in the traditional position of management accountant (or equivalent), a binary logistic regression analysis is undertaken by focusing only on the part of the sample of management accounting professionals employed in this traditional position. However, it should be noted that the sample size of this narrow sample is restrictive and may limit the power of the analysis to identify indicators. The sample size of respondents employed in the management accountant position is 188 respondents (*n*). With reference to the dependent variable, 100

respondents (53.2%) reported a low level of decision-making involvement, and 88 (46.8%) reported a high level of decision-making involvement. Additional descriptive statistics of this specific sample sub-set is available in Appendix 4 (Tables A4.3 and A4.4).

Table 6.7: Summary of bivariate analysis – indicators of current business decision-making involvement of the management accounting position

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	1.917 (1) *p* = .166	1.933 (1) *p* = .164
Age	7.222 (2) *p* = .027	7.515 (2) *p* = .023
Experience	3.013 (2) *p* = .222	3.049 (2) *p* = .218
Company size (sales, USD)	4.021 (2) *p* = .134	4.109 (2) *p* = .128
Pref_supp_info	1.918 (1) *p* = .166	1.937 (1) *p* = .164
Not to be entered into initial model (*p* > .25)		
Company size (employees)	1.71 (2) *p* = .425	1.722 (2) *p* = .423

Based on Table 6.7, 'Gender', 'Age', 'Experience', 'Company size (sales, USD)' and 'Pref_supp_info' are entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in only 'Company size (sales, USD)' remaining significant at $p \leq 0.05$ for the initial model. However, the removal of all the other variables significantly affects the likelihood ratio and also the beta coefficients of the 'Company size (sales, USD)' variable. Through an iterative process of adding back variables in order of significance, the model and beta coefficients seem to stabilise when 'Gender' and 'Age' are added back to the model. The summary of the statistics regarding the fit of the final model is presented in Table 6.8.

Table 6.8: Model fit statistics – indicators of current business decision-making involvement of the management accounting position

Statistic	Value	Finding
Likelihood ratio	12.415 (5), $p = 0.03$	Significant fit
Classification hit rate increase:		
- Maximum by chance	25%	
- Proportional by chance	27.9%	Acceptable improvement*
Area under ROC curve	0.664	Moderate discrimination
R^2:		
- McFadden	.052	Weak fit
- Nagelkerke	.093	
Hosmer & Lemeshow test	4.406 (6), $p = .622$	Good fit
Studentised residuals above 2	None	Good fit

* Base rate proportion is 51.2%

As expected, the model fit is somewhat weaker due to a smaller sample size. However, overall, the model fit statistics indicate that the model can still be interpreted as a moderately fitting model. Accordingly, the information on the variables in the final model is presented in Table 6.9 for further interpretation.

Table 6.9 indicates that 'Company size (sales USD)' and 'Age' are indicators of higher business decision-making involvement by respondents in the traditional management accountant position. 'Gender' serves as a controlling and moderating variable and is consequently not statistically significant. A management accounting professional employed by a large-sized company (based on sales revenue in US dollar) is 3.049 times (Wald $\chi^2 = 6.12$ (1), $p = .013$) less likely to report high business decision-making involvement than a management accounting professional employed by a small-sized company.

Table 6.9: Final logistic regression model – indicators of current business decision-making involvement of the management accounting position[4]

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Company size (sales USD)			6.217 (2) $p = .045$			
Company size (sales USD) 1	-0.557	0.414	1.809 (1) $p = .179$	0.573	0.254	1.29
Company size (sales USD) 2	-1.114	0.45	6.12 (1) $p = .013$	0.328	0.136	0.793
Age			5.539 (2) $p = .063$			
Age 1	0.919	0.407	5.111 (1) $p = .024$	2.507	1.130	5.561
Age 2	0.365	0.590	0.382 (1) $p = .536$	1.44	0.453	4.573
Gender	-0.375	0.335	1.253 (1) $p = .263$	0.687	0.357	1.325

The difference in the odds of being highly involved in business decision-making between respondents employed in small-sized companies, as compared with medium-sized companies, is not statistically significant (Wald χ^2 = 1.809 (1), $p = .179$). Consequently, regarding the traditional role of the management accountant, the findings indicate that management accounting professionals in small firms are more involved in making business decisions than management accountants in large firms. Management accountants in medium firms are also considered to be involved in business decision-making, as their involvement does not differ statistically significantly from their colleagues in smaller firms. These findings corroborate the suggestions by Byrne and Pierce (2007:489-490) and Yazdifar and Tsamenyi (2005:196) by providing quantitative empirical findings regarding the

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[4] The results of the regression analysis in Table 6.9 contain no significantly inflated standard errors, indicating that possible multicollinearity between age and experience did not present a problem in the analysis (Hosmer & Lemeshow, 2000:141).

difference in business decision-making involvement of the management accountant role between smaller and larger companies.

Furthermore, for the current sample, management accounting professionals that are in their midlife age (30 to 49 years) and employed in the traditional management accounting position are 2.507 times (Wald χ^2 = 5.111 (1), p = .024) more likely to report higher decision-making involvement than young (20 to 29 years) management accounting professionals in the same position. However, the difference in odds of reporting higher decision-making involvement between young (20 to 29 years) and older (50+ years) management accounting professionals is not statistically significant (Wald χ^2 = 0.382 (1), p = .536). Accordingly, not only is age positively correlated with the progression to higher level positions by management accounting professionals (Arnold *et al.*, 2000:123), but also with their business decision-making involvement, should they remain in traditional management accounting positions. However, the correlation of increased business decision-making involvement with age seems to be u-shaped with older management accounting professionals not being regularly involved in making business decisions. The possible reasons for older management accounting professionals not being as involved in business-related decision-making when compared with their midlife colleagues may be due to these individuals being inclined to favour the traditional role of the management accountant, or due to the manner in which the organisation views the role of these older professionals. Closer investigation into the possible reasons represents an avenue for future research.

6.3.2 Summary of findings regarding indicators of business-related decision-making

In Section 2.4, hypotheses were formulated to investigate, on a preliminary basis, possible indicators of higher business decision-making involvement by management accounting professionals. These hypotheses were tested in Section 0. A summary of the findings with reference to this investigation is presented in the paragraphs that follow.

The following hypotheses are **supported** by the results of the binary logistic regression analysis of the data with reference to the full sample (all positions):

- The position in which a management accounting professional in the sample was employed is a statistically significant indicator of a higher level of decision-making involvement. A higher level of business decision-making involvement is correlated with both management accounting professionals in the top management accounting position of financial director (or its equivalent), and those employed in positions with inherent business decision-making involvement.

- The size of a company, specifically in terms of revenue in US dollar, is an indicator of higher business decision-making involvement by management accounting professionals in the sample. Specifically, professionals employed in smaller companies were statistically significantly more probable to report higher business decision-making involvement than management accounting professionals in medium- and larger-sized companies.

The following hypotheses could **not** be **supported** by the results of the binary logistic regression analysis of data of the full sample (all positions):

- No support could be found to indicate that women in the sample were significantly less likely to report higher decision-making involvement than their male colleagues.

- Neither age nor experience was significantly correlated with a higher level of decision-making involvement.

- Company size, in terms of number of employees, did not indicate a significant correlation with a higher level of business decision-making involvement.

- A management accountant's level of preference for basing decisions on extensive supporting information rather than judgement, did not indicate a lower level of business decision-making involvement.

With reference only to management accounting professionals employed in the traditional management accounting position, the following hypotheses are **supported** by the results of the binary logistic regression analysis of the data:

- Similar to the findings for all positions, company size in terms of US dollar is found to be a significant indicator of the level of decision-making involvement of management

accounting professionals in the sample. Specifically, in larger companies, the management accountant was less likely to be involved in business decision-making when compared with smaller companies.

- Age is also found to be a significant indicator of the level of business decision-making involvement of respondents in the traditional management accounting position. However, the relationship is not linear. Management accounting professionals at midlife age were more highly involved in making business-related decisions than both their younger and older colleagues.

The following hypotheses could **not** be **supported** by the results of the analysis of data for the section of the sample who were employed in 'traditional' management accounting positions:

- Gender did not indicate significant differences in the level of decision-making involvement of respondents.

- Experience in being employed as a management accounting professional also did not significantly indicate a difference in the level of decision-making involvement of respondents in this section of the sample.

- Company size, in terms of number of employees, did not serve as a significant indicator of a higher level of decision-making involvement.

- A management accountant's level of preference for basing decisions on extensive supporting information rather than judgement, did not indicate a lower level of business decision-making involvement.

In the next section, the results of the investigation into any possible increases in business decision-making involvement by management accounting professionals in the sample are provided, with specific closer investigation into those employed in a traditional management accounting position.

6.4   INCREASE IN BUSINESS-RELATED DECISION-MAKING INVOLVEMENT

The literature on the changing role of management accounting professionals suggests an increase in involvement of management accounting professionals in 'commercial' or general

business matters (Montano *et al.*, 2001:302; Pierce & O'Dea, 2003:260; Rausch, 2011:138; Siegel *et al.*, 2003:43). This section therefore focuses on **Question 3** in the business-related decision-making involvement section of the questionnaire, which requested respondents to indicate the extent of any increase in decision-making involvement that they experienced during the past decade, on a five-point Likert scale. For the purposes of statistical analysis, the responses based on the Likert scale were recoded into a numerical ordinal scale. The response of 'Not all' was recoded to 1, 'Slightly' to 2, 'Moderately' to 3, 'Substantially' to 4, and 'Comprehensively' to 5. The emphasis in this study, and the analyses performed, is not specifically on the decade as a period, but on whether the role change and increase in decision-making involvement occurred, or were still occurring, recently, rather than having occurred much earlier (in other words, more than a decade ago). Accordingly, individuals with limited work experience were included in the analyses, as their recent experience regarding a possible increase in business decision-making involvement would indicate that the increase were taking place recently. However, individuals with less than one year of working experience were deemed not to be in a position to evaluate the possible extent of a difference of decision-making involvement in their positions. These respondents were excluded from the analyses that follow.

Figure 6.3 presents the percentage distribution of responses on a bar chart. Of all the respondents, apart from those with less than one year's experience (*n* = 281), 65.12% indicated a moderate to comprehensive increase in their involvement in business decisions, while only 12.46% reported no increase in involvement in business decisions.

Figure 6.3: Increase in business decision-making involvement during the past decade
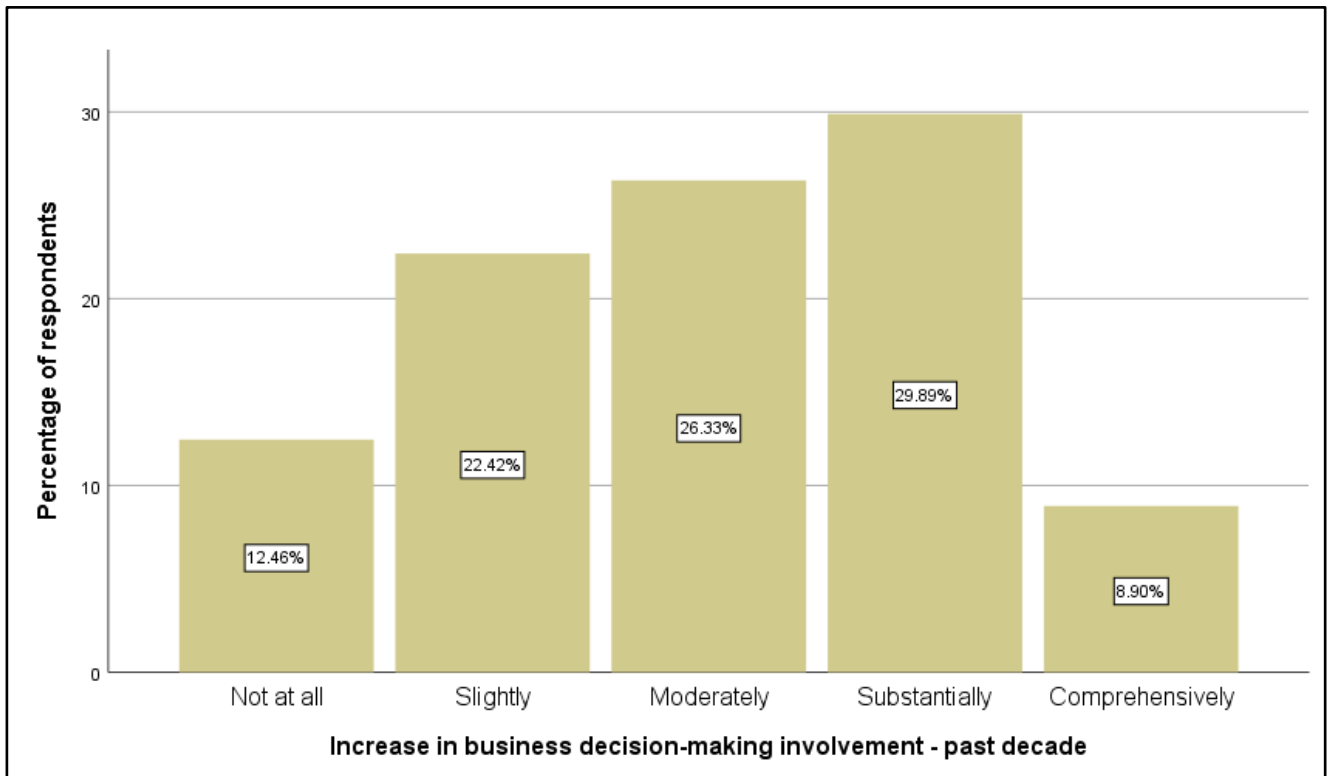
The full sample response confirms that management accounting professionals experienced an increase in business decision-making involvement during the past decade ($n = 281$, $M = 3$, $SD = 1.176$). Descriptive statistical analyses regarding the responses are provided in Table 6.10. The table includes separate analyses based on the respective positions occupied by respondents.

Again, a comparison of the reported increase in decision-making involvement between management accounting professionals in the traditional position and those in positions with inherent business decision-making involvement indicates a higher degree of increase in business decision-making involvement being experienced by respondents in positions inherently involving more general business management. However, with reference to Question 3, it should be noted that respondents who progressed to positions which inherently required business decision-making involvement during the last decade, would be expected to report an increase in decision-making involvement due to the requirement of their new positions.

Table 6.10: Level of increase in business decision-making involvement per position

Subsample description		N	Mean	SD	Min	Max
Full sample		281	3.00	1.176	1	5
'Traditional' management accounting positions	Controller, Accountant, Financial Manager.	174	2.66	1.126	1	5
	Chief Financial Officer (CFO), Financial Director (FD), Vice-president (VP) Finance.	46	3.72	0.958	1	5
Positions with inherent business decision-making involvement	Chief Executive Officer (CEO), Managing Director (MD), President.	16	4.19	0.834	3	5
	Chief Operating Officer (COO)	4	4	1.414	2	5
	Operational Manager	29	3.28	0.96	1	5
Other		12	2.75	0.965	1	4

The increase in involvement in business-related decision-making reported by management accounting professionals in the top management accounting position of CFO, FD or VP finance is substantial ($n = 46$, $M = 3.72$, $SD = 0.958$), and significantly higher than the increase reported by management accounting professionals in the traditional position of controller, accountant, management accountant or financial manager ($n = 174$, $M = 2.66$, $SD = 1.126$). However, as Section 6.3 indicated that the top management accounting position exhibited a higher degree of decision-making involvement, this reported increase could also be biased, to some extent, by career progression. Nevertheless, the reported increase in business decision-making involvement indicates the importance of an investigation into the business decision-making behaviour of management accounting professionals because these professionals can expect to experience an increase in business decision-making as they progress in their careers.

To investigate the conflict in the literature on the changing role of management accounting professionals in more detail, the most prudent approach of focusing on management accounting professionals in the traditional position of controller, accountant or financial

manager should provide the most impartial insight. Accordingly, the responses of management accounting professionals in traditional management accounting positions are presented graphically in Figure 6.4. The mean increase in decision-making involvement of respondents employed in the traditional management accounting position of M = 2.66 (n = 174, SD = 1.126) is depicted in Table 6.10.

Figure 6.4: Increase in business decision-making involvement during the past decade – management accounting position
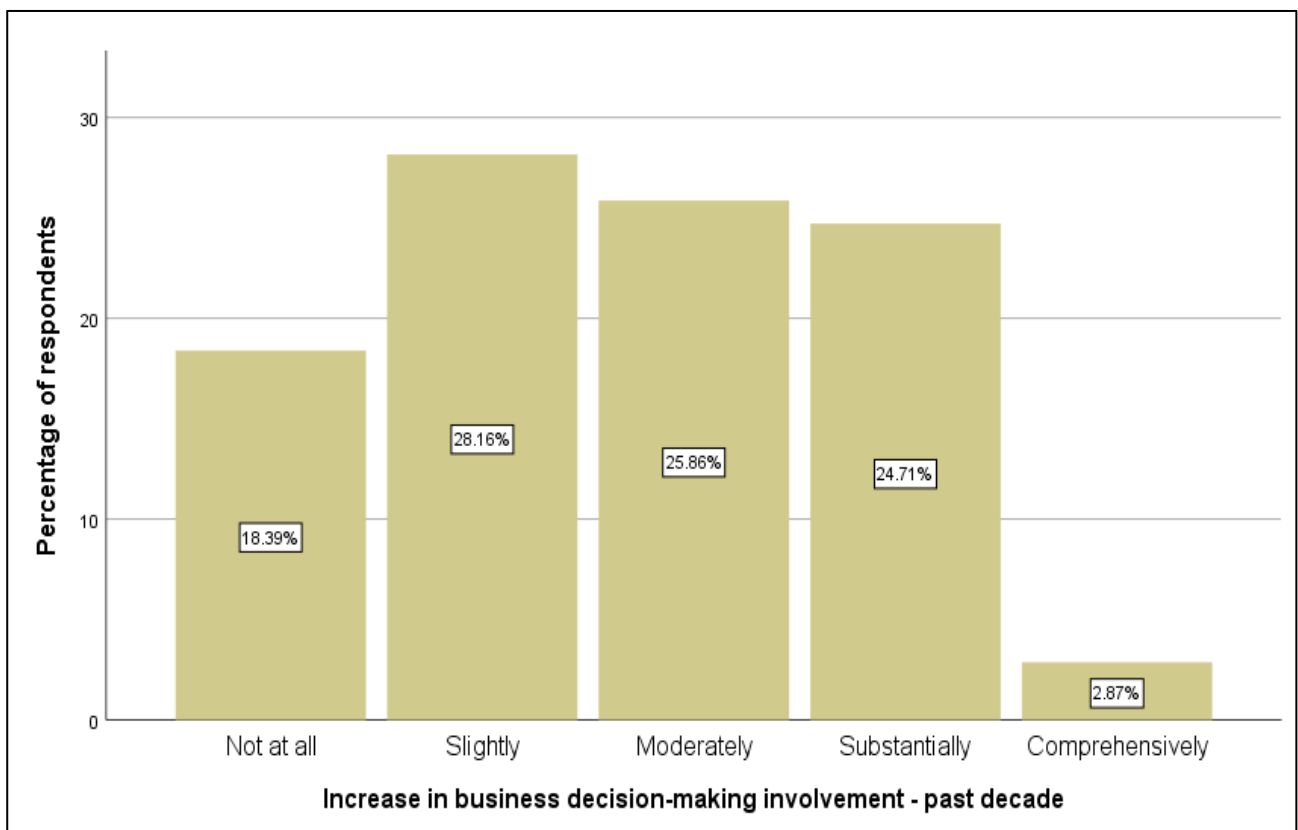
Figure 6.4 indicates that 81.59% of respondents in the traditional management accounting position reported some increase in business decision-making involvement. However, respondents indicating a moderate to comprehensive increase in business decision-making involvement may be more representative to support the significance required to argue a role change. This figure equates to 53.44% of respondents in the traditional management accounting position. The findings indicated above support the premise that the traditional role of management accountants in some businesses are changing towards that of business partner (Komakech, 2009:42; Pierce & O'Dea, 2003:278; Russell *et al.*, 1999:3; Siegel *et*

al., 2003:42; Sutton, 2006:3). This finding highlights the importance of investigating the decision-making behaviour of management accounting professionals. However, again this role change does not seem to apply to management accounting positions in all companies.

To extend the investigation into this phenomenon further, an investigation into possible correlations between demographic variables and an experienced increased involvement in business decision-making involvement of management accounting professionals in the traditional management accounting role is undertaken in the following sections. The first section recounts the hypotheses and presents the relevant analyses, while the second section summarises the findings with reference to the hypotheses.

6.4.1 Analysis of indicators of increase in business-related decision-making: traditional management accounting role

Possible theoretical demographic indicators which may be associated with management accounting professionals that are experiencing an increase in business decision-making involvement were discussed in Section 2.4 of the literature review. The focus of the hypotheses developed in the literature review and the analyses presented below is limited to the traditional management accounting role. This is due to the logical expectation that career progression to the other roles, which all exhibit higher decision-making involvement than the traditional role, according to Section 6.3 above, will bias any analyses conducted on the full sample. Additionally, respondents with less than one year of working experience were again excluded, as they were deemed not to be able to clearly judge a change in decision-making involvement over such a limited working career. The hypotheses developed in the literature review are as follows:

Hypothesis 2.1 – Increase in decision-making involvement and *gender*:
Women respondents report a lower increase in business decision-making involvement than men.

Hypothesis 2.2 – Increase in decision-making involvement and *age*:
Age correlates with a higher level of increase in business decision-making involvement.

Hypothesis 2.3 – Increase in decision-making involvement and *experience*:

Experience correlates with a higher level of increase in business decision-making involvement.

Hypothesis 2.4 – Increase in decision-making involvement and *company size*:

Management accounting professionals employed by smaller companies have experienced a higher level of increase in business decision-making involvement than their colleagues employed in larger companies.

Hypothesis 2.5 – Increase in decision-making involvement and *preference for supporting information*:

Management accounting professionals who indicated a higher level of preference for supporting information are less probable to have experienced an increase in business decision-making involvement, than management accounting professionals who indicated a preference for making intuition-based decisions.

To investigate possible indicators of high increases in business decision-making involvement of management accounting professionals in the traditional position of management accountant (or equivalent), a binary logistic regression analysis is undertaken. It should be noted that the sample size of this narrow sample is restrictive and could limit the power of the analysis. The number of responses that fall within this category are 174 (*n*). With reference to the dependent variable; 81 respondents (46.6%) indicated a low level of increase in decision-making involvement during the last decade, and 93 respondents (53.4%) indicated a high level of increase in business decision-making involvement. The additional descriptive statistics for this sample sub-set is available in Appendix 4 (Tables A4.5 and A4.6).

For ease of reference, the description, composition and abbreviations used for the variables in the bivariate logistic regression analyses are presented in Table 6.11. A more detailed discussion of the variables can be found in Section 5.4.6.2. The bivariate analyses to determine which variables should be entered into the initial model are presented in Table 6.12.

Table 6.11: Variable composition and convention for increase in decision-making involvement logistic regression analyses

Description of variable	Abbreviated name for analysis *(dummy variable convention in italics, where applicable)*
Gender of respondent	Gender
Age of respondent: • Young, respondents aged between 20 and 29 years; • Midlife, respondents aged between 30 and 49 years; and • Older, respondents aged 50 years and above.	Age *Age* *Age 1* *Age 2*
Years of work experience of respondent: • Little experience, 0 to 5 years' experience; • Moderate experience, 6 to 15 years' experience; and • Experienced, more than 15 years' experience.	Experience *Experience* *Experience 1* *Experience 2*
Position occupied by the respondent: • The traditional management accountant position, including its equivalents of financial manager, accountant and controller; • The top management accounting position of financial director, including its relative equivalents of chief financial officer and vice president of finance; and • Business management position, by combining the positions of managing director, including its relative equivalents of chief executive officer and president, as well as operational manager.	Position *Position_MA* *Position_FD* *Position_BM*
The size of the company in which the respondent is employed, measured in terms of sales revenue in US dollar: • Small, $10 million or less annual sales revenue; • Medium, $10.1 million to $1 billion annual sales revenue; and • Large; more than $1 billion annual sales revenue.	Company size (sales USD) *Company size (sales USD)* *Company size (sales USD) 1* *Company size (sales USD) 2*
The size of the company in which the respondent is employed, measured in terms of number of employees: • Small, 100 or less employees; • Medium, 101 to 5 000; and • Large, more than 5 000 employees.	Company size (employees) *Company size (employees)* *Company size (employees) 1* *Company size (employees) 2*
The level to which a respondent prefers to have supporting information to support the decisions, as opposed to relying on intuition or judgement	Pref_supp_info

Table 6.12: Summary of bivariate analysis – indicators of increase in business decision-making involvement of the management accounting position

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model ($p < .25$)		
Gender	2.754 (1) *p* = .097	2.733 (1) *p* = .096
Age	8.606 (2) *p* = .014	9.068 (2) *p* = .011
Experience	3.784 (2) *p* = .151	3.823 (2) *p* = .148
Pref_supp_info	4.566 (1) *p* = .033	4.764 (1) *p* = .029
Not to be entered into initial model ($p > .25$)		
Company size (employees)	0.311 (2) *p* = .856	0.311 (2) *p* = .856
Company size (sales USD)	2.62 (2) *p* = .27	2.652 (2) *p* = .266

Based on Table 6.12, 'Gender', 'Age', 'Experience' and 'Pref_supp_info' are entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in only 'Pref_supp_info' remaining significant at $p \leq 0.05$. The removal of all the other variables, apart from 'Age' does not significantly affect the likelihood ratio or the beta coefficients of the 'Pref_supp_info' variable. The summary of the statistics regarding the fit of the final model is presented in Table 6.13.

The model fit statistics indicate that the model is a moderate fit, because the area under the ROC curve and the R^2 statistics indicate a weak fit, contrary to the other statistics, which suggest a good fit. Despite the weak fit indication of the area under the ROC curve statistic, the improvement in the classification hit rate suggests that the interpretation of the model does have value. Accordingly, the information on the variables in the final model is presented in Table 6.14 for further interpretation.

Table 6.13: Model fit statistics – indicators of increase in business decision-making involvement of the management accounting position

Statistic	Value	Finding
Likelihood ratio	13.614 (3), $p = 0.003$	Significant fit
Classification hit rate increase:		
- Maximum by chance	15.2%	
- Proportional by chance	22.4%	Moderate improvement*
Area under ROC curve	0.658	Moderate discrimination
R^2:		
- McFadden	.056	Good fit
- Nagelkerke	.101	
Hosmer & Lemeshow test	5.039 (7), $p = .655$	Good fit
Studentised residuals above 2	None	Good fit

* Base rate proportion is 53.4%

Table 6.14: Final logistic regression model – indicators of increase in business decision-making involvement of the management accounting position[5]

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Age			8.411 (2) $p = .015$			
Age 1	1.130	0.395	8.17 (1) $p = .004$	3.096	1.426	6.718
Age 2	0.617	0.57	1.172 (1) $p = .279$	1.853	0.607	5.663
Pref_supp_info	-0.138	0.066	4.351 (1) $p = .037$	0.871	0.765	0.992

Table 6.14 indicates that 'Age' and 'Pref_supp_info' are predictors of a high increase in business decision-making involvement by respondents in the traditional management accounting position. A management accounting professional of midlife age is 3.096 times (Wald $\chi^2 = 8.17$ (1), $p = .004$) more likely to report a high increase in business decision-

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[5] The results of the regression analysis in Table 6.14 contain no significantly inflated standard errors, indicating that possible multicollinearity between age and experience did not present a problem in the analysis (Hosmer & Lemeshow, 2000:141).

making involvement than a management accounting professional that is young. The difference in the odds of reporting a high increase in involvement in business decision-making between older respondents and younger respondents is not statistically significant (Wald χ^2 = 1.172 (1), p = .279). This finding is similar to the finding of a high level of decision-making involvement being more pronounced in the middle age group in Section 0. It is to be expected that the younger group in the sample were not yet incorporated into making business decisions due to their limited experience in a management accounting employment position. However, the comparatively low level of increase in business decision-making involvement by older respondents is noteworthy.

Again, this lower level of involvement of older management accounting professionals can be the result of either a hesitancy by business to involve older management accounting professionals that are used to the traditional function of a management accountant in business decision, or indeed a reluctance by these older individuals to depart from the set ways of the controller position of the past, or both. The alternative argument that the older group did not experience a comparatively high level of decision-making involvement in the past decade due to having progressed to a higher level of decision-making involvement in years prior to the last decade is contradicted by the comparatively lower level of current business decision-making involvement found in Section 0. Similar to the findings in Section 0, the reasons for the existence of the inverted u-shaped curve regarding the level of increase in business decision-making involvement with reference to the age categories represent an opportunity for further research.

Management accounting professionals who indicated a higher level of preference for basing decisions on extensive supporting information, were less probable to experience an increase in business decision-making. Alternatively stated, for each 10%-point increase in preference for extensive supporting information when making decisions, a respondent was 14.8% less likely (Wald χ^2 = 4.351 (1), p = .037) to have experienced an increase in business decision-making involvement. Accordingly, the more comfortable management accounting professionals in the sample were with using their judgement when making decisions, the more likely they were to have experienced an increase in business decision-making involvement. This preliminary finding suggests that the traditional tendency of management

accountants to base decisions extensively on supporting information, to the detriment of timeous decision-making (Pierce & O'Dea, 2003:266; Vaivio & Kokko, 2006:52), remains a resisting force in the evolvement of the business partner role. This illustrates the importance of equipping management accounting professionals with the skills required to make quality decisions when using their judgement.

6.4.2 Summary of findings regarding indicators of increase in involvement in business-related decision-making

The following summary connects the findings of the analyses in Section 6.4.1 to the hypotheses devised in Section 2.4 regarding possible indicators of a lower, or higher, level of increase in business decision-making involvement by management accounting professionals in the sample who are employed in the traditional management accounting position.

The following hypothesis could not be rejected and is **supported** by the results of the binary logistic regression analysis of the data:

- Age is a significant indicator of a higher level of business decision-making involvement of respondents in the traditional management accounting position. Respondents in their midlife years reported experiencing a higher level of business decision-making involvement than young respondents. However, the increase in the level of decision-making involvement experienced by older respondents did not differ significantly from that experienced by young respondents.

- Management accounting professionals who indicated a higher level of preference for supporting information were less probable to have experienced an increase in business decision-making involvement, than management accounting professionals who indicated a preference for making intuition-based decisions.

The following hypotheses could **not** be **supported** by the results of the binary logistic regression analyses of the data as presented in Section 6.4.1:

- No significant correlation between the experience of a respondent and the level of increase of business decision-making involvement during the last decade could be established.

- The size of the company (whether in US dollar or number of staff employed) at which the responding management accounting professional was employed, was not found to significantly correlate with a higher level of increase in business decision-making involvement.

- The results indicated no significant difference in the level of increase in business decision-making involvement of men and women respondents.

The findings in Sections 6.3 and 6.4 present a base for future studies related to the management accounting profession to build on in order to better understand the discrepancy in the literature regarding the business partner role (Lambert & Sponem, 2011:566; Nielsen *et al.*, 2015:16) with specific reference to business decision-making involvement.

The following sections present the investigation into the attitude of management accounting professionals who were involved in business decision-making towards the use of judgement when making decisions, followed by an examination of the requirement to apply judgement when making business-related decisions.

6.5   LEVEL OF PREFERENCE FOR SUPPORTING INFORMATION

Harris (1994:14) argues that the personality traits common to individuals that decide to embark on a career in management accounting generally exhibit a tendency to prefer solid supporting evidence when making decisions, resulting in hesitancy to make decisions based on intuition. Pierce and O'Dea (2003:274) note that this hesitancy is a key criticism of operational managers with reference to management accounting professionals regarding their possible involvement in business decisions.

Accordingly, **Question 4** in the role and decision-making involvement section of the questionnaire required respondents to indicate their **level of preference for making decisions based on specific supporting information,** as opposed to making decisions based on their own intuition or judgement. Respondents were presented with an 11-point scale ranging from 0 (indicating an unequivocal preference for making decisions based on ample supporting information) to 10 (indicating complete comfort in making decisions based only on intuition and judgement).

The scale for this question was reversed during analysis to accommodate both the discussion to follow, as well as the comparison with the results from the level to which respondents indicated that they were required to make judgement-based decisions. Hence, the results and discussion to follow are based on a scale between 0 and 10, where 0 indicates complete comfort in making decisions based only on intuition and judgement, and 10 indicates an unequivocal preference for making decisions based on ample supporting information.

Respondents indicated a preference for supporting information as can be seen by the mean and median in Table 6.15. However, the level to which respondents preferred supporting information ranged from being completely comfortable with making decisions based on intuition and judgement to unequivocally preferring ample supporting information.

Table 6.15: Level of preference[6] for supporting information

	N	**Mean**	**Median**	**SD**	**Minimum**	**Maximum**
Level of preference for supporting information	303	5.96	7	2.656	0	10

The results of the one-sample t-test indicate that the mean preference of respondents ($n = 303$) for making decisions based on ample supporting information, as opposed to making decisions based on intuition (M = 5.96, SD = 2.656), differs significantly

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[6] 0-10 Scale reversed from presentation in questionnaire

(t(302) = 6.316, p = 0.001) from having no specific preference (no preference denoted by M = 5). The eta-squared statistic (r^2 = 0.1167) represents a medium to large effect size. The findings indicate that the respondents in the sample, on average, preferred making decisions based on sound supporting information. However, the reported preference for supporting information is not as substantial as suggested by discussions in past literature (Harris, 1994:14; Pierce & O'Dea, 2003:274), possibly indicating that management accounting professionals are adapting to the requirement of the business partner role to base some decisions on judgement (Pierce & O'Dea, 2003:274). In the following section, the investigation into this requirement is presented in more detail.

6.6 PERCENTAGE OF DECISION FOR WHICH SUPPORTING INFORMATION IS AVAILABLE

The next question was included to further investigate the possible issue suggested in the literature regarding the requirement to use intuition and judgement to an extent to which the generalised personality of management accounting professionals would not be comfortable with, as suggested by Pierce and O'Dea (2003:274) in combination with the discussion by Harris (1994:14).

Question 5 in the role and decision-making involvement section of the questionnaire required respondents to indicate the **percentage** (in increments of ten percentage points) **of the business decisions** in which they were involved which **had ample supporting information available**. This question was only displayed to participants who selected at least some decision-making involvement in Question 2 (n = 267). A descriptive summary of the responses is presented in Table 6.16.

Table 6.16: Percentage of decisions with ample supporting information

	N	Mean	Median	SD	Minimum	Maximum
Percentage of decision with ample supporting information*	267	57.98	60	20.066	0	100

* increments of 10 percentage points

The 267 respondents to Question 5 indicated that, on average, 57.98% of the business decisions in which they were involved had ample supporting information to support the decision-making process. The standard deviation of 20.066 indicates a relatively low dispersion with 51.7% of responses falling in the range of 50% to 70% of decisions with ample supporting information. However, this finding indicates that there were a number of business decisions in which management accountants were involved that did not have ample supporting information. For a mean of 42.02% of the decisions, management accounting professionals were required to rely on their judgement and intuition to participate in making these business decisions. This finding supports the suggestion reported by the production and sales managers interviewed by Pierce and O'Dea (2003:274), namely that there were a substantial number of decisions in which management accounting professionals could have been involved for which obtaining near-perfect information to support the decisions was not viable.

6.7 COMPARISON OF PREFERENCE FOR SUPPORTING INFORMATION WITH PERCENTAGE OF DECISIONS WITH AMPLE SUPPORTING INFORMATION

Research indicates that business decisions are regularly made in a context where limited supporting information is available (Järvenpää, 2007:100; Pierce & O'Dea, 2003:276). It may be of interest to note how the mean percentage of business decisions in which management accounting professionals are required to participate for which ample supporting information is available compare with their mean reported preference for supporting information. Inversely, having to base a relatively higher percentage of decisions on limited supporting information than the level to which management accounting professionals report to be comfortable with could translate into a higher susceptibility to behavioural biases, according to the arguments presented by Rzeszutek (2015:77). Consequently, the level to which management accounting professionals prefer to have supporting information when making business decisions (Question 4) is compared in this section with the percentage of decisions for which they report to have ample supporting information (Question 5). To accommodate the comparison, the 0%-100% scale with 10% increments used in Question 5 is recoded into an 11-point scale (0-10) to facilitate the comparison with the results from Question 4.

The results of a paired samples t-test comparison of the means of the two questions are presented in Table 6.17 and discussed in more detail below.

Table 6.17: Paired sample t-test of difference between preference for supporting information and percentage of decisions with ample supporting information

Individual statistics	N	Mean	Median	SD	SE
Preference of supporting information	267	5.94	7.0	2.66	0.163
Percentage of decisions with ample supporting information	267	5.80	6.0	2.007	0.123

Paired samples t-test	Mean	SD	SE	95% Confidence interval of the difference		t	df	Significance (two-tailed)
				Lower	Upper			
Paired differences	0.139	3.229	0.198	-0.251	0.528	0.701	266	p = 0.484

Although respondents indicated a slightly lower availability of supporting information for decisions in which they were involved (M = 5.8, SD = 2.007), when compared with their preference for supporting information (M = 5.94, SD = 2.66), the difference is found not to be statistically significant, t (266) = 0.701, p = 0.484 (two-tailed).

The mean difference between the availability of the information and respondents' preference for supporting information is 0.139 (1.39 percentage points) with a 95% confidence interval ranging from -0.251 to 0.528 (confirming the non-significant results). The eta-squared statistic (0.00184) indicates a very small effect size.

The mean level of preference by management accounting professionals in the sample for supporting information is similar to the mean percentage of decisions in which they were

involved that had ample supporting information available. The requirement to base some decisions on judgement and intuition should accordingly, on average, not cause management accounting professionals undue distress, and should therefore not result in higher susceptibility to behavioural biases (Rzeszutek, 2015:77).

6.8 SUMMARY

This chapter presented the investigation of the business decision-making involvement and related matters of the management accounting professionals in the sample. Firstly, the results fill a gap in the literature regarding the level to which the changing role of management accountants translates into involvement in business decisions, and secondly, the results illustrate the importance of investigating the decision-making behaviour of these professionals.

Section 6.2 indicated that 18.1% of management accounting professionals were employed in positions that were deemed to inherently require the making of business decisions. Firstly, Section 6.3 contained the corroboration of the previous section by the finding that respondents employed in positions that were deemed to inherently require business decision-making did indeed indicate a higher involvement in making these decisions than the involvement by management accounting professionals employed in the traditional management accounting position. Secondly, the section contained the finding that professionals occupying the top management accounting position of financial director (or its equivalent of chief financial officer, or vice president of finance) were distinctly involved in making business decisions. Thirdly, Section 6.3 contained the findings regarding the business decision-making involvement of management accounting professionals in the traditional management accountant position, supporting the premise of Lambert and Sponem (2011:566), namely that the business partner role, investigated in the present study from the perspective of business decision-making involvement, was not as pervasive as advocated in some of the literature. These findings support the argument by Nielsen *et al.* (2015:16) that the roles of management accountants in business differ and are complex in nature. Logistic regression-based analyses of possible demographic indicators of a higher level of business decision-making involvement confirm that the level of involvement in

making business decisions is significantly related to the position in which a management accounting professional is employed. Regarding management accounting professionals employed in the traditional management accounting position, the size of the company (with reference to revenue measured in US dollar) in which the professional was employed, and the age of the professional, serve as significant indicators of the level of business decision-making involvement. Interestingly, it was found that the middle age group was the most involved in making business decisions, compared with the younger and older age groups.

The possible increase in business decision-making involvement of management accounting professionals during the last decade due to the emerging business partner role was discussed in Section 6.4. Career progression into different and higher-level positions should entail an increase in decision-making involvement in business decisions due to the differences in such involvement between the positions indicated in Sections 6.2 and 6.3. Accordingly, the analyses in Section 6.4 focused exclusively on respondents who occupied a traditional management accounting position. It was found that 53.44% of management accountants in this position reported either a moderate (25.86%), substantial (24.71%) or comprehensive (2.87%) increase in business decision-making involvement. However, 28.16% reported only a slight increase and 18.38% no increase in decision-making involvement. The dispersion of responses emphasises that the conflict in the literature regarding the emergence of the business partner role, as also discussed in Section 6.3, remains a reality in practice. Therefore, the different levels of decision-making involvement relate to the different ways in which organisations utilise their management accounting professionals (Nielsen *et al.*, 2015:15). Logistic regression was also applied in this section to identify whether any possible demographic variables, suggested in related literature, are indicators of an increase in business decision-making involvement. Age, and confidence in using their judgement were found to significantly relate to a difference in the level of increase in business decision-making involvement. Similar to the findings in Section 6.3, the middle age group reported the highest increase in business decision-making involvement, differing significantly from both the younger and older age groups. Higher levels of confidence in using judgement, when required, correlated with an increase in business decision-making involvement.

The findings in the previous sections, namely that a substantial percentage of management accounting professionals were indeed involved in business decision-making, signify the importance of investigating their preferences regarding the use of judgement to make decisions, as well as whether the decisions in which they were involved indeed required the use of judgement. These issues were discussed in Sections 6.5 to 6.7. Management accounting professionals in the sample preferred basing decisions on sound supporting information, as opposed to basing decisions on judgement, according to the findings of Section 6.5. However, the mean preference of respondents, based on a continuum from 0% (indicating a firm preference for judgement) to 100% (indicating a firm preference for ample supporting information), was found to be 59.6%. This figure indicates that, on average, the management accounting professionals in the sample were less averse to using judgement than suggested in earlier literature (see Harris, 1994:14; and Pierce & O'Dea, 2003:274 as examples). This finding could be an indication that the profession is adapting to the requirement of the emerging business partner role. Section 6.6 presented the finding that management accounting professionals who were involved in making business decisions were indeed required to base decisions on judgement, because a mean percentage of 42% of the decisions in which they were involved did not have ample supporting information in their opinion. When comparing the mean preference of the respondents for basing decisions on ample supporting information with the percentage of decisions for which ample information was available, it was found in Section 6.7 that the requirement to base a mean of 42% of decisions on judgement to some extent, did not differ significantly from the mean level of 40.6% to which the respondents were comfortable with using judgement. Accordingly, the 'average' management accounting professional in the sample should not be unduly anxious about the level to which he or she was required to use judgement when making business decisions. When interpreting this finding with reference to the argument of Rzeszutek (2015:77), discussed in Section 6.7, this should indicate a lower susceptibility to the behavioural biases which are investigated in the following two chapters.

CHAPTER 7: RESULTS AND DISCUSSION OF BEHAVIOURAL ASPECTS RELATED TO FRAMING IN BUSINESS DECISION-MAKING

7.1 INTRODUCTION

The change in the role of many management accounting professionals to the role of business partner includes a high and increasing level of involvement in making business decisions, according to the findings in Chapter 6. Accordingly, it is important to investigate the decision-making behaviour of these professionals. In this chapter, the focus is on identifying the possible frame dependence-related biases that influence management accounting professionals when making business decisions. Literature on the behavioural influences of frame dependence on human and financial decision-making was reviewed in Chapters 3 and 4.

After this introduction to Chapter 7, Sections 7.2 to 7.7 will identify whether the frame dependence-related biases stemming from loss aversion, concurrently framed decisions, the certainty and pseudo-certainty effect, mental accounting and the endowment effect respectively, influence the decisions of a material proportion of management accounting professionals in the sample. In Section 7.8, the study builds on the findings of the previous sections by investigating, on a preliminary basis, possible indicators of higher bias susceptibility of respondents in the sample to the framing-based biases under investigation. Chapter 7 is then concluded with a brief summary of the findings in the chapter.

Results in the following sections are presented for the **full sample**, as well as for a **narrow sample**. The *narrow sample* is the sample excluding respondents who selected the inferior option of the transparently framed alternative question to the concurrent decisions test (see Section 5.4.7 for more information). Both samples are discussed in detail as a matter of prudence.

7.2   LOSS AVERSION BIAS

Questions 1 and 2 in the frame dependence area in the behavioural influences section of the questionnaire presented respondents with a positively framed and negatively framed version of the same scenario. The questionnaire was designed with care to ensure that respondents were not presented with one version of the question directly after the other, as well as to randomise the order in which the two versions were presented to the different respondents. Each version contained the same two options (apart from being framed differently) from which respondents had to select a plan of action. The one option induced a risk-averse action, while the other represented a risk-seeking action. The objective of the test was to see whether respondents retained their risk-averse or risk-seeking preference, irrespective of the frame in which the question was presented; or whether the framing indeed influenced respondents to reverse their risk preferences. Descriptive analysis indicates that 27.4% of respondents in the full sample and 28.1% of respondents in the narrow sample changed their preference when presented with the differently framed scenarios. Further analysis, as presented in Table 7.1, investigated whether the changes in preferences were in a definite direction and whether it was statistically significant.

Table 7.1: Test for significance of loss aversion bias

Sample	Size (*n*)	Decision frame	Option selection	McNemar's test for significance (two-tailed)
Full sample	219	Positive	Risk averse: 64.4% Risk-seeking: 35.6%	$p = 0.001$*
		Negative	Risk averse: 52.5% Risk-seeking: 47.5%	
Narrow sample	185	Positive	Risk averse: 64.3% Risk-seeking: 35.7%	$p = 0.001$*
		Negative	Risk averse: 51.4% Risk-seeking: 48.6%	

* Binomial distribution used.

The comparison of two responses provided by the same respondents violates the independence assumption of Pearson's chi^2 test. Accordingly, McNemar's chi^2 test for significant deviation from consistency is used (see Section 5.4.5.4 for a detailed discussion of this issue) to analyse the responses to Questions 1 and 2, with the aim to test for possible significant preference reversals due to the framing effects of loss aversion.

For both the full sample and the narrow sample, McNemar's test indicate a statistically significant preference reversal (p = 0.001) by respondents, resulting from the difference in the framing of the problem and decision options. For the full sample, the risk-averse-preference of 64.4% of respondents when presented with the positively framed problem decreased to 52.5% of respondents when the problem was framed negatively. With reference to effect size, the odds ratio (OR = 1.63) indicates a moderate effect in that respondents in the full sample was 1.63 times more probable to select the risk-seeking alternative in the loss frame than in the gain frame.

For the narrow sample, the risk-averse preference (originally 64.3% of respondents) decreased to 51.4% of respondents. The odds ratio (OR = 1.706) indicates a 1.706 times increase in the level of preference for the risk-seeking alternative in the loss frame, as opposed to the gain frame.

The findings in both these sample compositions indicate the presence of loss aversion, as defined by Tversky and Kahneman (1992:298), due to the preference reversal indicating higher loss aversion in the gain frame than in the loss frame. In accordance with the argument by Haigh and List (2005:531), namely that individuals that are professionals should form the focus of newer studies to confirm findings of the presence of loss aversion in the decision-making of undergraduate students, the current study finds evidence of the presence of loss aversion in the business decision-making behaviour of management accounting professionals. However, the levels of preference reversal towards loss aversion in the current sample (11.9%*[7] and 12.9%*) are lower than those of previous studies (Bazerman, 1994:55 (60%*); Tokar *et al.*, 2016:17 (35.6%*); Tversky & Kahneman, 1981:453 (50%*)). The effects of loss aversion are therefore present in the business-related

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[7] *The % sign in all the instances marked with an asterisk (*) refers to percentage points.*

decision-making of management accounting professionals in the sample, but the levels of prevalence are lower than those of previous studies on other, more general, populations.

7.3 CONCURRENT DECISION FRAME BIAS

Question 3 in this section of the questionnaire presented the concurrent decisions test problem in a transparently framed problem. The issues identified during the analysis of these questions and the resulting treatment thereof were discussed in Section 5.4.7. **Question 4** presented the test for the presence of the bias-inducing influence of the concurrent decision frame. Question 4 consisted of two sub-questions, which needed to be answered at the same point in time. When combined, the sub-questions formed a 'package' of concurrent decisions. If the concurrent decision frame in the questionnaire was correctly interpreted, the optimal answer would be to select Option B from Sub-question 1 and Option C from Sub-question 2, resulting in an expected loss of $500 million and a maximum possible loss of $750 million. Selecting Options A and D resulted in an expected loss of $510 million; selecting Options A and C resulted in a certain loss of $510 million and selecting Options B and D resulted in an expected loss of $500 million, but with maximum possible loss of $1 billion (thus higher risk than when selecting B and C). The test here was to see whether respondents were able to see the concurrent decision 'package' and selected the optimal option package of B and C, or whether they interpreted each decision on its own and selected the option of each sub-decision on a separate basis (loss aversion effects were expected to encourage respondents to select Options A and D).

In the analysis of the full sample, the option selection combinations of respondents are compared with their option selection in **Question 3** (the transparently framed version of the concurrent decisions problem). This is in accordance with the approach followed by Sebora and Cornwall (1995:49-51). Sebora and Cornwall (1995:49) suggest a prudent approach by only comparing selections of combinations in Question 4 that have exact equivalents in Question 3. These were the optimal combination B and C in Question 4, which was equivalent to option B in Question 3, and the suboptimal combination A and D (loss aversion-induced combination) in Question 4, which was equivalent to Option A in Question 3. The prudent approach applied by Sebora and Cornwall (1995:49) was also followed in the

analysis of responses to Questions 3 and 4 in the present study. The percentage of respondents who selected combinations other than the comparable combinations in the present study (41.1%) is similar to the percentage of participants (43.14%) who selected the non-comparable combinations in the study by Sebora and Cornwall (1995). For the current study, descriptive analysis indicate that 78.3% of responding management accounting professionals in the full sample (but limited to those selection comparable options) and 82.6% in the narrow sample changed their preferences when having to base their decisions on the differently framed versions of the same concurrent decision scenario. Again, McNemar's test is used to conduct further analysis.

Table 7.2: Test for significance of concurrent decisions bias

Sample	Size (*n*)	Question	Option selection	Test for significance (two-tailed)
Full sample	136	Question 3	A – suboptimal: 15.4% B – optimal: 84.6%	McNemar's test *p* <0.001*
		Question 4	A and D – suboptimal: 80.1% B and C – optimal: 19.9%	
Narrow sample	115	Question 3	A – suboptimal: 0% B – optimal: 100%[8]	*See Table 7.3*
		Question 4	A and D – suboptimal: 82.6% B and C – optimal: 17.4%	

* Binomial distribution used.

With reference to the full sample, Table 7.2 indicates that the preference by respondents for the optimal solution (84.6%) when presented in a transparent frame in Question 3 reverses to a preference for the suboptimal combination (80.1%) when presented in the concurrent decision frame. This preference reversal is statistically highly significant ($p < 0.001$), according to McNemar's test. The odds ratio ($OR = 22.108$) indicates that respondents in the full sample are 22.108 times more likely to select the suboptimal option in the concurrent

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[8] All responses indicating selection of the suboptimal (inferior) option are excluded as indicated above.

frame than in the transparently presented frame. This indicates the very high effect that the influence of the concurrent frame has on the decision preferences of respondents.

However, in the narrow sample, all respondents who selected the inferior option in Question 3 are removed (in accordance with the discussion in Section 5.4.7). Therefore, based on an expectation of rationality, it would be expected that all remaining respondents (100%) should maintain their preference for the optimal outcome if they are not influenced by the concurrent frame of **Question 4**. The effect of the expected outcome of 100% of respondents maintaining their preference for the optimal outcome is that the expected frequency for the suboptimal outcome is zero. McNemar's test is unable to calculate statistical significance when at least one of the expected frequencies is below five. Therefore, no test for a statistical significant difference between the expected 100% optimal combination selection of the narrow sample and the actual combination selection by the narrow sample can be calculated using McNemar's test or any other chi^2 alternative. However, a 95% Wilson binomial confidence interval is used to confirm the statistical significance of the deviation of the respondents in the narrow sample from their rational response to the clearly framed question when presented with the concurrently framed option. This statistical test is applied to Question 4 and presented in Table 7.3.

Table 7.3: Test for significance of concurrent decisions bias – narrow sample

Sample	Size (*n*)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Narrow sample	115	Lower bound limit – 96.8%	Lower bound limit – 11.6%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 17.4%**	$(p < 0.01)$
			Upper bound limit – 25.3%	

For the narrow sample, a substantial diversion (82.6%) from the expected unanimous preference by respondents for the optimal combination was also found to be statistically significant. The substantial levels of preference reversal in line with loss aversion-induced

concurrent decisions bias of 64.7%*[9] and 82.6%* in the full and narrow samples respectively are similar to those of previous studies (Sebora & Cornwall, 1995:51 (72.1%*); Shefrin, 2002:26 (50%*); Tversky & Kahneman, 1981:211 (73%*)).

Accordingly, management accounting professionals in the sample were influenced by loss aversion-based concurrent decisions bias. The level of prevalence of concurrent decisions bias among these professionals is relatively similar to that of previous studies on other populations.

7.4   CERTAINTY FRAME BIAS

Whether a certain option was weighted higher by respondents than an option that did not create certainty, even if the certainty option provided less economic value, was tested by **Question 5** in the frame dependence section of the questionnaire. Respondents were presented with two insurance premium increase options, both providing a 20 percentage point increase in coverage for their respective events (comparable in terms of probability of occurrence and expected loss). However, Option B increased coverage from 80% to 100% for its event, and Option A from 70% to 90% for its event. When compared, the option to increase to 90% coverage was better financial value on a per percentage-point basis ($50 per month less expensive in total) than the increase to 100% option. Because management accounting professionals are financial experts, it was expected that all respondents would select the option that provided the greatest financial value. The actual responses are compared with this expectation to determine whether there is a significant difference between the expected unbiased responses and actual responses. A significant difference in responses indicates the presence of certainty frame bias in the decision-making of management accounting professionals.

Table 7.4 presents the test indicating whether the actual response proportion of respondents who selected the rational Option A differs significantly from full rationality if the sample is found to be unbiased and therefore not significantly affected by the certainty bias. For this

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[9] The % sign in all the instances marked with an asterisk (*) refers to percentage points.

purpose, the 95% Wilson binomial confidence interval of a fully rational (100%) proportion is compared with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the respective samples.

Table 7.4: Test for significance of certainty effect bias

Sample	Size (*n*)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Full sample	246	Lower bound limit – 98.5%	Lower bound limit – 47.8%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 54.1%**	($p < 0.01$)
			Upper bound limit – 60.2%	
Narrow sample	207	Lower bound limit – 98.2%	Lower bound limit – 45.4%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 52.2%**	($p < 0.01$)
			Upper bound limit – 58.9%	

Of the respondents in the full sample (*n* = 246), 54.1% selected the financially optimal Option A and 45.9% were biased by the certainty provided by Option B. The 95% Wilson binomial confidence intervals indicate that the actual responses by management accountants in the full sample differ statistically significantly from rationality ($p < 0.01$), as there is no overlap between the respective confidence intervals (Cumming & Finch, 2005:180). Even fewer respondents in the narrow sample selected the financially optimal Option A (52.2%), resulting in 47.8% of respondents in the narrow sample being biased by the certainty afforded by Option B. Consequently, the comparisons of the respective binomial confidence intervals of the narrow sample (*n* = 207) indicate that the actual responses by management accounting professionals in the narrow sample also differ significantly ($p < 0.01$) from rationality. Accordingly, certainty bias is present in the decision-making behaviour of management accounting professionals. A smaller yet substantial percentage of respondents in the samples (45.9% and 47.8% respectively) were influenced by this bias in comparison with the percentage of respondents in the seminal work by

Tversky and Kahneman (1981:455 (78%)). However, a recent study by Mather *et al.* (2012:808) found a very high variance in the prevalence of the certainty effect between younger (18 to 35 years; 39% prevalence) and older adults (60 to 85 years; 75% prevalence) in an experiment in the loss domain, similar to the current study. The current study's findings fall within this range and are closer to the younger adult prevalence found by Mather *et al.* (2012:808), which can be expected due to the higher ratio of younger management accounting respondents in the sample, as opposed to the older respondents (see demographic information of the sample in Section 5.4.6.1). Accordingly, management accounting professionals were significantly influenced by the certainty effect, to a similar degree to a recent comparable study. Further investigation into the possibility that age, *inter alia*, is a significant indicator of susceptibility to certainty effect bias is presented in Section 7.8.3.

7.5 PSEUDO-CERTAINTY BIAS

Questions 6 and **7** served to identify whether respondents' decision preferences were influenced by the framing of a decision problem in a manner which created the illusion of a certainty option. Question 7 framed the problem to create an illusionary certainty option, while Question 6 was a transparently framed version of the same decision problem. The questions are therefore analysed to identify whether the pseudo-certainty created by Question 7 significantly altered the decision preferences of respondents, as indicated by the transparently framed Question 6. Descriptively, 22.1% of respondents in the full sample and 21.8% in the narrow sample altered their preferences between the transparently framed and pseudo-certainty framed questions. The in-depth analysis of the results presented in Table 7.5 investigates whether the alteration in preferences are consistent with pseudo-certainty bias.

With reference to the full sample, the preference by respondents for Option B in the transparently framed problem (58.9%) in Question 6 reverses to a preference for the pseudo-certainty Option A in Question 7 (50.7%). According to McNemar's test, the reversal is moderately statistically significant ($p = 0.02$). According to the odds ratio ($OR = 1.47$),

respondents in the full sample are 1.47 times more likely to select Option A when it is presented in a frame that creates pseudo-certainty than in a clear frame.

Table 7.5: Test for significance of pseudo-certainty effect bias

Sample	Size (*n*)	Question	Option selection	Test for significance (two-tailed)
Full sample	219	Question 6	A – 41.1% B – 58.9%	McNemar's test $p = 0.02$*
		Question 7	A – 50.7% B – 49.3%	
Narrow sample	185	Question 6	A – 38.4% B – 61.6%	McNemar's test $p = 0.023$*
		Question 7	A – 48.6% B – 51.4%	

* Binomial distribution used.

The analysis of the narrow sample indicates that the majority of the respondents retained their preference for Option B in Question 6 (61.6%) when confronted with the pseudo-certainty problem frame in Question 7 (51.4%). McNemar's test indicates that the change in preference by the respondents in the narrow sample is also moderately statistically significant ($p = 0.023$). The odds ratio again confirms a moderate effect ($OR = 1.52$). The percentage of management accounting professionals in both sample variants who selected the pseudo-certainty option (50.7% and 48.6%) falls within the range reported by earlier studies on other populations (Sebora & Cornwall, 1995:53 (44%); Slovic *et al.*, 1982:481 (57%); Tversky & Kahneman, 1981:455 (74%)). Management accounting professionals in the sample were therefore significantly influenced by the pseudo-certainty effect bias to a similar degree to other populations.

7.6   MENTAL ACCOUNTING-BASED BIAS

The possible effect of the framing of a decision problem to invoke the mental accounting-based bias of the decision-maker was tested by means of **Questions 8** and **9** in the frame

dependence section of the questionnaire. Question 8 was framed to invoke the loss of money accounted for as being allocated for the specific expenditure about which the decision needed to be made. Question 9 was framed as a loss not specifically related to the expenditure to which the decision pertains. In both frames, the business lost the same amount, albeit due to different counterparties.

Table 7.6: Test for significance of traditional mental accounting-based bias

Sample	Size (*n*)	Question	Option selection	Test for significance (two-tailed)
Full sample	219	Question 8	A – 69.9% B – 30.1%	McNemar's test $p = 1.000$*
		Question 9	A – 69.4% B – 30.6%	
Narrow sample	185	Question 8	A – 67.6% B – 32.4%	McNemar's test $p = 1.000$*
		Question 9	A – 68.1% B – 31.9%	

* Binomial distribution used.

Based on the initial descriptive analysis, 34.2% of management accounting professionals in the full sample and 35.1% in the narrow sample switched their preference between the differently framed scenarios. However, for both the full sample (69.9% and 69.4%) and the narrow sample (67.6% and 68.1%), the average preference of respondents for Option A remained the same, irrespective of the mental account the problem frame attempted to induce. As indicated in Table 7.6, McNemar's test confirms that the very slight difference in percentage preference for Option A is not statistically significant for both the full sample ($p = 1.000$) and the narrow sample ($p = 1.000$). With reference to effect size, the odds ratio ($OR = 1.02$ and 0.975) confirms that the odds of respondents on average preferring Option A remain essentially the same irrespective of whether the loss is framed to come from the same account or different accounts (odds of 2.318 and 2.269 for the full sample, and 2.083 and 2.136 for the narrow sample). However, the percentage of respondents who changed their preference is substantial. Accordingly, of the 34.2% (full sample) and 35.1% (narrow

sample) respondents who changed their preference, almost half changed their preference in one direction and almost half in the other direction, resulting in non-significant differences in the average preferences. Yet the individual preference reversal proportions are statistically significant ($p < 0.01$) according to the 95% Wilson binomial confidence intervals for both the full and the narrow sample (according to Table 7.7).

Table 7.7: Test for significance of unconventional mental accounting bias

Sample	Size (*n*)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Full sample	219	Lower bound limit – 98.28%	Lower bound limit – 59.25%	
		Proportion if no preference reversal – 100%	**Sample proportion with no preference reversal – 65.8%**	($p < 0.01$)
			Upper bound limit – 71.72%	
Narrow sample	185	Lower bound limit – 97.98%	Lower bound limit – 57.75%	
		Proportion if no preference reversal – 100%	**Sample proportion with no preference reversal – 64.9%**	($p < 0.01$)
			Upper bound limit – 71.38%	

Therefore, the difference in framing significantly influenced the preferences of management accounting professionals in the sample, but not in the traditionally expected mental accounting theory-based manner. Benartzi and Thaler (2007:92-93) and Thaler (1999:190-192) indicate the significant presence of mental accounting-based bias in decision-making by individuals with reference to their personal finances. Chen *et al.* (2012:436) identified the presence of mental accounting in the decision-making behaviour of newspaper vendors, with reference to the finances of the vendors' own businesses. However, in the study by Sebora and Cornwall (1995:55-56) regarding business-related decisions in the hypothetical

scenario of employees making decisions related to their companies, similar limited evidence of mental accounting was found. Sebora and Cornwall (1995:55-56) provide no indication of whether some participants in their study exhibited inverse preference reversals to the general mental accounting theory, neither does any of the other mental accounting-based studies that were reviewed.

Affect in terms of the mood of the respondents in the current study could have influenced some of the respondents. Note that the questionnaire contained a relatively extensive number of questions compared with that of other studies, which mostly only investigated either frame dependence or heuristic-based biases (see Chapters 3 and 4). If a respondent were presented with the same account scenario earlier in the questionnaire, the particular individual might still have been in a positive mood resulting in less conservative decisions (Chung *et al.*, 2008:154). If the same individual then had to respond to the different mental accounts scenario closer to the end of the questionnaire when fatigue and anxiety to finish started to set in, the individual might have made a more conservative decision (not continuing with the staff function after the financial loss) due to a more negatively orientated mood (Chung *et al.*, 2008:154). However, because the questions were presented in a random fashion, this explanation alone cannot account for the substantial unorthodox preference reversal by some respondents. Based on the results of the analysis, management accounting professionals were influenced by mental accounting-based bias in their business-related decision-making behaviour. However, the particular manner in which they were influenced should be investigated in more detail in a future study designed to confirm or contest, and subsequently explain, the phenomenon identified in this study.

7.7 ENDOWMENT EFFECT BIAS

Decision-makers attach a higher value to a good when it is owned than when it is not owned (Kahneman *et al.*, 1991:194-197). **Questions 10** and **11** tested whether the same biasing effect was present when management accounting professionals valued a good that was owned by the business in which they were employed. Question 10 presented respondents with a decision frame in which they needed to suggest an acceptable selling price for a property owned by their employer, while Question 11 presented the same scenario in a

frame where respondents were required to suggest an acceptable purchase price for a property which their employer was looking to purchase. Both questions had eight ordinal (ranked) price categories from which to select a suggested value. The test for the presence of the endowment effect bias is presented in Table 7.8 and discussed in more detail in the following paragraphs.

Table 7.8: Test for presence of endowment effect bias

Sample	Size (*n*)	Number of categories for which:			Wilcoxon signed rank test for significance (two-tailed)
		Sell > Buy	Buy = Sell	Sell < Buy	
Full sample	219	86	94	39	*p* < 0.001
Narrow sample	185	76	75	34	*p* < 0.001

A Wilcoxon signed rank test is done to analyse the responses of both the full sample and the narrow sample. The ranks are based on the eight ordinal price range-based categories presented as options to the respondents (numbered categories 1 to 8 for analysis purposes). For the full sample, the Wilcoxon signed rank test indicates that respondents valued the property significantly higher ($p = 0.001$, $z = -3.822$) when it was owned by their employer (*First Quart* = 4, *Mdn* = 5, *Third Quart* = 6*)* than when it was owned by a third party (*First Quart* = 3, *Mdn* = 4, *Third Quart* = 5) and the employer was interested in purchasing the property. The effect size ($r = 0.26$) indicates a medium effect size.

Similar to the full sample, the findings of the narrow sample indicate that respondents in the narrow sample also valued the property significantly higher ($p = 0.001$, $z = -3.738$) when it was owned by their employer (*First Quart* = 4, *Mdn* = 5, *Third Quart* = 6*)* than when it was owned by a third party (*First Quart* = 3, *Mdn* = 4, *Third Quart* = 5). The slightly higher effect size ($r = 0.28$) remain in the medium range.

The results of the present study indicate that management accounting professionals were influenced by the endowment effect in accordance with previous research summarised by Kahneman *et al.* (1991:194-197). The results also provide further evidence to support the

findings by Glöckner *et al.* (2015:224) that the endowment effect may still be present in decision-making by an individual, even when the particular good is the property of the individual's employer.

7.8 INDICATORS OF HIGHER SUSCEPTIBILITY TO THE BIASING INFLUENCES OF FRAME DEPENDENCE

The possible indicators of higher susceptibility to the biasing influence of frame dependence were discussed in Section 4.3.1. In the current section, the data gathered by means of the questionnaire survey tool is analysed to identify whether the possible indicators correlate with susceptibility to being influenced by the various biases. However, the analysis is subject to some limitations. Firstly, each respondent is evaluated to be susceptible to a bias based on only one testing scenario, or combinations of scenarios. Accordingly, this does not necessarily indicate a habitual susceptibility to the particular bias. Secondly, the power of the analysis is limited by the sample size. Therefore, not all indicators of susceptibility to a particular bias may be identified as such. These limitations are not unique to this study (see D'Angelo *et al.*, 2018:165; Kahneman & Tversky, 1979:264-265; Lowies, 2012:105-106; Sebora & Cornwall, 1995:47-49). Because the purpose of this analysis is to be exploratory in nature, the limitations are noted, but do not preclude the value of attempting to identify possible indicators on a preliminary basis, by grounding the investigation in previous research on other populations.

In each of the following sections, the hypotheses generated in the literature review with reference to susceptibility to the specific bias are summarised to facilitate the investigations. However, although the relevant significant findings are discussed in each section, the findings are related to the hypotheses in the summary section (Section 7.8.7).

The composition of the data for the binary logistic regression analyses was discussed in detail in Section 5.4.6.2. A brief description of the variables is repeated in Table 7.9 for ease of reference.

Table 7.9: Variable composition and parameters for frame dependence logistic regression analyses

Description of variable	Abbreviated name for analysis *(dummy variable convention in italics, where applicable)*
Gender of respondent	Gender
Age of respondent: • Young, respondents aged between 20 and 29 years; • Midlife, respondents aged between 30 and 49 years; and • Older, respondents aged 50 years and above.	Age *Age* *Age 1* *Age 2*
Years of work experience of respondent: • Little experience, 0 to 5 years' experience; • Moderate experience, 6 to 15 years' experience; and • Experienced, more than 15 years' experience.	Experience *Experience* *Experience 1* *Experience 2*
Position occupied by the respondent: • The traditional management accountant position, including its equivalents of financial manager, accountant and controller; • The top management accounting position of financial director, including its relative equivalents of chief financial officer and vice president of finance; and • Business management position, by combining the positions of managing director, including its relative equivalents of chief executive officer and president, as well as operational manager.	Position *Position 1* *Position 2* *Position 3*
The level to which a respondent prefers to have supporting information to support the decisions, as opposed to relying on intuition or judgement	Pref_supp_info

7.8.1　Indicators of loss aversion bias susceptibility

The hypotheses generated in Section 4.3.1 regarding indicators of susceptibility to loss aversion are as follows:

Hypotheses – *Higher* susceptibility to loss aversion
The following demographic variables indicate a higher susceptibility to loss aversion bias:
> **Hypothesis 3.1 – *Gender:***
> - *Female respondents, as opposed to male respondents.*
>
> **Hypothesis 3.2 – *Age*:**
> - *Older respondents, as opposed to younger respondents.*
>
> **Hypothesis 3.4 – *Level of preference for supporting information*:**
> - *Respondents who indicated a higher level of preference for supporting information, as opposed to respondents who indicated a preference for making intuition-based decisions.*
>
> **Hypothesis 3.5 – *Position*:**
> - *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis – *No difference* in susceptibility to loss aversion
The following demographic variable indicates no significant difference in susceptibility to loss aversion bias:
> **Hypothesis 3.3 – *Experience*:**
> - *Period of work experience of respondents.*

To confirm whether possible demographic indicators suggested in the literature indicate higher susceptibility to loss aversion bias in the sample of management accounting professionals, logistic regression model building and analysis are conducted to test the hypotheses presented above. The sample for this analysis consisted of 219 (*n*) respondents. The analysis was performed to identify susceptibility specifically to loss aversion bias, accordingly, only respondents who reversed their preferences in the direction suggested by loss aversion were included in the biased category of the dependent variable. Consequently,

43 (19.6%) respondents were affected specifically by loss aversion bias, while 176 (80.4%) were not specifically affected by loss aversion. Further descriptive statistics related to the respondents who were included in this analysis, are provided in Appendix 4 (Table A4.7). The various steps and ultimate findings emanating from the logistic regression analysis are as follows:

Table 7.10: Summary of bivariate analysis – indicators of loss aversion bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model ($p < .25$)		
Pref_supp_info	1.728 (1) *p* = .189	1.783 (1) *p* = .182
Not to be entered into initial model ($p > .25$)		
Gender	0.068 (1) *p* = .795	0.068 (1) *p* = 0.794
Age	0.238 (2) *p* = .888	0.25 (2) *p* = 0.883
Experience	2.083 (2) *p* = .353	2.108 (2) *p* = .349
Position	1.608 (2) *p* = .448	1.565 (2) *p* = .457

Based on Table 7.10, 'Pref_supp_info' qualified to be entered into the initial model. However, it was not significant at $p \leq 0.05$. A Mann-Whitney U test was performed to confirm the non-significance of the difference in preference for supporting information, between the respondents biased by loss aversion (*Md* = 7, *n* = 176) and the respondents who were not affected by loss aversion bias (*Md* = 7, *n* = 43), *U* = 3 265, *z* = -1.407 *p* = .159, *r* = .095. Therefore, no significant indicators of susceptibility to loss aversion bias could be identified from the sample.

7.8.2 Indicators of concurrent decisions bias susceptibility

With reference to concurrent decisions-based bias, the following hypotheses were developed in Section 4.3.1 of indicators of higher bias susceptibility:

Hypotheses – *Higher* susceptibility to concurrent decisions bias:
The following demographic variables indicate a higher susceptibility to bias emanating from decisions which are framed concurrently:

    Hypothesis 4.1 – *Gender*:

- *Women respondents, as opposed to men who responded.*

    Hypothesis 4.2 – *Age*:

- *Older respondents, as opposed to younger respondents.*

    Hypothesis 4.4 – *Level of preference for supporting information*:

- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

    Hypothesis 4.5 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis – *No difference* in susceptibility to concurrent decisions bias:
The following demographic variable indicates no significant difference in susceptibility to bias emanating from decisions which are framed concurrently:

    Hypothesis 4.3 – *Experience*:

- *Period of work experience of respondents.*

To test the hypotheses, logistic regression model building and analysis are conducted. The relevant steps and findings are presented below. Of the sample of $n = 152$ respondents who completed the concurrently presented questions, 33 (21.7%) selected the optimal combined decision package and 119 (78.3%) selected the sub-optimal combined decision package. The detailed descriptive statistics for the sample tested for this model, are available in Appendix 4 (Table A4.8).

Table 7.11: Summary of bivariate analysis – indicators of concurrent decision bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Position	5.691 (2)	5.448 (2)
	p = .058	*p* = .066
Not to be entered into initial model (*p* > .25)		
Gender	0.148 (1)	0.15 (1)
	p = .7	*p* = .699
Age	0.861 (2)	0.874 (2)
	p = .65	*p* = .646
Experience	0.326 (2)	0.323 (2)
	p = .85	*p* = .851
Pref_supp_info	0.617 (1)	0.612 (1)
	p = .432	*p* = .434

Except for 'Position', no other variables are below the cut-off value, according to Table 7.11. Although the 'Position' variable is below the cut-off value, it is not statistically significant (at $p > 0.05$). This non-significance is confirmed by conducting Pearson's chi^2 test for independence ($\chi^2 = 6.013$, $p = .058$). Based on the above, no demographic variables are significant indicators of susceptibility to concurrent decisions bias in the sample.

7.8.3   Indicators of certainty effect bias susceptibility

The hypotheses that were generated in the literature review for indicators of susceptibility to the certainty effect are as follows:

Hypotheses – *Higher* susceptibility to certainty effect bias:

The following demographic variables indicate a higher susceptibility to the biasing effect of a certainty option:

Hypothesis 5.1 – *Gender*:

- *Women respondents, as opposed to the men who responded.*

Hypothesis 5.2 – *Age*:

- *Older respondents, as opposed to younger respondents.*

Hypothesis 5.4 – *Level of preference for supporting information*:

- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis 5.5 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis – *No difference* in susceptibility to certainty effect bias:

The following demographic variable indicates no significant difference in susceptibility to bias emanating from the certainty effect:

Hypothesis 5.3 – *Experience*:

- *Period of work experience of respondents.*

Logistic regression model building and analysis are conducted to confirm whether possible demographic-related variables indicate susceptibility to certainty effect-based bias. A total of 246 respondents (*n*) could be included in the sample for this logistic regression analysis. With reference to the dependent variable, 133 (54.1%) of respondents in the sample were not biased by the certainty effect and 113 (45.9%) committed the bias induced by the certainty effect. Additional descriptive statistics regarding the sample for this analysis are available in Appendix 4 (Table 4.9). The relevant steps and findings of the logistic regression model development and analysis are presented in the paragraphs which follow.

Table 7.12: Summary of bivariate analysis – indicators of certainty effect bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
None		
Not to be entered into initial model (*p* > .25)		
Gender	0.486 (1) *p* = .486	0.488 (1) *p* = .485
Age	1.316 (2) *p* = .518	1.318 (2) *p* = .517
Experience	1.175 (2) *p* = .557	1.175 (2) *p* = .556
Position	0.206 (2) *p* = .902	0.206 (2) *p* = .902
Pref_supp_info	0.034 (1) *p* = .854	0.034 (1) *p* = .854

Based on Table 7.2, no demographic variables are below the cut-off value, and accordingly, none are found to be significant indicators of susceptibility to certainty effect bias for the sample data.

7.8.4   Indicators of pseudo-certainty effect bias susceptibility

The following hypotheses from the literature review relate to indicators of bias regarding the pseudo-certainty effect:

Hypotheses – *Higher* susceptibility to pseudo-certainty effect bias:
The following demographic variables indicate a higher susceptibility to the biasing effect of an option that creates the impression of certainty, while no certainty is actually afforded:
   Hypothesis 6.1 – *Gender*:
   - *Women respondents, as opposed to the men who responded.*

Hypothesis 6.2 – *Age*:

- *Older respondents, as opposed to younger respondents.*

Hypothesis 6.4 – *Level of preference for supporting information*:

- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis 6.5 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis – *No difference* in susceptibility to pseudo-certainty effect bias:

The following demographic variable indicates no significant difference in susceptibility to bias emanating from decisions which are framed to create pseudo-certainty:

Hypothesis 6.3 – *Experience*:

- *Period of work experience of respondents.*

The relevant steps of logistic regression model building and analysis which were conducted to confirm whether possible demographic-related variables indicate susceptibility to pseudo-certainty effect-based bias are presented below. The number of respondents in the sample (n = 192) for this analysis who changed their preference due to the pseudo-certainty provided by Option A were 48 (25%), compared to 144 (75%) who did not change their preference. Additional descriptive statistics of the sample for this analysis is available in Appendix 4 (Table A4.10).

Table 7.13 indicates that, except for 'Gender', no other variables are below the cut-off value. Although the 'Gender' variable is below the cut-off value, it is not statistically significant (at $p > 0.05$). This non-significance is confirmed by doing a chi^2 test with Yates continuity correction (χ^2 = 2.179, p = .140). Based on the above, no demographic variables are significant indicators of susceptibility to pseudo-certainty effect bias in the sample.

Table 7.13: Summary of bivariate analysis – indicators of pseudo-certainty effect bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	2.691 (1) *p* = .101	2.667 (1) *p* = .102
Not to be entered into initial model (*p* > .25)		
Age	0.608 (2) *p* = .738	0.655 (2) *p* = .721
Experience	0.93 (2) *p* = .628	0.944 (2) *p* = .624
Position	0.367 (2) *p* = .832	0.365 (2) *p* = .833
Pref_supp_info	1.001 (1) *p* = .317	1.017 (1) *p* = .313

7.8.5 Indicators of mental accounting-based bias susceptibility

Hypotheses regarding indicators of susceptibility to mental accounting-related bias, which were discussed in Section 4.3.1, are as follows:

Hypotheses – *Higher* susceptibility to bias resulting from mental accounting:

The following demographic variables indicate a higher susceptibility to the biasing effects of mental accounting:

Hypothesis 7.1 – *Gender*:

- *Women respondents, as opposed to the men who responded.*

Hypothesis 7.2 – *Age*:

- *Older respondents, as opposed to younger respondents.*

Hypothesis 7.4 – *Level of preference for supporting information*:

- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis 7.5 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypotheses – *No difference* in susceptibility to bias resulting from mental accounting:

The following demographic variable indicates no difference in susceptibility to the biasing effects of mental accounting:

Hypothesis 7.3 – *Experience*:

- *Period of work experience of respondents.*

To confirm whether possible demographic indicators suggested in the literature indicate higher susceptibility to mental accounting-based bias in the sample of management accounting professionals, logistic regression model building and analysis are conducted. The sample of respondents on whom the analysis is based consisted of 219 (*n*) responses. Out of this sample, 144 respondents (65.8%) were classified into the unbiased category of the dependent variable, and 75 respondents (34.2%) were classified as having committed mental accounting-based bias. Descriptive statistics for this particular sample is available in Appendix 4 (Table A4.11). The various steps and ultimate findings emanating from the logistic regression analysis follow below.

Table 7.14 indicates that only the 'Gender' variable is below the cut-off value. However, 'Gender' is not statistically significant at the $p < 0.05$ level. The non-significance of 'Gender' as an indicator was confirmed by conducting a chi^2 test with Yates' continuity correction ($\chi^2 = 3.045$, $p = .081$). Because no other variables are below the cut-off value and 'Gender' is not statistically significant, no indicators of susceptibility to mental accounting-based bias could be determined for the current study's sample.

Table 7.14: Summary of bivariate analysis – indicators of mental accounting-based bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	3.558 (1) *p* = .059	3.542 (1) *p* = .06
Not to be entered into initial model (*p* > .25)		
Age	0.163 (2) *p* = .922	0.164 (2) *p* = .921
Experience	2.392 (2) *p* = .302	2.43 (2) *p* = .297
Position	0.411 (2) *p* = .814	0.406 (2) *p* = .816
Pref_supp_info	0.037 (1) *p* = .847	0.037 (1) *p* = .847

7.8.6 Indicators of endowment effect bias susceptibility

With respect to indicators of susceptibility to the endowment effect, the following hypotheses were developed in Section 4.3.1:

Hypotheses – *Higher* susceptibility to bias resulting from the endowment effect:

The following demographic variables indicate a higher susceptibility to the biasing effects of endowment:

Hypothesis 8.1 – *Gender*:

- *Women respondents, as opposed to the men who responded.*

Hypothesis 8.2 – *Age*:

- *Older respondents, as opposed to younger respondents.*

Hypothesis 8.4 – *Level of preference for supporting information*:

- *Respondents who indicate a higher level of preference for supporting information as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis 8.5 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis – *No difference* in susceptibility to bias resulting from the endowment effect:

The following demographic variable indicates no difference in susceptibility to the biasing effects of endowment:

Hypothesis 8.3 – *Experience*:

- *Period of work experience of respondents.*

The hypotheses, based on relevant literature, state that certain demographic variables indicate higher susceptibility to endowment effect-based bias. To test whether any of the selected demographic variables indicate susceptibility to endowment effect bias for the sample of management accounting professionals, a logistic regression model building and analysis exercise are conducted. The various steps and resulting findings are presented below. Of the respondents included in the sample for this analysis (n = 180), 94 (52.2%) suggested the same price category for both the sales and purchase price, while 86 (47.8%) indicated a higher suggested sales price category than purchase price category, and were therefore influenced by the endowment bias. More comprehensive descriptive statistics for this particular sample is available in Appendix 4 (Table A4.12).

Based on Table 7.15, 'Age', 'Position' and 'Pref_supp_info' are entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in only 'Pref_supp_info' being significant (at $p \leq 0.05$). The removal of the 'Age' and 'Position' variables do not significantly affect the likelihood ratio, nor the beta coefficient of 'Pref_supp_info'. Accordingly, only the 'Pref_supp_info' variable is retained in the model. The summary of the statistics regarding the fit of the final model is presented in Table 7.16.

Table 7.15: Summary of bivariate analysis – indicators of endowment effect bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Age	3.418 (1) *p* = .181	3.477 (1) *p* = .176
Position	4.709 (2) *p* = .095	4.876 (2) *p* = .087
Pref_supp_info	5.443 (1) *p* = .02	5.624 (1) *p* = .018
Not to be entered into initial model (*p* > .25)		
Gender	0.512 (2) *p* = .474	0.513 (2) *p* = .474
Experience	2.356 (2) *p* = .308	2.372 (2) *p* = .305

Table 7.16: Model fit statistics – indicators of endowment effect bias susceptibility

Statistic	Value	Finding
Likelihood ratio	5.624 (1), *p* = 0.018	Significant fit
Classification hit rate increase: - Maximum by chance - Proportional by chance	16.09% 20.97%	Moderate improvement*
Area under ROC curve	0.606	Weak discrimination
R^2: - McFadden - Nagelkerke	.023 .041	Weak fit
Hosmer & Lemeshow test	4.406 (6), *p* = .106	Good fit
Studentised residuals above 2	None	Good fit

* Level of bias, and therefore base rate proportion, is 52.2%

The model fit statistics provide contradictory findings regarding the fit of the model. This indicates that the model fit could be improved upon and the interpretation of the influence of the predictor variable on the outcome variable can only be seen as preliminary.

Table 7.17: Final logistic regression model – indicators of endowment effect bias susceptibility

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Pref_supp_info	0.137	0.059	5.443 (1) $p = .02$	1.147	1.022	1.286

The interpretation of the variable in the model in Table 7.17 should be viewed as preliminary, due to a relatively weak model fit. 'Pref_supp_info' is the only significant predictor. A Box-Tidwell test confirms that the linearity of the logit assumption for this continuous variable is met ($p = .347$). The model indicates that each 10%-point increase in preference for making decisions that are based on sound supporting information, as opposed to decisions based on judgement, by a management accounting professional in the sample, is associated with a 14.7% increase (Wald $\chi^2 = 5.443$ (1), $p = .02$) in susceptibility to the endowment effect bias. A Mann-Whitney U-test is conducted to confirm whether 'Pref_supp_info' does indeed differ to a statistically significant extent, between biased and unbiased respondents, to provide additional assurance on its status as predictor variable. According to the Mann-Whitney U-test, there is a statistically significant difference ($U = 3183.5$, $z = -2.48$, $p = .013$, $r = 0.185$) between the preference for supporting information of biased ($Md = 6.38$, $n = 86$) and unbiased ($Md = 5.46$, $n = 94$) respondents in terms of the endowment effect. This additional analysis indicates that a statistically significantly higher level of preference for making decisions based on sound supporting information, as opposed to basing decisions on judgement, is associated with respondents who were biased as opposed to respondents who were unbiased, by the endowment effect. The combination of statistical results from the analyses described in this section preliminarily indicate that management accounting professionals who prefer to base decisions on sound supporting information, and accordingly are less comfortable to use their judgement when making business decisions, are more susceptible to the biasing influence of the endowment effect. This finding provides some support for the argument by Rzeszutek (2015:77), namely that individuals who are more anxious about using their judgement when making decisions, may be more prone to the biasing influences of the behavioural aspects covered in the present study.

7.8.7 Summary of indicators of higher susceptibility to frame dependence-based bias.

Possible indicators of susceptibility to the frame dependence-related biases of loss aversion, misapprehension of concurrent decisions, the certainty and pseudo-certainty effect, mental accounting-based bias, and the endowment effect bias were investigated on a preliminary basis in Section 7.8 by means of logistic regression analyses.

Of the hypotheses generated, the following hypotheses are **supported** by the results from the logistic regression analyses:

- **Hypothesis 8.4:**

  Management accounting professionals in the sample who indicated a higher preference for basing decisions on adequate supporting information than on judgement were found to be more susceptible to the endowment effect, than professionals who were more comfortable with basing decisions on the use of judgement.

- **Hypotheses 3.3, 4.3, 5.3, 6.3, 7.3 and 8.3:**

  There is no difference in framing-based bias susceptibility between more and less experienced management accounting professionals in the sample.

The following hypotheses could **not** be **supported**:

- **Hypotheses 3.1, 4.1, 5.1, 6.1, 7.1 and 8.1:**

  Women respondents in the sample are more susceptible to the biasing effects of frame dependence than men.

- **Hypotheses 3.2, 4.2, 5.2, 6.2, 7.2 and 8.2:**

  Older responding management accounting professionals are more susceptible to the biasing effects of frame dependence than younger respondents.

- **Hypotheses 3.4, 4.4, 5.4, 6.4 and 7.4:**

  Management accounting professionals in the sample who indicated a higher preference for basing decisions on ample supporting information, and who are therefore less comfortable with basing decisions on judgement, are more susceptible to loss aversion bias, concurrent decisions framing bias, certainty and pseudo-certainty effect bias, and mental accounting-based bias.

- **Hypotheses 3.5, 4.5, 5.5, 6.5, 7.5 and 8.5:**

  Management accounting professionals in the traditional management accounting position are more susceptible to the biasing influence of loss aversion, concurrent decisions framing, certainty and pseudo-certainty, mental accounting and the endowment effect.

The findings above were based on an exploratory investigation, the power of which was limited by the sample size. Future larger sample-based studies may accept or reject more of the hypotheses discussed above, which this study could not confirm.

7.9   SUMMARY

The chapter presented an investigation into whether a significant proportion of management accounting professionals in the sample were influenced by a number of frame dependence-based biases identified from current behavioural literature. Additionally, an exploratory investigation into possible indicators of higher bias susceptibility among respondents in the sample was undertaken. The main findings in this chapter are summarised below.

The findings in Sections 7.2 to 7.7 regarding the possible influence of the selected frame dependence bias on a significant proportion of management accounting professionals are presented in Table 7.18.

For all of the biases investigated, a significant proportion of management accounting professionals in the sample were influenced by each respective bias. This finding highlights the importance of making these professionals aware of the biases that may influence them, as well as the importance of further research into debiasing strategies suited to debias the decisions of these professionals. For concurrent decisions-based bias, certainty effect bias and pseudo-certainty effect bias, the proportion of respondents who were influenced by the biasing effects was similar to other populations investigated in previous studies. However, with reference to loss aversion, the management accounting professionals were substantially less biased than other populations from earlier studies.

Table 7.18: Summary of the findings – influence of frame dependence-related biases

Section	Hypothesis number and *Bias*	Proportion biased respondents	Significance of proportion	Comparison of proportion to previous studies on general populations
Section 7.2	Hypothesis 3: *Loss aversion*	11.9%-12.9%	Significant	Substantially lower than other populations
Section 7.3	Hypothesis 4: *Concurrent decisions*	64.7%-82.6%	Significant	Similar to other populations
Section 7.4	Hypothesis 5: *Certainty effect*	45.9%-47.8%	Significant	Similar to recent study, lower than older seminal study
Section 7.5	Hypothesis 6: *Pseudo-certainty effect*	48.6%-50.7%	Significant	Similar to other populations
Section 7.6	Hypothesis 7: *Mental accounting*	34.2%-35.1%	Significant	Preference reversals in both directions differ from previous studies, which found reversal to be predominantly one directional
Section 7.7	Hypothesis 8: *Endowment effect*	39.4%-42.3%	Significant	Not available

Although the mean selection of a particular mental account by the sample population differed much less between frames than the findings of previous studies on other populations, more in-depth analysis revealed that a significant level of preference reversal occurred at individual level. No information on this effect is available from past studies. Accordingly, the possible reasons for this phenomenon should form the focus of a future study. Due to the nature of the endowment effect questions in the current and in previous studies (being comparisons of mean buying and selling prices), comparative information regarding the proportion of influence in previous studies is not available.

The findings regarding the susceptibility of management accounting professionals to framing bias indicate that involving these professionals in business decision-making should not increase the mean level of bias of the decision-making group, because the management accounting professionals exhibit mostly similar levels of bias to other individuals, and lower loss aversion bias than others. The findings of investigations into another group of behavioural aspects which may influence the decisions of management accounting professionals, namely heuristics, are presented in Chapter 8.

CHAPTER 8: RESULTS AND DISCUSSION OF BEHAVIOURAL ASPECTS RELATED TO HEURISTICS IN BUSINESS DECISION-MAKING

8.1 INTRODUCTION

The investigation into the decision-making behaviour of management accounting professionals is continued in this chapter by testing for the possible presence of bias stemming from reliance on cognitive decision heuristics. *Heuristics* are defined as decision simplification strategies (Bazerman, 1994:6) or rules of thumb (Shefrin, 2002:14) to assist a decision-maker in dealing with complex decisions. These heuristics regularly facilitate good decision-making. However, under certain conditions, the application of heuristics leads to systematic and predictable decision bias (Tversky & Kahneman, 1974:1124). Biases related to representativeness, overconfidence, anchoring and adjustment, and affect were investigated and the findings are presented in Sections 8.2 to 8.5. A preliminary investigation into possible indicators of higher susceptibility to each bias is presented in Section 8.6. The findings presented in this chapter are summarised in Section 8.7.

Similar to Chapter 7, the results in the following sections are presented for the **full sample**, as well as for a **narrow sample**. The *narrow sample* refers to the sample excluding respondents who selected the inferior option of the transparently framed alternative question to the concurrent decisions test (see Section 5.4.7 for more information). As a matter of prudence, both samples are discussed in detail.

8.2 BIASES RELATED TO THE USE OF THE REPRESENTATIVENESS HEURISTIC

Questions 1, 2 and **3** in the heuristic-based biases section of the questionnaire tested for the presence of biases emanating from reliance on the representativeness heuristic in the decision-making of management accounting professionals. **Question 1** tested whether respondents were susceptible to the *misconceptions of chance bias* by requesting respondents to indicate what they considered the probability was of successfully appointing a suitable sales director after three failed attempts. Respondents were provided with the

historical record of the relevant recruitment agency of having a 75% success rate in suitable appointments. In the absence of any evidence to the contrary, the historically correct success rate should be used as the best indicator of success (Bazerman, 1994:24). The question provided respondents with three possible options, namely 'A' being a probability of less than 75% (an option not available in the original question by Bazerman), 'B' being 75%, and 'C' being more than 75%. The selection of Option C related to the misconceptions of chance bias which was based on the premise that decision-makers could be biased by expecting chance to be a self-correcting process. In the context of this question, a higher than 75% probability of success could be expected to correct for the three previous unsuccessful occurrences. The expected unbiased response and the actual distribution of responses are presented in Table 8.1.

Table 8.1: Comparison of option selection – misconceptions of chance

Sample	Size (n)	Option selection – if unbiased	Option selection – actual
Full sample	258	A – 0%	A – 46.1%
		B – 100%	B – 38.8%
		C – 0%	C – 15.1%
Narrow sample	220	A – 0%	A – 49.1%
		B – 100%	B – 37.3%
		C – 0%	C – 13.6%

The statistical analysis of responses is presented in Table 8.2. The comparison of the 95% Wilson binomial confidence interval of a fully rational (100%) proportion with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the full sample ($n = 258$) indicates that the actual responses by management accountants in the full sample differ statistically significantly from rationality ($p < 0.01$), as there is no overlap between the respective confidence intervals (Cumming & Finch, 2005:180). Similarly, the comparisons of the respective binomial confidence intervals of the narrow sample ($n = 220$) indicate that the actual responses by management accounting professionals in the narrow sample also differ significantly ($p < 0.01$) from rationality.

Table 8.2: Test for significance of the misconceptions of chance bias

Sample	Size (*n*)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Full sample	258	Lower bound limit – 98.5%	Lower bound limit – 33%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 38.8%**	(*p* < 0.01)
			Upper bound limit – 44.8%	
Narrow sample	220	Lower bound limit – 98.28%	Lower bound limit – 31.2%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 37.3%**	(*p* < 0.01)
			Upper bound limit – 43.8%	

However, referring to Table 8.1, the direction of the deviation towards Option A (46.1% for the full sample and 49.1% for the narrow sample) is contrary to the misconceptions of chance bias. Careful analysis of the question to identify the possible reason for this anomaly results in the suggestion that one of the other biases related to the representativeness heuristic may have influenced respondents' decision-making. Respondents may have viewed the three previous unsuccessful outcomes as representative of a possible inability of the recruitment company to service the employing company. The *insensitivity to sample size bias* (see Section 3.5.1 for more information on this bias) would result in respondents viewing the small sample of three unsuccessful occurrences as representative of the company's dealings with the recruitment agency, despite the agency's 75% success rate based on a large historical sample. Additionally, the *insensitivity to base rates bias* (see Section 3.5.1 for more information on this bias) would result in respondents viewing the uninformative descriptive information of the three unsuccessful occurrences as more representative of the recruitment agency's performance than the actual base rate of the 75% historical success rate which was provided. The findings by Joyce and Biddle (1981b:341), namely that individuals within the related field of auditing are susceptible to the insensitivity to base rate bias, support the suggestion that this bias may have influenced the respondents

of the current study. Accordingly, a strong argument can be made that biases related to the representativeness heuristic influenced the decision-making of respondents.

Huber *et al.* (2010:452) found that after three consecutive one-sided outcomes of a 50% probability event, the probability that the decision-maker would select the same outcome as a probability in a consequent event decreased to between 20% and 25%. This translates to a 75% to 80% bias proportion with reference to predictions for the fourth outcome. Huber *et al.* (2010) indicate that the quantitative findings of their study are similar to the findings of previous studies on this bias, specifically citing Rabin (2002) and Rapoport and Budescu (1997). For the present study, the proportions of biased responses related to the representativeness heuristic are 61.2% (full sample) and 62.7% (narrow sample) respectively. However, the specific influence of the *misconceptions of chance bias* could only be identified for 15.1% in the full sample and 13.6% in the narrow sample (being the proportion of respondents who selected Option C).

Nonetheless, the additional decision option resulted in rich findings in terms of the influence of biases related to the representativeness heuristic, suggesting biasing effects in both directions from the unbiased option. This finding extends previous research findings as follows: Peters (1993) argues that multiple heuristics could be present in decision-making behaviour on a particular task, while the current study's findings suggest that multiple biases from the same heuristic may influence the decision-making behaviour of individuals for a specific decision-problem.

Question 2 tested for the presence of the *confirmation bias* in the decision-making behaviour of management accounting professionals. The confirmation bias emanates from the human decision-making tendency to only look for confirming evidence to support a statement when both confirming and disconfirming evidence, or at the very least only disconfirming evidence, should be investigated to determine the validity of a statement. Question 2 was formulated to suggest a statement made by an investment analyst, namely that the market always rises in line with this analyst's forecasts for it to rise. Respondents were requested to indicate the minimum evidence required to confirm this claim. Option A referred to a favourable report by the analyst (i.e. a forecast for the market to rise), Option B

referred to an unfavourable report by the analyst (i.e. a forecast for the market to fall), Option C suggested an actual rise in the market and Option D an actual fall in the market. Accordingly, the confirmation bias was exhibited by responding with Options A and C, while the correct Options were A and D. In an attempt to lower the word count of the questionnaire, Options A and B simply referred to a favourable report and an unfavourable report without further explanation of what this was intended to mean in the actual questionnaire. If the meaning of Options A and B was not understood, respondents could have been tempted to only select either Option C (thereby exhibiting the bias) or Option D (the correct response). It seems as if some respondents did indeed not understand the meaning of Options A and B, because 34.5% of respondents selected only one, or a combination of, the last two options (Options C and D). Due to this finding from the responses and the argument discussed above, these responses are aggregated with the responses which combined these selections with Option A for analysis purposes, as there is a justifiable reason to believe that these respondents intended to answer the question in a comparable manner. Similar to the study from which the question was adapted (Einhorn & Hogarth, 1978:400), some respondents selected other combinations than the combinations indicated above. In order to be prudent, the responses containing these other combinations are disregarded for the purposes of analysing susceptibility to the confirmation bias. The options selected by respondents are presented in Table 8.3.

Table 8.3: Option selection comparison – confirmation

Sample	Size (*n*)	Option selection – if unbiased	Option selection - actual
Full sample	153	C, or A and C – 0%	C, or A and C – 91.5%
		D, or A and D – 100%	D, or A and D – 8.5%
Narrow sample	133	C, or A and C – 0%	C, or A and C – 91.7%
		D, or A and D – 100%	D, or A and D – 8.3%

The statistical analysis to determine whether a significant portion of the respondents were influenced by the confirmation bias is presented in Table 8.4. The comparison of the 95% Wilson binomial confidence interval of a 100% unbiased proportion with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the full sample (*n* = 153)

indicates that the actual responses by management accountants in the full sample differ statistically significantly from rationality ($p < 0.01$) because there is no overlap between the respective confidence intervals, in accordance with the criteria indicated by Cumming and Finch (2005:180). Similarly, the comparisons of the respective binomial confidence intervals of the narrow sample ($n = 133$) indicate that the actual responses by management accounting professionals in the narrow sample also differ significantly ($p < 0.01$) from rationality. For the full sample, 91.5% of respondents indicated that they considered confirming evidence only to be sufficient to test the statement of the analyst, while in the narrow sample, the percentage of respondents considering confirming evidence to be sufficient are even higher at 91.7% of respondents with combinations valid to this test. This percentage is alarmingly high when considering that training for management accounting professionals' controller role includes the premise that entries in an accounting system should be both complete and valid.

Table 8.4: Test for significance of the confirmation bias

Sample	Size (n)	Wilson 95% binomial confidence interval if unbiased – Options D, or A and D	Wilson 95% binomial confidence interval – actual proportion of Options D, or A and D	Test for significance
Full sample	153	Lower bound limit – 97.6%	Lower bound limit – 5%	($p < 0.01$)
		Proportion if no bias – 100%	**Sample unbiased proportion – 8.5%**	
			Upper bound limit – 14%	
Narrow sample	133	Lower bound limit – 97.2%	Lower bound limit – 4.7%	($p < 0.01$)
		Proportion if no bias – 100%	**Sample unbiased proportion – 8.3%**	
			Upper bound limit – 14.2%	

To compare the findings with the findings of the previous study by Einhorn and Hogarth (1978), all responses to the current study are considered ($n = 255$ for the full sample and $n = 217$ for the narrow sample). In the current study, only 1.6% of respondents in the full sample and 1.4% of respondents in the narrow sample selected the correct minimum

combination of a favourable report and a piece of disconfirming evidence. Einhorn and Hogarth (1978:400) found that 21.7% of the professional statisticians (n = 23) in their experimental sample requested the correct combination. It could be argued that, as part of their controller role, management accounting professionals are trained look for both confirming and disconfirming evidence when having to ensure that accounting entries are valid and complete. Yet, only 1.2% of respondents in the full sample (1.4% in the narrow sample) of the present study selected the combination of a favourable report, combined with a rise in the market (confirming as valid) and a fall in the market (disconfirming, i.e. confirming as invalid). The total percentage of respondents who requested any combination which included disconfirming evidence is 14.9% for the full sample and 16.2% for the narrow sample. Wason (1969:475) found that 6.3% of first-year psychology students requested disconfirming evidence. However, Einhorn and Hogarth (1978:400) found that 43.5% of professional statisticians in their sample requested some form of disconfirming evidence. They argue that individuals with scientific training may be more aware of the need to seek for disconfirming evidence. Nevertheless, their final findings indicate that training alone is not sufficient, because many professionally trained individuals continue to seek confirming evidence only (Einhorn & Hogarth, 1978:413-414). The finding of the limited proportion of management accounting professionals in the present study who sought disconfirming evidence, despite their training to ensure that accounting entries were valid, confirms the argument that education on seeking disconfirming evidence is not sufficient to combat the confirmation bias (Einhorn & Hogarth, 1978:413-414).

The possible influence of the third bias relating to the use of the representativeness heuristic, namely the *misconceptions of regression to the mean bias*, *wa*s investigated by **Question 3** in this section of the questionnaire. Question 3 was an extension of a similar question used previously by Lowies (2012:124) to test for the presence of this bias. The question presented respondents with two scenarios from which they had to select the scenario which they preferred. Option A presented an investment that slightly outperformed other investments in the recent past, and which was accordingly and appropriately priced slightly higher than other more average investments. Option B presented an investment that performed slightly worse than the average of other investments in the recent past, and which was accordingly and appropriately priced slightly lower than other more average investments. De Bondt and

Thaler (1985:797) empirically illustrated that the investment in Option B should, on average, outperform the investment in Option A for at least a period of three years after the investment was made. This phenomenon is attributed by De Bondt and Thaler (1985:797) to the naturally occurring regression back to the mean of investments that deviate from the mean. Therefore, Option B is the most rational choice, while selection of Option A is an indicator of misconception of the regression to the mean bias. The results of the statistical analysis of this question for the present study are presented in Table 8.5.

Table 8.5: Test for significance of the misconceptions of regression to the mean bias

Sample	Size (n)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Full sample	258	Lower bound limit – 98.5%	Lower bound limit – 43.9%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 50%**	($p < 0.01$)
			Upper bound limit – 56.1%	
Narrow sample	220	Lower bound limit – 98.3%	Lower bound limit – 46.6%	
		Proportion if no bias – 100%	**Sample unbiased proportion – 53.2%**	($p < 0.01$)
			Upper bound limit – 59.7%	

For the full sample ($n = 258$), the comparison of the 95% Wilson binomial confidence interval of a 100% unbiased proportion with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the sample indicates that the actual responses by management accountants in the full sample differ statistically significantly from rationality ($p < 0.01$) because the respective confidence intervals do not overlap (Cumming & Finch, 2005:180). The most rational option, namely Option B, was selected by 50% of respondents in the full sample. The results of the comparisons of the respective binomial confidence intervals of the narrow sample ($n = 220$) indicate that the actual responses by management accounting professionals in the narrow sample also differ significantly ($p < 0.01$) from rationality. The percentage of respondents in the narrow sample that selected the optimal investment scenario is slightly higher at 53.2%. These findings indicate that some

management accounting professionals in the sample placed exaggerated value on recent past performance, in accordance with the arguments by De Bondt and Thaler (1985, 1987). However, the proportion of management accounting professionals who exhibited the bias of regression to the mean in the current study is substantially lower than the 76.4% proportion of listed property fund managers in South Africa who exhibited this bias, according to the study by Lowies (2012:124). The level of bias by investors in shares on the securities exchange in the United States of America required to substantiate the findings of general share market overreaction by De Bondt and Thaler (1985:804; 1987:579) suggests a higher than 50% bias rate. Accordingly, despite a significant proportion of the management accounting professionals in the sample being influenced by the bias, the proportion of biased respondents is lower than in other populations from previous studies.

Lewis *et al.* (1983:280) and Komakech (2009:253) state that management accounting professionals rely on the representativeness heuristic when making control and financial decisions. The results of the present study indicate that a significant proportion of management accounting professionals are influenced by biases resulting from the representativeness heuristic in their business decision-making. Accordingly, future research on debiasing strategies to deal with representativeness-related biases would be valuable to improve the decision-making skills of the profession.

8.3   OVERCONFIDENCE BIAS

The possible presence of overconfidence bias in the decision-making behaviour of management accounting professionals was investigated by Questions 4 to 7 in the heuristic-based bias section of the questionnaire. All the overconfidence-related questions tested for the overconfidence of management accounting professionals in their abilities when compared with others (other business managers, other management accounting professionals and other respondents to the questionnaire). Consequently, this study focused on the overplacement aspect of overconfidence, according to the classification by Moore and Healy (2008:502). However, the other studies referred to in the interpretation of the results did not classify overconfidence into this categorisation. Therefore, the interpretation will not specifically refer to overplacement when comparing the results with the results of

previous studies. **Questions 4** and **5** required respondents to indicate how they deemed their business decision-making ability to compare with business managers, as well as with other management accounting professionals respectively. The response options that were available to the respondents consisted of a five-level Likert scale, with average ability being the centre option. The responses were coded from 1 for a response by individuals who deemed their decision-making ability to be 'Well below average' to 5 for a response by individuals who deemed their ability to be 'Well above average'. A one-sample t-test is conducted to determine whether the mean response by respondents differs significantly from average confidence. It is hypothesised that, should respondents in the sample not be either overconfident or underconfident, the mean response to Questions 4 and 5 should be average for each of the questions. Accordingly, a mean response of 3 for each of the samples represents the null hypothesis for statistical analysis purposes.

Table 8.6: Test for significance of overconfidence bias – ability relative to other managers

Sample	Size (*n*)	Mean	Standard deviation	*t*	*df*	Bootstrapped significance
Question 4 – confidence in ability relative to other business managers						
Full sample	304	3.53	0.795	77.448	303	*p* = .001
Narrow sample	265	3.54	0.783	73.499	264	*p* = .001
Question 5 – confidence in ability relative to other management accounting professionals						
Full sample	303	3.51	0.825	74.062	302	*p* = .001
Narrow sample	264	3.5	0.823	69.201	263	*p* = .001

The proportion of respondents who rate their own decision-making abilities higher than other business managers are 58.4% (177 responses). Results from the one-sample t-test presented in Table 8.6 indicate that the mean confidence level of respondents in the full sample ($n = 304$) in their business decision-making abilities when compared with the other business managers ($M = 3.53$, $SD = 0.795$) differs significantly ($t(303) = 77.448$, $p = 0.001$) from an 'Average' level of confidence ($M = 3$). The eta-squared statistic ($r^2 = 0.952$) indicates a large effect size. The higher than 'Average' mean value in the full sample indicates that

management accounting professionals in the full sample considered their business decision-making ability to be significantly higher than the ability of the average business manager.

When comparing their decision-making abilities to other management accounting professionals, 52.1% of respondents (being 158 respondents) were confident that they are better decision-makers. The mean confidence of respondents in the full sample ($n = 303$) in their business decision-making abilities when compared with other management accounting professionals ($M = 3.51$, $SD = 0.825$) also differs significantly ($t(302) = 74.062$, $p = 0.001$) from an 'Average' level of confidence ($M = 3$). The eta-squared statistic ($r^2 = 0.948$) indicates a large effect size. Management accounting professionals in the full sample also considered their business decision-making abilities to be significantly higher than the ability of an 'Average' management accounting professional. The high level of confidence by respondents in the full sample in their business decision-making ability is an indication of the presence of overconfidence bias.

Management accounting professionals in the full sample were slightly more confident in their decision-making ability when compared with other business managers ($M = 3.54$, $SD = 0.792$) than when compared with other management accounting professionals ($M = 3.51$, $SD = 0.825$). However, this difference is not statistically significant ($p = 0.58$), according to a paired sample t-test ($t(302) = 0.592$).

With reference to the narrow sample, 59.3% (being 157 respondents) considered their decision-making abilities to be better than other business managers. The results from the one-sample t-test indicate that the mean confidence level of respondents in the sample ($n = 265$) in their business decision-making abilities when compared with the other business managers ($M = 3.54$, $SD = 0.783$) differs significantly ($t(264) = 73.499$, $p = 0.001$) from an 'Average' level of confidence ($M = 3$). The eta-squared statistic ($r^2 = 0.953$) indicates that the effect size of this difference is large. Accordingly, respondents in the narrow sample also considered their business decision-making ability to be significantly higher than that of the average business manager. When compared with other management accounting professionals, 51.4% (being 136 respondents) considered their decision-making abilities to surpass that of their management accounting peers. The confidence of respondents in the

narrow sample (n = 264) in their business decision-making abilities (M = 3.50, SD = 0.823) also differs significantly (t(263) = 69.201, p = 0.001) from an 'Average' level of confidence (M = 3). The eta-squared statistic (r^2 = 0.948) once more indicates a large effect size. Respondents in the narrow sample considered their business decision-making abilities to be significantly higher than the ability of an 'Average' management accounting professional. The results from analysis of the data of the narrow sample indicate the presence of overconfidence bias.

Similar to the full sample, management accounting professionals in the narrow sample were slightly more confident in their decision-making ability when compared with other business managers (M = 3.54, SD = 0.779) than when compared with other management accounting professionals (M = 3.50, SD = 0.823). This difference is not statistically significant (p = 0.439), according to a paired sample t-test (t(263) = 0.776).

Menkhoff and Nikiforow (2009) found that fund managers viewed their investment decision-making performance as better than that of other fund managers. Menkhoff and Nikiforow (2009:323) also used a five-point scale to measure overconfidence. However, their scale had to be inverted to be compared with the current study. After the inversion adjustment, Menkhoff and Nikiforow (2009:325) found a mean of 3.66 level of confidence by fund managers in their ability when compared with other fund managers. Menkhoff and Nikiforow (2009:325) did not provide the percentage of respondents who exhibited overconfidence in their sample, but referred to an earlier study by Svenson (1981), which reported an overconfidence proportion of 82% with reference to respondents' rating of their own vehicle driving ability. Lowies (2012:128) found that 58.8% of listed property fund managers in his sample were confident that they had the ability to outperform the other fund managers. If the mean is calculated for the responses by the property fund managers, the confidence of fund managers in their abilities, as compared with other fund managers, is 3.65 (Lowies, 2012:268). Consequently, the mean confidence of management accounting professionals in the present study, whether compared with other business managers (M = 3.53), or other management accountants (M = 3.51), is somewhat lower than that found for other populations in previous studies. The proportion of respondents who considered their decision-making abilities to be above those of other business managers

(full sample = 58.4%, narrow sample = 59.3%), and management accounting professionals (full sample = 52.1%, narrow sample = 51.4%), are lower than the 82% proportion reported by Svenson (1981), as well as respectively similar to, and lower than, the 58.8% reported by Lowies (2012:128).

Questions 6 and **7** endeavoured to determine respondents' confidence in providing an estimate for a difficult task to determine whether the influence of the overconfidence bias remained present when management accounting professionals were confronted with difficult decision problems. Question 6 requested each respondent to estimate the exact percentage of all respondents to the questionnaire who would, in Question 9 of the demographical information section of the questionnaire, indicate that they were employed at companies consisting of 100 or fewer employees (the smallest category available in Question 9). This could not be known in advance, but respondents might have felt that they could estimate it to some extent based on available data regarding the general percentage of micro and small enterprises when compared with larger enterprises. However, due to the challenges of estimating in advance the exact percentage of respondents who would indicate that they were employed in companies with 100 or fewer employees, respondents were expected to be more conservative with reference to their confidence in being able to predict this particular figure with more accuracy than other respondents (Moore & Healy, 2008:504). Question 7 then requested respondents to indicate their confidence in being able to predict a more accurate estimate when compared with other respondents in the sample. The response options to Question 7 were an 11-point scale of percentages between 0% and 100%, in increments of 10 percentage points. The responses to Questions 6 and 7 are summarised in Table 8.7.

Predictions with reference to the percentage of respondents who were employed by companies with 100 or fewer employees range between 0% and 100% for the full sample (M = 42.04%, SD = 23.66%) and between 3% and 100% for the narrow sample (M = 41.23%, SD = 23.44%). It should be noted that the actual percentage of respondents employed by companies with 100 or fewer employees is 27% for the full sample and 28.4% for the narrow sample.

Table 8.7: Test for significance of overconfidence bias when faced with a difficult decision problem

Sample	Size (*n*)	Mean	Median	Standard deviation
Question 6 – prediction of percentage of respondents working in companies with 100 or fewer employees				
Full sample	303	42.04%	40%	23.66%
Narrow sample	264	41.23%	40%	23.44%
Question 7 – confidence in ability to predict the above relative to other respondents in the sample				
Full sample	303	51.12%	50%	21.55%
Narrow sample	264	49.96%	50%	21.30%

The mean confidence of respondents in the full sample in their ability to provide a more accurate estimate than other respondents in the sample is 51.12% (*SD* = 21.55%). Based on a one-sample t-test (*t*(302) = 0.906), this level of confidence does not differ significantly (*p* = 0.365) from a 50% (thus average) confidence level. The mean confidence of respondents in the narrow sample in their ability to provide an accurate estimate for such a difficult forecast is just below 50% (*M* = 49.96%, *SD* = 21.30%). According to a one-sample t-test (*t*(264) = -0.029), the mean level of 49.96% confidence does not differ significantly (*p* = 0.977) from a 50% (thus average) confidence level. Accordingly, for difficult decision problems, the presence of the overconfidence bias could not be confirmed in the decision-making behaviour neither of respondents in the full sample, nor respondents in the narrow sample. Consistent with the findings by Moore and Healy (2008:512), the mean confidence of the respondents in the current study in their abilities compared with others decreases when faced with a difficult decision problem. However, contrary to the argument by Moore and Healy (2008:504), the mean confidence that management accounting professionals who responded have in themselves when compared with others does not decrease to a level significantly below average.

The large standard deviation (*SD* = 21.548%) in the confidence of respondents indicates that a large variation is present in the confidence levels of the respondents. This is confirmed by Figure 8.1.

Figure 8.1: Distribution of level of confidence of respondents with reference to the difficult task relative to other respondents
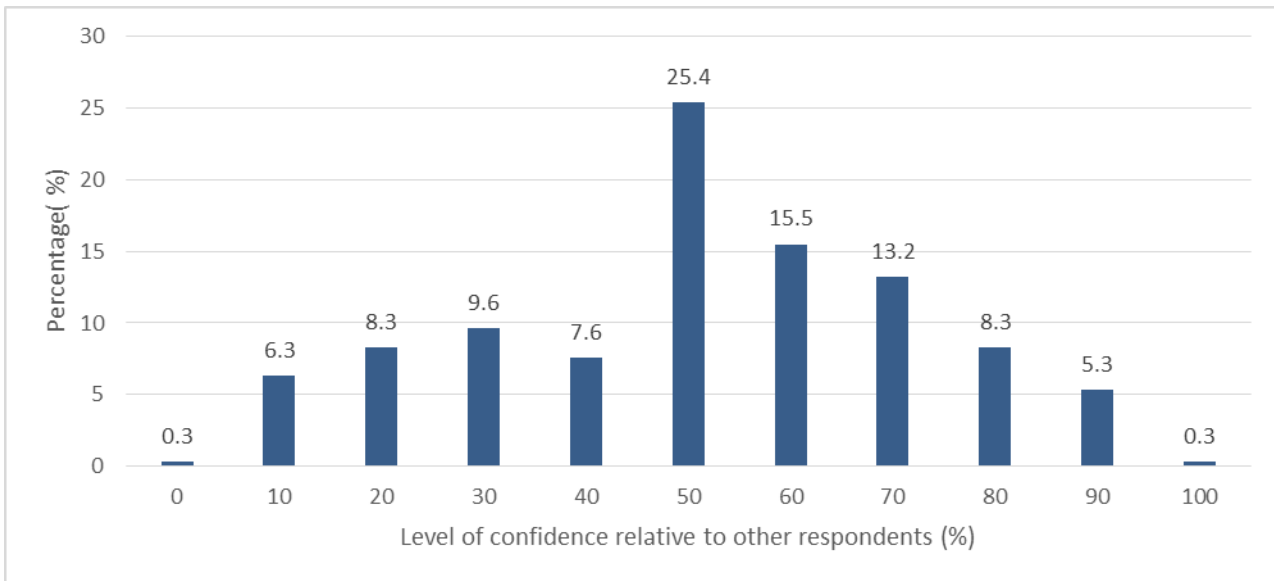
Due to the complexity of the estimate requested in the difficult decision problem, lower levels of confidence can be expected. However, the higher levels of confidence indicated by some respondents warrant further investigation. Figure 8.2 indicates whether the level of accuracy of estimates increases or, alternatively stated, whether the level of *inaccuracy* of estimates *decreases* relative to an increase in confidence levels. A decrease in inaccuracy relative to an increase in confidence levels suggests that the increased confidence may be validly based on a higher level of knowledge relevant to the decision problem. However, Figure 8.2 indicates the opposite, namely higher mean inaccuracy levels for respondents with higher confidence levels relative to respondents who indicated a lower level of confidence. The standard deviations of the estimates are also presented in Figure 8.2. It is hypothesised that if respondents with higher confidence levels were more knowledgeable with reference to the difficult decision scenario than respondents with lower levels of confidence, then the standard deviations of responses from respondents who indicated lower confidence would be higher due to the natural dispersion of 'best guesses' relative to more informed guesses by the high confidence respondents. Figure 8.2 shows that the standard deviations of estimates from respondents with different confidence levels do not indicate a decreasing trend. The discussions above corroborate the earlier finding that overconfidence bias was present in the decision-making behaviour of some management accounting professionals in the sample.

Figure 8.2: Overconfidence bias – mean absolute distances of estimates from correct outcome *vs* standard deviation of estimates in 10% confidence increments
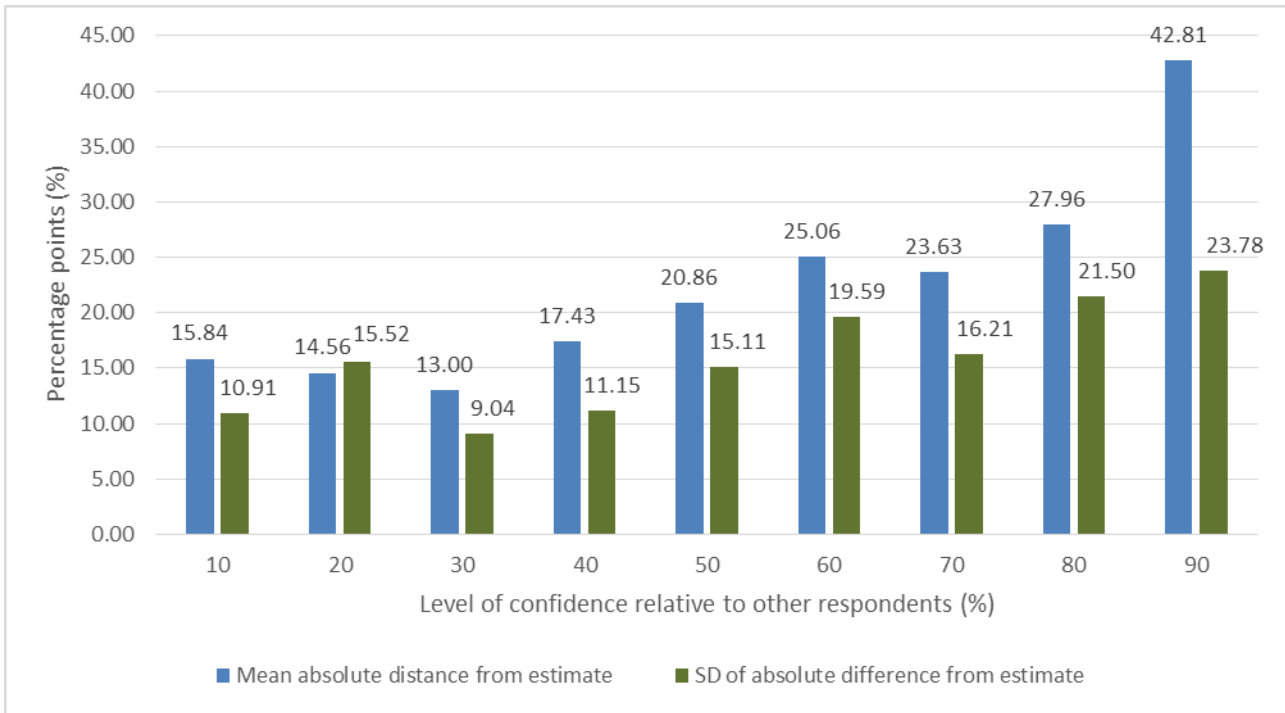
Subsequently, the relationship between the confidence that respondents had in their estimates and the distance of the respondents' estimates from the actual value is investigated by means of Pearson's product-moment correlation coefficient. A statistically significant medium-strength and positive correlation *(n* = 303, *r* = .338, *p* < .001) between the level of confidence by respondents in their estimates and an increase in the distance of the estimates from the actual value is found. Consequently, an increase in the confidence levels of respondents is associated with an increase in the mean inaccuracy of their responses to this difficult decision problem. This finding suggests that the level of *over*confidence increases in line with the level of confidence of respondents in their ability with reference to a difficult decision task. The finding that an increase in error rate shows a medium-strength correlation with an increase in confidence levels provides support for previous suggestions that overconfidence may have negative economic effects (Szyszka, 2010:127) and/or may be correlated with poorer financial performance (Arend *et al.*, 2016:15).

The increase in error rate that accompanies the increase in confidence could be due to the respondents with higher confidence levels having access to information on the percentage of small firms in existence in general, which may differ from the percentage found for the population in the sample of the present study. If this is the case, then the confident respondents should provide a narrower range of responses, which approximates possible information to which they may have access than the range of guesses by the respondents with low confidence levels. To ensure that the finding of inaccuracy was not due to an anomaly in the demographics of the responses to the present study, it was decided to investigate the possible correlation between the range of estimates provided by a category of respondents when aggregated into nine confidence-level categories (0% and 100% levels of confidence are disregarded because each was only selected by one respondent) and the level of confidence of each category. Accordingly, the non-parametric Spearman's rho correlation coefficient is used to investigate the relationship between the level of confidence by respondents in their estimate and the range of estimates within the confidence-level group (measured by means of the standard deviation of the estimates). A statistically significant strong and positive correlation is found between the particular level of confidence of the group of respondents and the width of the range of estimates in the particular group of respondents ($n = 9$, $r = .8$, $p = .01$). The positive correlation indicates that the range of estimates increases along with an increase in the level of confidence of respondents. Accordingly, the findings confirm that the increase in error rate which accompanies an increase in confidence levels is not due to more confident respondents having access to more reliable information. It indicates the contrary, namely that higher overconfidence levels are associated with a wider range of guesses, which can be associated with a lower level of conservatism in guesses (i.e. more 'wild' guesses).

The finding of the presence of overconfidence bias in the decision-making behaviour of management accounting professionals is of particular concern when considered with reference to the discussion in the literature review regarding the association between a higher propensity for accounting misstatement by executives and overconfidence (Meikle *et al.*, 2016:129). Ben-David *et al.* (2007:29; 2013:1577) argue that overconfidence bias results in chief financial officers making overoptimistic earnings forecasts. According to Meikle *et al.* (2016:129), this places executives in general under pressure when the lower

actual earnings results are noted to fraudulently report higher performance, which is closer to the overoptimistic forecasts. Therefore, mitigation of susceptibility to the overconfidence bias by management accounting professionals should receive urgent attention in subsequent research studies.

8.4   ANCHORING AND ADJUSTMENT BIAS

Question 8 the heuristics-based biases section of the questionnaire investigated whether management accounting professionals tended to anchor their thought processes on an initial value, whether relevant or irrelevant, as well as whether they then proceeded with conservative adjustments from this initial value. Question 8 presented respondents with a decision about the acquisition of another company, which was based on the probability of the successful introduction of a new product by the company which was set to be acquired. Information on five steps that were still necessary to ensure successful introduction of the new product to the market was provided. For each step, an estimate of the probability of that particular step being completed successfully was provided. The probability estimate of successful completion for the first step was 95%, followed by 90%, 80%, 90% and 90% respectively for the other steps. Respondents were then requested to provide a judgement-based estimate of the overall probability that the new product would be successfully introduced to the market. Seven category-based choice options were provided to respondents from which to make their selection. If respondents anchored on the initial probability of 95% and made insufficient (conservative) adjustments for the subsequent probabilities, their biased response would be higher than the correct response. The correct response was Category 3, namely 50%-59%, because the correct probability was 55.4% (0.95 x 0.9 x 0.8 x 0.9 x 0.9). The responses are presented in Table 8.8.

Table 8.8: Percentage-based frequency distribution of responses to test for anchoring and adjustment bias

Option categories (category number)	0%-39% (1)	40%-49% (2)	50%-59% (3)	60%-69% (4)	70-79% (5)	80-89% (6)	90%-100% (7)
Full sample	0.7%	3.4%	19.4%	12.7%	20.9%	32.8%	10.1%
Narrow sample	0.4%	3.5%	19.7%	10.9%	20.5%	34.9%	10%

Table 8.8 indicate that 76.1% of respondents in the full sample, and 76.3% of respondents in the narrow sample were influenced by anchoring and adjustment bias. A one-sample t-test indicates that the mean response category (M = 4.88, SD = 1.432) selected by management accounting professionals in the full sample (n = 268) differs significantly (t(267) = 21.544, p < 0.001) from the correct response category (M = 3). The eta-squared statistic (r^2 = 0.635) indicates a large effect size. Similarly, the one-sample t-test for the narrow sample indicates that the mean response category (M = 4.93, SD = 1.426) selected by management accounting professionals in the narrow sample (n = 229) differs significantly (t(228) = 20.434, p < 0.001) from the correct response category (M = 3). The eta-squared statistic (r^2 = 0.647) accordingly also indicates a large effect size. The mean responses by management accountants in both the full and the narrow samples are higher than the correct answer. The management accounting professionals in the samples were therefore influenced by the anchoring and adjustment heuristic-based biases of anchoring and insufficient adjustment in their decision-making behaviour. If the means of the samples of M = 4.88 and M = 4.93 are converted to percentages (falls within Category 4, which is 60%-69%), it results in mean percentage estimates of 67.92% and 68.37%. These means are similar to the mean response (64.4%) obtained by Joyce and Biddle (1981b:135) from professional auditor respondents. It should be noted that Joyce and Biddle (1981a:135) expressed concern over the level of independence of the various steps in their scenario and suggested that the statistically correct response could be viewed as a minimum response with possibility for a somewhat higher answer if the steps were not fully independent. However, the view that the steps are relatively independent is maintained in the present study, because no indication is provided of interdependence. The findings are also

consistent with previous studies on anchoring and adjustment research as explained in the following sentence. The behaviour of management accounting professionals in being susceptible to committing the anchoring and adjustment heuristic-based bias is consistent with the findings of previous studies on professionals in the control domain (Brown, 1981:67), financial decision-making domain (Cen *et al.*, 2013:73; Joyce & Biddle, 1981b:135; Kudryavtsev & Cohen, 2010:172 (94.3%); Whyte & Sebenius, 1997:82)[10] and property investment domain (Lowies *et al.*, 2016:60 (84.6%); Northcraft & Neale, 1987:95).[11]

8.5   AFFECT BIAS

The final question in the questionnaire, namely **Question 9** in the heuristic-based biases section, investigated the possible presence of a biasing effect resulting from emotional influences on the decision-making behaviour by management accounting professionals. Respondents were presented with two investment options from which to make a single investment decision. The question stated that there was no difference in the risk attached to the two investment options. Option A had a higher expected return of $505 000 (a 55% probability of a return of $550 000 and a 45% probability of a return of $450 000) than Option B's $495 000 (a 45% probability of $550 000 and a 55% probability of a return of $450 000). Each of the two options indicated that the respondents would possibly have to collaborate with a particular manager from another division with whom they had worked with in the past. However, in Option A, the description of the past behaviour of the particular manager was constructed to invoke negative affective reactions in the respondents, while the description of the past behaviour of the particular manager in Option B should invoke relatively neutral to slightly positive affective reactions in the respondents. The expected outcome of Option A indicates that it was the superior option, but the influence of negative affective reactions could encourage the respondents to rather select the biased Option B. The result of the statistical test to ascertain whether a significant proportion of the sample was influenced by affective reactions is presented in Table 8.9.

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[10] Biased proportions in brackets, where available.
[11] Biased proportions in brackets, where available.

Table 8.9: Test for significance of affect-induced bias

Sample	Size (*n*)	Wilson 95% binomial confidence interval if unbiased	Wilson 95% binomial confidence interval – actual proportion	Test for significance
Full sample	268	Lower bound limit – 98.6%	Lower bound limit – 55.6%	(*p* < 0.01)
		Proportion if no bias – 100%	**Sample unbiased proportion – 61.6%**	
			Upper bound limit – 67.2%	
Narrow sample	229	Lower bound limit – 98.4%	Lower bound limit – 53.8%	(*p* < 0.01)
		Proportion if no bias – 100%	**Sample unbiased proportion – 60.3%**	
			Upper bound limit – 66.4%	

For the full sample (*n* = 268), the comparison of the 95% Wilson binomial confidence interval of a 100% unbiased proportion with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the sample indicates that the actual responses by management accountants in the full sample differ statistically significantly from rationality (*p* < 0.01) because the respective confidence intervals do not overlap (Cumming & Finch, 2005:180). The result of the narrow sample (*n* = 229) is similar to that of the full sample, because the 95% Wilson binomial confidence interval of a 100% unbiased proportion does not overlap with the 95% Wilson binomial confidence interval of the actual unbiased proportion of the sample. Thus the actual responses by management accountants who represented the narrow sample also differ statistically significantly from rationality (*p* < 0.01). Therefore, it is evident that a significant proportion of the management accounting professionals in the sample were influenced by the biasing effect of their affective reactions to the decision scenario. However, when comparing the proportion of biased respondents with the percentage obtained by Kida *et al.* (2001:1342) in the gain context of their comparable first scenario, a substantially smaller proportion of the management accounting professionals in the current study's samples (38.4% and 39.7%) were biased by affective reactions than the proportion of business managers in the sample of Kida *et al.* (2001:1342) (71.5%). This suggests that, in general, management accounting professionals are more able to focus on the relevant information and to ignore the biasing influence of their emotions

than managers in general. Accordingly, the influence of management accounting professionals on a decision-making team is expected to lower the mean affect bias susceptibility of the team.

8.6 INDICATORS OF HIGHER SUSCEPTIBILITY TO THE INFLUENCES OF BIASES RELATED TO THE USE OF HEURISTICS

Possible relationships between the demographic variables of decision-makers and their susceptibility to heuristic-based biases were discussed in Section 4.4.1. The identified relationships may serve as indicators of higher susceptibility to biases, where applicable. However, the literature indicates that the relationships between demographic variables and susceptibility to heuristic-based biases are complex and not consistent between the heuristics. These relationships are investigated in the following sections. It should be noted that the analyses presented are subject to the same limitations that apply to the investigation of possible demographic indicators of higher susceptibility to frame dependence-related biases discussed in Section 7.8. These limitations include the limitations on the power of the analyses due to sample size restrictions, and the identification of susceptibility to a specific bias mostly being limited to one instance in which it is committed by a respondent. Similar to the discussion in that section, the limitations are not unique to this study and do not pre-empt the exploratory investigations as discussed in following sections.

In each of the following sections regarding susceptibility to a specific heuristic-based bias, the hypotheses generated in the literature review with reference to susceptibility to the respective bias are presented in summarised format to facilitate the investigations. However, while the relevant significant findings are discussed in each section, the findings are related to the hypotheses in the summary section (Section 8.6.7).

The composition of the data for the binary logistic regression analyses was discussed in detail in Section 5.4.6.2. A brief description of the variables is repeated in Table 8.10 for ease of reference.

Table 8.10: Variable composition and parameters for heuristic-based bias logistic regression analyses

Description of variable	Abbreviated name for analysis *(dummy variable convention in italics, where applicable)*
Gender of respondent	Gender
Age of respondent: • Young, respondents aged between 20 and 29 years; • Midlife, respondents aged between 30 and 49 years; and • Older, respondents aged 50 years and above.	Age *Age* *Age 1* *Age 2*
Years of work experience of respondent: • Little experience, 0 to 5 years' experience; • Moderate experience, 6 to 15 years' experience; and • Experienced, more than 15 years' experience.	Experience *Experience* *Experience 1* *Experience 2*
Position occupied by the respondent: • The traditional management accountant position, including its equivalents of financial manager, accountant and controller; • The top management accounting position of financial director, including its relative equivalents of chief financial officer and vice president of finance; and • Business management position, by combining the positions of managing director, including its relative equivalents of chief executive officer and president, as well as operational manager.	Position *Position 1* *Position 2* *Position 3*
The level to which a respondent prefers to have supporting information to support the decisions, as opposed to relying on intuition or judgement.	Pref_supp_info

8.6.1 Indicators of susceptibility to misconceptions of chance bias (representativeness heuristic)

To confirm whether possible demographic indicators suggested in the literature indicate higher susceptibility to misconception of chance bias in the sample of management accounting professionals, logistic regression model building and analysis are conducted to test the following hypotheses from Section 4.4.1:

Hypotheses – *Higher* susceptibility to misconception of chance bias

The following demographic variables indicate a higher susceptibility to misconceptions of chance bias:

Hypothesis 9.1.1 – *Gender:*

- *Men who responded, as opposed to women who responded.*

Hypothesis 9.1.2 – *Age:*

- *Older respondents, as opposed to younger respondents.*

Hypothesis 9.1.4 – *Position:*

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis 9.1.5 – *Preference for supporting information:*

- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis – *No difference* in susceptibility to misconception of chance bias

The following demographic variable indicates no significant difference in susceptibility to misconception of chance bias:

Hypothesis 9.1.3 – *Experience:*

- *Period of work experience of respondents.*

The various steps and ultimate findings emanating from the logistic regression analysis follow. The portion of respondents that could be analysed as part of this analysis were $n = 258$. With reference to the dependent variable, 39 (15.1%) of respondents in this sample

were biased specifically by misconceptions of chance, while 219 (84.9%) were not specifically influenced by this bias. For a more comprehensive analysis of the descriptive statistics for the sample in which the indicators of susceptibility to misconceptions of chance bias was tested, refer to Appendix 4 (Table A4.13).

Table 8.11: Summary of bivariate analysis – indicators of misconceptions of chance bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	2.321 (1) p = .128	2.273 (1) p = .132
Age	2.779 (2) p = .249	3.769 (2) p = .152
Not to be entered into initial model (*p* > .25)		
Experience	0.09 (2) p = .956	0.09 (2) p = .956
Position	1.49 (2) p = .475	1.411 (2) p = .494
Pref_supp_info	0.087 (1) p = .768	0.087 (1) p = .768

Based on the initial bivariate analysis presented in Table 8.11, 'Gender' and 'Age' are entered into the initial model. When analysing the initial model, it is evident that no variables are significant at the p < 0.05 level. Accordingly, no statistically significant indicators of susceptibility to misconception of chance bias could be identified in the current study.

8.6.2 Indicators of susceptibility to the confirmation bias (representativeness heuristic)

The sample size of respondents who selected viable options to test for the confirmation bias (n = 153), exacerbated by the skewness of responses towards bias (n_{biased} = 140, *versus* $n_{unbiased}$ = 13), violates the sample size assumption required for logistic regression. The

maximum number of parameters that can form part of a logistic regression model based on the sample size is 1 [min(13,140)/10]. Accordingly, multivariate analysis is not possible. The skewness also results in violation of the minimum expected frequency assumption for the chi^2 test for the categorical variables. Consequently, no analyses could be conducted to confirm or dispute possible indicators of susceptibility to confirmation bias.

8.6.3 Indicators of susceptibility to misconceptions of regression to the mean bias (representativeness heuristic)

Similar to the misconceptions of chance bias, the misconceptions of regression to the mean bias also originates from use of the representativeness heuristic. Accordingly, the same hypotheses as generated in Section 4.4.1 with reference to indicators of susceptibility to biases from the representativeness heuristic are stated here.

Hypotheses – *Higher* susceptibility to misconceptions of regression to the mean bias
The following demographic variables indicate a higher susceptibility to misconceptions of regression to the mean bias:

Hypothesis 9.3.1 – *Gender:*
- *Men who responded, as opposed to women who responded.*

Hypothesis 9.3.2 – *Age*:
- *Older respondents, as opposed to younger respondents.*

Hypothesis 9.3.4 – *Position*:
- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis 9.3.5 – *Preference for supporting information*:
- *Respondents who indicate a higher level of preference for supporting information, as opposed to respondents who indicate a preference for making intuition-based decisions.*

Hypothesis – *No difference* in susceptibility to misconception of regression to the mean bias

The following demographic variable indicates no significant difference in susceptibility to misconception of regression to the mean bias:

Hypothesis 9.3.3 – *Experience*:

- *Period of work experience of respondents.*

With reference to the misconception of regression to the mean bias, the following logistic regression modelling and analysis are undertaken to confirm whether the possible demographic indicators suggested in the literature indicate higher susceptibility to this bias in the sample of management accounting professionals. The sample for this analysis consisted of $n = 258$ respondents, of which 129 (50%) were not biased by misconceptions of regression to the mean and 129 (50%) were influenced by this behavioural bias. Additional descriptive statistics of this sample is available in Appendix 4 (Table A4.13).

Table 8.12: Summary of bivariate analysis – indicators of misconception of regression to the mean bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model ($p < .25$)		
Age	8.607 (2) $p = .014$	8.967 (2) $p = .011$
Position	5.896 (2) $p = .052$	6.093 (2) $p = .048$
Pref_supp_info	4.073 (1) $p = .044$	4.139 (1) $p = .042$
Not to be entered into initial model ($p > .25$)		
Gender	0.438 (1) $p = .508$	0.439 (1) $p = .508$
Experience	2.088 (2) $p = .352$	2.104 (2) $p = 0.349$

Based on Table 8.12, 'Age', 'Position' and 'Pref_supp_info' are entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in only 'Age' remaining significant at a $p \leq 0.05$ level. However, the removal of the 'Position' and 'Pref_supp_info' variables significantly affects the likelihood ratio and also the beta coefficients of the 'Age' variable. Accordingly, these variables are added back to the model. The statistics regarding the fit of the final model are summarised in Table 8.13.

Table 8.13: Model fit statistics – indicators of misconceptions of regression to the mean bias susceptibility

Statistic	Value	Finding
Likelihood ratio	14.559 (5), $p = 0.012$	Significant fit
Classification hit rate increase:		
- Maximum by chance	20.04%	
- Proportional by chance	23.3%	Moderate improvement*
Area under ROC curve	0.638	Moderate discrimination
R^2:		
- McFadden	.043	Weak fit
- Nagelkerke	.078	
Hosmer & Lemeshow test	4.406 (6), $p = .998$	Good fit
Studentised residuals above 2	None	Good fit

* Level of bias, and therefore base rate proportion, is 51.4%

Apart from the R^2 statistics, the other fit statistics indicate a moderate to good fit. Accordingly, the model is accepted as a moderate model. Future research may provide additional assurance on the findings. The information on the variables in the final model is presented in Table 8.14 which indicates that 'Age' is the only predictor of susceptibility to misconception of regression to the mean bias by respondents in the sample. 'Pref_supp_info' and 'Position' serve as controlling and moderating variables and are not statistically significant.

Table 8.14: Final logistic regression model – indicators of misconception of regression to the mean bias susceptibility

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Age			5.329 (2) $p = .07$			
Age 1	-0.565	0.344	2.927 (1) $p = .087$	0.568	0.297	1.086
Age 2	-1.072	0.481	4.963 (1) $p = .026$	0.342	0.113	0.879
Pref_supp_info	-0.076	0.051	2.177 (1) $p = 0.14$	0.927	0.839	1.025
Position			2.991 (2) $p = .224$			
Position 1	-0.068	0.392	0.03 (1) $p = .863$	0.935	0.433	2.017
Position 2	0.565	0.344	2.705 (1) $p = .1$	1.759	0.897	3.449

Younger management accounting professionals (20-29 years) are 2.924 times (Wald $\chi^2 = 4.963$ (1), $p = .026$) more likely to be influenced by misconception of regression to the mean bias than older (50+ years) professionals in the sample. The findings indicate no significant difference in susceptibility to misconceptions of regression to the mean bias (Wald $\chi^2 = 2.927$ (1), $p = .087$) between younger and midlife (30-49 years) respondents. The finding that younger and midlife management accounting professionals in the sample were more prone to the biasing effects of misconceptions of regression to the mean contradicts the argument by Peters *et al.* (2000:150) that older adults are more susceptible to this bias than younger adults. The argument by Peters *et al.* (2000:149) is founded on older adults being more likely to use the representativeness heuristic in general, because older adults rely more on schematic knowledge. These authors assumed (they did not provide previous studies as reference for this assumption) that usage of the representativeness heuristic is correlated with higher susceptibility to its biases. The findings of the present study suggest that different demographic variables may indicate higher susceptibility to each of the biases

related to the same heuristic (in this case, representativeness). Age, which is a significant indicator for higher susceptibility to misconceptions of regression to the mean bias in younger respondents than in older respondents, is a highly insignificant indicator with reference to susceptibility to misconceptions of chance bias (see Section 0), even though both biases stem from the representativeness heuristic. It should be noted that the model fit statistics indicate that additional variables, which are not part of the current study, may further enhance the current findings.

8.6.4 Indicators of susceptibility to overconfidence bias

The applicability of possible indicators of susceptibility to overconfidence bias, as suggested in literature, is investigated by means of the following hypotheses developed in Section 4.4.1:

Hypotheses – *Higher* susceptibility to overconfidence bias
The following demographic variables indicate a higher susceptibility to overconfidence bias:

Hypothesis 10.1 – *Gender:*

- *Men who responded, as opposed to women who responded.*

Hypothesis 10.2 – *Age*:

- *Younger respondents, as opposed to older respondents.*

Hypothesis 10.4 – *Position*:

- *Respondents in general managerial positions, as opposed to respondents in traditional management accounting positions.*

Hypothesis 10.5 – *Preference for intuition-based decision-making (inverse of preference for supporting information)*:

- *Respondents who indicated a higher level of preference for making intuition-based decisions, as opposed to respondents who indicated a high preference for supporting information when having to make decisions.*

Hypothesis – *No difference* in susceptibility to overconfidence bias

The following demographic variable indicates no significant difference in susceptibility to overconfidence bias:

Hypothesis 10.3 – *Experience*:

- *Period of work experience of respondents.*

The aforementioned hypotheses are tested by way of a logistic regression modelling and analysis exercise. The process and results are discussed in more detail below. Respondents are classified as being susceptible to overconfidence bias when the respondents indicated that they had a higher than 50% confidence in their prediction of the difficult decision problem. Additionally, the respondents also had to indicate an 'Average' to 'Well above average' confidence in their decision-making abilities when compared with other management accounting professionals, as well as with other business managers. Consequently, in the sample for this analysis ($n = 303$), susceptibility to overconfidence bias was not comprehensively proven in 188 (62%) of the respondents. For 115 (38%) of the respondents, overconfidence bias were prevalent in their confidence in their decision-making abilities. Descriptive statistics of this sample and the applicable variables are presented in Appendix 4 (Table A4.14).

Table 8.15 indicates that 'Gender', 'Age', 'Position' and 'Pref_supp_info' should be entered into the initial model. When analysing the initial model, the moderating and controlling effects of the variables result in 'Age' and 'Pref_supp_info' remaining significant at a $p \leq 0.05$ level. However, the removal of the 'Position' and 'Gender' variables significantly affects the likelihood ratio and also the beta coefficients of the model variables. Accordingly, these variables are added back to the model through an iterative process (according to relative significance of removed variables) to identify the optimal model. The model likelihood ratio and variable coefficients stabilise when 'Position' is added back.

Table 8.15: Summary of bivariate analysis – indicators of overconfidence bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	1.854 (1) *p* = .173	1.881 (1) *p* = .17
Age	6.263 (2) *p* = .044	6.495 (2) *p* = .039
Position	4.122 (2) *p* = .127	4.118 (2) *p* = .128
Pref_supp_info	5.858 (1) *p* = .016	5.919 (1) *p* = .015
Not to be entered into initial model (*p* > .25)		
Experience	2.067 (2) *p* = .356	2.082 (2) *p* = .353

The statistics regarding the fit of the final model are summarised in Table 8.16. Apart from the R^2 statistics, the other fit statistics indicate a moderate to good fit. Accordingly, the model is accepted as a moderate model. Preliminary interpretations from the model should be supplemented by future research in this area.

Table 8.16: Model fit statistics – indicators of overconfidence bias susceptibility

Statistic	Value	Finding
Likelihood ratio	15.425 (5), *p* = 0.009	Significant fit
Classification hit rate increase: - Maximum by chance - Proportional by chance	 3.43% 20.64%	 Moderate improvement*
Area under ROC curve	0.629	Moderate discrimination
R^2: - McFadden - Nagelkerke	 .04 .071	 Weak fit
Hosmer & Lemeshow test	3.747 (7), *p* = .808	Good fit
Studentised residuals above 2	None	Good fit

* Level of bias, and therefore base rate proportion, is 61.3%

Table 8.17: Final logistic regression model – indicators of overconfidence bias susceptibility

Variable	Beta coefficient	Standard error	Significance (Wald)	Odds ratio	Confidence interval (95%) for odds ratio	
Pref_supp_info	0.105	0.048	4.818 (1) $p = .028$	0.901	0.820	0.989
Age			6.317 (2) $p = .042$			
Age 1	0.405	0.309	1.715 (1) $p = .19$	1.499	0.818	2.748
Age 2	-0.511	0.478	1.332 (1) $p = .248$	0.576	0.226	1.469
Position			3.818 (2) $p = .148$			
Position 1	0.688	0.358	3.701 (1) $p = .054$	1.99	0.987	4.012
Position 2	0.235	0.327	0.515 (1) $p = .473$	1.265	0.666	2.402

Information for the variables in the final model is presented in Table 8.17. 'Pref_supp_info' is the only statistically significant predictor of susceptibility to overconfidence bias by respondents in the sample. A Box-Tidwell test done to assess the linearity of the logit of the 'Pref_supp_info' variable indicates non-significance at $p = .715$, confirming that the assumption of linearity of the logit of this continuous variable is met. 'Age' and 'Position' serve as controlling and moderating variables and are not statistically significant. The model indicates that for each 10%-point increase in the preference for basing decisions on intuition or judgement as opposed to on extensive supporting information, respondents are 10.99% (Wald $\chi^2 = 4.818$ (1), $p = .028$) more likely to be influenced by overconfidence. Accordingly, management accounting professionals who are relatively comfortable with relying on intuition or judgement when making business decisions are more prone to overconfidence bias. This finding corroborates the arguments by Bazerman and Moore (2012:29), namely that overconfidence may be the antecedent for a high level of trust in one's own intuition. Furthermore, this finding by the current study has important implications for business

managers who view management accountants as inhibitors of business decision-making (Byrne & Pierce, 2007:480; Pierce & O'Dea, 2003:282; Rausch, 2011:138; and Siegel *et al.*, 2003:41). At least part of the reason why management accounting professionals may be inhibiting business decisions is that they view the decision options with less overconfidence, and accordingly, more objectively. As indicated by the findings, if management accounting professionals require more supporting information before being willing to make a decision, it may be an indication that the management accounting professionals are less biased by overconfidence. Based in the financial and other dangers of overconfidence bias in business decision-making (Arend *et al.*, 2016:15; Ben-David *et al.*, 2013:1577; Meikle *et al.*, 2016:129), business managers would be well advised to pay attention to the views of the management accounting professionals who require more information for a business decision, as this should assist in mitigating overconfidence bias. Additional influences and indicators not dealt with in the current study may improve the models of future studies.

8.6.5 Indicators of susceptibility to anchoring and conservative adjustment bias

The following hypotheses relating to indicators of susceptibility to anchoring and adjustment bias are conveniently presented in summarised format:

Hypotheses – *Higher* susceptibility to anchoring and conservative adjustment bias
The following demographic variables indicate a higher susceptibility to anchoring and adjustment bias:

Hypothesis 11.1 – *Gender:*
- *Women who responded, as opposed to men who responded.*

Hypothesis 11.2 – *Age*:
- *Older respondents, as opposed to younger respondents.*

Hypothesis 11.4 – *Position*:
- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis 11.5 – *Preference for supporting information:*

- *Respondents who indicated a higher level of preference for supporting information, as opposed to respondents who indicated a preference for making intuition-based decisions.*

Hypothesis – *No difference* in susceptibility to anchoring and conservative adjustment bias

The following demographic variable indicates no significant difference in susceptibility to anchoring and adjustment bias:

Hypothesis 11.3 – *Experience*:

- *Period of work experience of respondents.*

Logistic regression is also employed to investigate the possible effect of literature-derived suggested indicators of susceptibility to anchoring and adjustment bias. The process and results are discussed below. With reference to the dependent variable, 205 (79.8%) of the respondents in the sample ($n = 257$) for this analysis were biased by the influence of the anchor and conservatively adjusted this value, while 52 (20.2%) were not affected by the bias. Additional descriptive statistics of this sample can be found in Appendix 4 (Table A4.15).

'Gender', 'Age', and 'Experience' should be entered into the initial model, according to the bivariate analyses in Table 8.18. When analysing the initial model, only 'Gender' is significant at a $p \leq 0.05$ level. The removal of the 'Age' and 'Experience' variables affects the likelihood ratio to a limited extent (2.9% change), and the beta coefficients of the 'Gender' variable remain constant. Accordingly, the final model only contains the 'Gender' variable.

Table 8.18: Summary of bivariate analysis – indicators of anchoring and adjustment bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model (*p* < .25)		
Gender	8.369 (1) *p* = .004	9.83 (1) *p* = .002
Age	5.058 (2) *p* = .08	4.794 (2) *p* = .091
Experience	3.009 (2) *p* = .222	3.139 (2) *p* = .208
Not to be entered into initial model (*p* > .25)		
Position	2.3 (2) *p* = .317	2.258 (2) *p* = .323
Pref_supp_info	0.014 (1) *p* = .905	0.014 (1) *p* = .905

Table 8.19: Model fit statistics – indicators of anchoring and adjustment bias susceptibility

Statistic	Value	Finding
Likelihood ratio	9.83 (1), *p* = 0.002	Significant fit
Classification hit rate increase: - Maximum by chance - Proportional by chance	 0% 17.84%	 Weak improvement*
Area under ROC curve	0.611	Weak discrimination
R²: - McFadden - Nagelkerke	 .038 .059	Weak fit
Hosmer & Lemeshow test	Not applicable, only one dichotomous categorical variable	
Studentised residuals above 2	3.5%	Good fit

* Level of bias, and therefore base rate proportion, is 79.8%

The statistics regarding the fit of the final model are summarised in Table 8.19. Apart from the likelihood ratio statistic, the other fit statistics indicate a relatively weak fit. Accordingly, the model cannot be accepted for interpretation. However, the model indicates that 'Gender' is strongly associated with a higher susceptibility to bias in the sample. This finding is confirmed by conducting a chi^2 test for independence to identify whether the proportion of bias among male and female respondents differs statistically significantly. The chi^2 test for independence (with Yates' continuity correction) confirms that there is a statistically significant difference (χ^2 = 8.987 (1), p = .003, phi = .187) in the proportion of men (74.3%) that were influenced by the anchoring and adjustment bias, as opposed to the proportion of women (90.0%) that were influenced by the bias. The phi-coefficient indicates a small to medium effect size. Accordingly, the results preliminarily indicate that a higher proportion of women were influenced by the anchoring and adjustment heuristic-based bias than men. Even though this finding in the current study is preliminary due to the small to medium effect size, it is in accordance with the study by Kudryavtsev and Cohen (2010:169), who found that female MBA students in their sample were more prone to anchoring bias. A future study may add value by separating the influence of anchoring from the influence of conservative adjustment from the anchor to identify whether one or both of these biasing influences are responsible for the difference in bias susceptibility between the genders. Still, it should be noted that the proportion of both genders that were influenced by the anchoring and adjustment bias in the present study is very high (male at 74.3% and female at 90.0%).

8.6.6   Indicators of susceptibility to affect-induced bias

Lastly, possible indicators of susceptibility to the influence of affect-based bias, suggested in the literature, are investigated by testing the following hypotheses:

Hypotheses – *Higher* susceptibility to affect-related emotional bias
The following demographic variables indicate a higher susceptibility to affect-based bias:
  Hypothesis 12.1 – *Gender:*
  * *Women who responded, as opposed to men who responded.*
  Hypothesis 12.2 – *Age*:
  * *Older respondents, as opposed to younger respondents.*

Hypothesis 12.3 – *Experience*:

- *Less experienced respondents, as opposed to more experienced respondents.*

Hypothesis 12.4 – *Position*:

- *Respondents in traditional management accounting positions, as opposed to respondents in general managerial positions.*

Hypothesis 12.5 – *Preference for supporting information:*

- *Respondents who indicated a higher level of preference for supporting information, as opposed to respondents who indicated a preference for making intuition-based decisions.*

Logistic regression model building and analysis are conducted to test the hypotheses. The sample for this analysis consisted of 268 responses (*n*), of which 103 (38.4%) were responses indicating the influence of affect bias and 165 (61.6%) responses which were unbiased. The descriptive statistics for this sample is available in Appendix 4 (Table A4.16). The initial bivariate analysis which is required to start the model building process is presented in Table 8.20.

Table 8.20: Summary of bivariate analysis – indicators of affect bias susceptibility

Variable	Wald (*df*) significance	Likelihood ratio (*df*) significance
To be entered into initial model ($p < .25$)		
Gender	7.804 (1) $p = .005$	7.843 (1) $p = .005$
Experience	3.555 (2) $p = .169$	3.622 (2) $p = .164$
Not to be entered into initial model ($p > .25$)		
Age	1.967 (2) $p = .374$	1.955 (2) $p = 0.376$
Position	1.376 (2) $p = .503$	1.385 (2) $p = .5$
Pref_supp_info	0.261 (1) $p = .609$	0.261 (1) $p = .609$

The results of the initial bivariate analyses presented in Table 8.20 indicate that 'Gender' and 'Experience' should be entered into the initial model. In the initial model, only 'Gender' is significant at a $p \le 0.05$ level. Removal of the 'Experience' variable does not affect the likelihood ratio or the beta coefficient of the 'Gender' variable dramatically. Accordingly, the final model is kept with only 'Gender' as variable. The statistics regarding the fit of the final model are summarised in Table 8.21.

Table 8.21: Model fit statistics – indicators of affect bias susceptibility

Statistic	Value	Finding
Likelihood ratio	7.843 (1), $p = 0.005$	Significant fit
Classification hit rate increase:		
- Maximum by chance	0%	
- Proportional by chance	16.91%	Weak improvement*
Area under ROC curve	0.584	Weak discrimination
R^2:		
- McFadden	.022	Weak fit
- Nagelkerke	.039	
Hosmer & Lemeshow test	Not applicable, only one dichotomous categorical variable	
Studentised residuals above 2	None	Good fit

* Level of bias, and therefore base rate proportion, is 61.6%

Apart from the likelihood ratio statistic, the other fit statistics indicate a relatively weak fit. Accordingly, the model cannot be accepted for interpretation. However, similar to the anchoring and adjustment bias model, it indicates that 'Gender' is strongly associated with a higher susceptibility to affect based bias in the sample. This suggestion that the bias proportion differs significantly between genders is confirmed by conducting a chi^2 test for independence. The chi^2 test for independence (with Yates' continuity correction) confirms that there is a statistically significant difference ($\chi^2 = 7.195$ (1), $p = .005$, *phi* = .172) in the proportion of men (32.4%) that were influenced by the emotions-based affect bias, as opposed to the proportion of women (50%) that were influenced by the bias. The phi-coefficient indicates a small to medium effect size. Accordingly, the preliminary results

indicate that a significantly higher proportion of women were influenced by the affect-based bias than men. This preliminary finding provides some support for the argument by Croson and Gneezy (2009:21) that women are more prone to affect bias, due to their more acute responsiveness to the influence of emotions in general. Further investigation in future studies to determine the effect of variables not present in the current study will be of value because the findings of the current study are subject to limited effect size.

8.6.7 Summary of indicators of higher susceptibility to heuristic-based bias

In Section 8.6, logistic regression analyses were used to identify, on a preliminary basis, indicators of higher susceptibility to the following:

- the biases of misconceptions of chance, confirmation, and misconceptions of regression to the mean, all three related to reliance on the representativeness heuristic;
- the bias of overconfidence;
- the bias of anchoring on an initial value and then making conservative adjustments to this anchor as more information becomes available – also referred to as the anchoring and adjustment heuristic; and
- the biasing effects of emotional responses to decision-scenarios – also referred to as the affect heuristic.

The following hypotheses generated in Section 4.4.1 are **supported** based on the findings in Section 8.6:

- **Hypothesis 10.5:**

  Respondents who indicated a higher level of preference for making intuition-based decisions, as opposed to a preference for ample information to support decision-making, are more prone to overconfidence bias. The implication of the acceptance of this finding is that business managers should value management accounting professionals' fixation with supporting information, because this could inhibit the manifestation of overconfidence bias in business decision-making by management.

- **Hypothesis 11.1:**

  The women who responded are more susceptible to the anchoring and conservative adjustment bias than the men who responded. The significance of this finding is limited

by a small to medium effect size, but it corroborates earlier findings with reference to senior business management students. It is suggested that the possible influence of anchoring and the possible influence of conservative adjustment are investigated separately in a future study to identify whether one or both influences result in the difference in susceptibility between women and men.

- **Hypothesis 12.1:**

   The women respondents in the sample are more susceptible to the affect-related biasing influence of emotions. Due to a small to medium effect size, the finding should also be regarded as preliminary. However, it is substantiated by arguments in the literature that women experience emotional influences more acutely than men.

- **Hypotheses 9.1.3, 9.3.3, 10.3 and 11.3:**

   The period of work experience of management accounting professionals is not an indicator of susceptibility to the biases of misconceptions of chance and misconceptions of regression to the mean, overconfidence bias and the bias induced by the anchoring and adjustment heuristic. These findings are consistent with prior research.

The following hypothesis is **rejected**, based on the findings in Section 8.6:

- **Hypothesis 9.3.2:**

   Older respondents are more susceptible to the misconceptions of regression to the mean bias than younger respondents. Contrary to the hypothesis, it was found that older respondents were significantly less susceptible to the misconceptions of regression to the mean bias than younger and midlife respondents. This finding suggests that there is a difference in susceptibility to the various biases that emanate from the use of the same heuristic. This is an avenue that could profit from being explored in more detail in future research.

The following hypotheses could **not** be **supported** by the findings in this section:

- **Hypotheses 9.1.1, 9.3.1 and 10.1:**

   Gender is a significant indicator of susceptibility to the misconceptions of chance bias, the misconceptions of regression to the mean bias and overconfidence bias.

- **Hypotheses 9.1.2, 10.2, 11.2 and 12.2:**

  Older respondents are more susceptible to the misconceptions of chance bias, overconfidence bias, anchoring and conservative adjustment bias and the influence of affective reactions bias than younger respondents.

- **Hypothesis 12.3:**

  Less experienced respondents are more susceptible to affect-induced emotional reactions bias than more experienced respondents.

- **Hypotheses 9.1.4, 9.3.4, 10.4, 11.4 and 12.4:**

  Respondents in traditional management accounting positions are more susceptible to heuristic-based biases than respondents in general managerial positions.

- **Hypotheses 9.1.5, 9.3.5, 11.5 and 12.5:**

  Respondents who indicated a higher preference for basing decisions on ample supporting information are more susceptible to the biases of misconceptions of chance, misconceptions of regression to the mean, anchoring and conservative adjustment, and affect-based emotional reactions than respondents who indicated a preference for using intuition when making decisions.

8.7 SUMMARY

The possible presence in the decision-making behaviour of management accounting professionals of biases that arise from using specific cognitive heuristics when making decisions was investigated in Chapter 8. An exploratory investigation into possible indicators of higher susceptibility to these biases, based on demographic information about the respondents, was also undertaken. The main findings are summarised in the following paragraphs. Table 8.22, which serves as a tabulated summary of the findings are presented mainly on the page to follow, but continues with one row on the page after the following page.

Table 8.22: Summary of the findings – influence of heuristic-related biases

Section and *Heuristic*	Hypothesis number and *Bias*	Proportion of biased respondents	Significance of proportion	Comparison of proportion to previous studies of general populations
Section 8.2 *Representativeness*	Hypothesis 9.1: *Misconceptions of chance*	61.2%-62.7% *(13.6%-15.1%)*	Significant	Total biased proportion is lower than previous studies which focused only on misconceptions of chance bias. *However, pure misconception of chance bias proportion is lower, due to high bias towards an additional option provided in the questionnaire. This option is argued to also relate to a representativeness-based bias.*
Section 8.2 *Representativeness*	Hypothesis 9.2: *Confirmation bias*	91.5%-91.7%	Significant	Similar to higher than other professional populations.
Section 8.2 *Representativeness*	Hypothesis 9.3: *Misconceptions of regression to the mean*	46.8%-50.0%	Significant	Lower than other populations.
Section 8.3 *Overconfidence*	Hypothesis 10: *Overconfidence in abilities compared with others*	*Mean confidence of sample*: 3.50-3.54 on 5-point scale (51.4% - 59.3%)	Significantly different from 'Average' confidence of '3'	Somewhat lower than other populations in general, but relatively higher with reference to over-confidence on difficult task.
Section 8.4 *Anchoring and adjustment*	Hypothesis 11: *Anchoring on initial value and conservative adjustment thereto*	76.1% - 76.3%	Significant bias evident from *mean* response	The *mean* response are similar to other professional populations.

Section and _Heuristic_	Hypothesis number and _Bias_	Proportion of biased respondents	Significance of proportion	Comparison of proportion to previous studies of general populations
Section 8.5 _Affect_	Hypothesis 12: _Affective reactions dominating rationality_	38.4%-39.7%	Significant	Substantially lower than other professional populations.

Table 8.22 presents the specific findings of Sections 8.2 to 8.5. Management accounting professionals in the sample were significantly influenced, on average, by all the biases tested. Accordingly, these professionals were not immune to the biases emanating from the use of heuristics when facing complex decisions. In particular, management accounting professionals in the sample indicated similar levels of bias, compared with other populations in previous studies with reference to confirmation bias relating to the representativeness heuristic, and the anchoring and conservative adjustment bias. The respondents in the sample exhibited a lower level of bias than reported in previous studies on other populations for the misconceptions of chance bias and the misconceptions of regression to the mean bias (both the aforementioned biases relate to the representativeness heuristic) and general overconfidence bias. Encouragingly, although a significant proportion of management accounting professionals in the sample were influenced by their affective reactions, the proportion was substantially lower than an earlier study of managers in general. In contrast, the level of overconfidence relating to difficult tasks exhibited by management accounting professionals in the sample, are cause for concern.

Based on the summary of the above findings, involving management accounting professionals in business decision-making may be favourable in terms of lowering the mean level of heuristic-induced bias in a diverse management decision-making group, because management accounting professionals exhibited mostly lower bias susceptibility than other professional populations. Accordingly, the higher levels of rationality among management accounting professionals may be partially responsible for the view by some business managers that they inhibit business decision-making. When a decision is influenced by the

biasing effects of heuristics, management accounting professionals may indeed differ from the rest of the management group in terms of their opinion and accordingly suggest that additional information should be gathered to obtain a better indication of what the actual optimal decision option may be, thereby decreasing the influence of heuristic-related bias.

CHAPTER 9: CONCLUSION

9.1 SUMMARY OF CHAPTERS AND FINDINGS

This research study commenced with a quote in the introductory chapter, which argues that if an individual does not have an understanding of human thought processes and behaviour, the individual cannot anticipate when the cognitive decision processes, which usually lead to effective and efficient decision-making, may guide the individual astray. The present research study investigated the possible influence of biasing thought process behaviour in a particular group of decision-makers, namely management accounting professionals, by means of an online survey approach. Management accountants, financial managers and business accountants were sampled by means of convenience sampling from worldwide members of the Chartered Institute of Management Accountants (CIMA), the Institute of Management Accountants (IMA), and from a sample of professionals who indicated that they were educated and employed as management accountants or financial managers on the databases of respondent panels from Qualtrics' ESOMAR-approved partners. The chapters and main findings of the study are summarised into two sections. The first addresses the evolving role of business partner and its accompanying increase in business decision-making involvement. The second summarises possible judgemental biases in the business decision-making behaviour of management accounting professionals.

9.1.1 Evolving business partner role and business decision-making involvement

According to the literature discussed in Chapter 2, the role of management accounting professionals, as a specific group of decision-makers, is changing from the traditional 'scorekeeper' and 'controller' role to that of 'business partner' who provides interpretation and consultation assistance to management. The description of the business partner role suggests that management accounting professionals may be more involved in making business decisions in this new role than in the traditional role. However, some researchers argue that the prevalence of the business partner role is overstated.

Consequently, the business decision-making involvement of management accounting professionals in the sample was investigated and described in detail in Chapter 6. It was found that 58.6% of management accounting professionals in the sample reported a moderate to constant involvement in making business decisions. When analysing the positions in which the respondents in the sample were employed, it was found that 18.1% of respondents occupied positions which inherently required business decision-making involvement. These include the positions of chief executive officer (or its equivalent of managing director or president), chief operating officer and operational manager. All the positions which were deemed to require inherent business decision-making involvement were found to require higher decision-making involvement than the mean involvement for the sample. Management accounting professionals who were employed in the top management accounting-related position of chief financial officer (or its equivalent of finance director or vice-president of finance) also reported a comparatively high level of business decision-making involvement. However, of the respondents employed in the position of management accountant, controller or financial manager, only 46.8% reported moderate to constant involvement in making business decisions. Accordingly, 53.2% of respondents in these positions reported limited to no business decision-making involvement. These findings corroborate indications in the literature that the business partner role, which includes business decision-making involvement, is a reality for a substantial portion of the management accounting professionals in the sample. However, with specific reference to the positions of management accountant, controller and financial manager, decision-making involvement was found not to be as prevalent as indicated by the greater part of literature on the business partner role.

The results from the binary logistic regression analysis, which investigated the possible demographic indicators of higher business decision-making involvement, were subsequently presented in Chapter 6. The results firstly support the findings described in the previous paragraph, namely that the position in which a management accounting professional is employed is indicative of the extent to which the professional is expected to be involved in making business decisions. The position of financial director (and its equivalents), as well as the positions with inherent business decision-making involvement (chief executive officer and its equivalents, as well as operational manager), indicates higher

business decision-making involvement. Among management accounting professionals in the traditional management accountant position (and its equivalents), the size of employing companies as measured in revenue in US dollar terms, and the age of management accounting professionals, are indicative of the level of current decision-making involvement. Management accounting professionals employed in larger companies are less likely to be highly involved in making business decisions. Therefore, the role of the management accounting function in smaller firms are less formally defined around the controller function, leaving scope for general management and the management accounting function to engage in financial consultation. Management accounting professionals in their midlife are more likely to be highly involved in making business decisions than their younger and older colleagues. The reason for the relatively lower business decision-making involvement of younger management accounting professionals can be ascribed to the need to first gain experience in practical management accounting, but also to gain a better understanding of the business and industry in which they are employed. However, the lower decision-making involvement of older individuals than their midlife colleagues requires further future investigation. It is preliminarily suggested that these individuals, and/or their fellow operational managers, still view their role from the more traditional controller and scorekeeper perspective.

The emerging nature of the business partner role, with specific reference to an increase in business decision-making involvement, was also investigated and described in Chapter 6. Although it was found that 65.1% of respondents indicated a moderate to comprehensive increase in business decision-making involvement during the last decade, this percentage could have been influenced by the career progression of the respondents to positions with higher levels of decision-making involvement. Therefore, the prudent approach of focusing on respondents in the management accountant, controller or financial manager positions, was adopted. Of the responding management accounting professionals in these positions, 53.4% indicated a moderate to comprehensive increase in involvement in making business decisions. The finding supports the emergence of a business partner role. However, again the prevalence is not as widespread as generally suggested. Yet, the increase in business decision-making involvement experienced by a significant proportion of responding

management accounting professionals highlights the need to investigate to decision-making behaviour of these professionals.

Binary logistic regression was also used to identify the relevance to the sample of possible demographic indicators of an increase in the decision-making involvement of management accounting professionals within the last decade. Only age was found to be a significant indicator. A similar trend to the current level of decision-making involvement was found, namely that a comparatively higher level of increase in business decision-making involvement was experienced by midlife management accounting professionals compared to what was experienced by their younger and older colleagues. Evidently, the younger colleagues may still experience the higher level of increase in business decision-making involvement as their work experience increases with age. The younger professionals might also have entered into the profession at a stage when their base experience of business decision-making involvement was higher than that of midlife and older individuals. However, their limited level of current involvement suggests that the former is a more plausible interpretation of the results. The limited level of increase in decision-making involvement experienced during the last decade by older individuals, combined with their current lower level of involvement reported in the previous section, provides support to indicate that the controller and scorekeeper role remains descriptive of older individuals in the profession.

9.1.2   Frame dependence and heuristics in judgemental decision-making

The inability of prescriptive decision research to account for actual human decision-making behaviour has resulted in the development of the descriptive decision research field. The main theories in cognitive decision behaviour research were discussed in Chapter 3. Research into the influence of the manner in which a decision is framed is based on the prospect theory of cognitive decision-making behaviour. The manner in which a decision problem is framed may result in inconsistent decision-making behaviour by the same individual. Accordingly, the decision frame may bias the decision-making behaviour of the decision-maker. The influence of the frame dependence biases is more pronounced for decision problems which involve uncertainty. Decision-makers also rely on decision simplification strategies to solve uncertain or difficult decision problems in the absence of

perfect information. These strategies are referred to as decision heuristics. Although heuristics regularly result in relatively sufficient decision-making, it may also result in biased decision-making behaviour under various circumstances. For the management accounting professionals in the sample who were involved in making business decisions, the results in Chapter 6 indicated that a mean of 42% of decisions did not have ample supporting information and were therefore characterised by uncertainty, making them susceptible to biased decision-making behaviour.

The literature review in Chapter 4 indicated that frame dependence and heuristic research have been extensively researched in the business and financial decision-making realms. However, limited research has been undertaken in the field of management accounting. Decision-making behavioural research in the management accounting field focuses on the influence of behaviour on specific decisions, while no studies were found to have investigated the decision-making behaviour of management accounting professionals as a group of decision-makers. This gap in the literature was dealt with in Chapter 7, by an investigation into the biasing influence of frame dependence on the decision-making behaviour of management accounting professionals, and in Chapter 8, by an investigation into the influence of biases stemming from decision heuristics in the decision-making behaviour of these professionals.

The findings presented in Chapter 7 indicated that all the main frame dependence influences identified in the literature and investigated in this study influenced a significant proportion of respondents. The frame dependence-related biases which influenced the decision-making behaviour of the responding management accounting professionals were as follows (from most prevalent to least prevalent – the proportion of the sample that was influenced is presented in brackets): concurrent decisions frame (64.7 to 82.6%)[12], the effect of pseudo-certainty framing (48.6% to 50.7%), the effect of certainty framing (47.8% to 45.9%), the effect of endowment framing (39.4% to 42.3%), the effect of different mental accounts framing (34.2% to 35.1%) and loss aversion bias (11.9% to 12.9%).

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[12] Two bias proportions are indicated, one for the full sample, and one for the narrow sample, which exclude those respondents who responded irrationally to a transparently framed question (see Section 5.4.7).

The continued investigation into frame dependence biases, which identified demographical data of respondents which were associated with susceptibility to each of the specific biases tested, was presented in the remainder of Chapter 7. It was found that management accounting professionals who indicated a higher preference for basing decisions on ample supporting information as opposed to using their intuition or judgement on which to base decisions were more susceptible to the endowment affect bias. In support of findings in other populations, it was found that there was no difference in bias susceptibility of respondents, based on their level of experience as management accounting professionals. Gender, age and the position in which a management accounting professional is employed could not be confirmed as possible indicators of bias susceptibility to any of the frame dependence biases. Similarly, the level of preference by a respondent for basing decisions on ample supporting information could not be confirmed as an indicator of susceptibility to loss aversion bias, concurrent decisions framing bias, certainty bias, pseudo-certainty bias or mental accounting bias. However, the power of the analyses was limited by the sample size. Accordingly, more of these demographic factors may be identified as additional indicators of bias susceptibility in the population in future studies.

With reference to biases arising from the use of cognitive decision heuristics, the results described in Chapter 8 specified that a significant proportion of the management accounting professionals in the sample were influenced by all the biases investigated. The heuristic-based biases which influenced the decision-making behaviour of the responding management accounting professionals were as follows (the proportion of the sample, presented from most prevalent to least prevalent, that was influenced is presented in brackets, where available): confirmation (91.5% to 91.7%), anchoring and adjustment (76.1% to 76.4%), overconfidence (51.4% to 59.3%), misconceptions of regression to the mean (46.8% to 50.0%), affect (38.4% to 39.7%), and misconceptions of chance (pure: 13.6% to 15.1%, including other representativeness-related bias: 61.2% to 62.7%).

The remainder of Chapter 8 continued by presenting the results of the identification of possible demographic indicators of susceptibility to each heuristic-based bias in the sample of management accounting professionals. A higher susceptibility to overconfidence bias was exhibited by respondents who indicated a higher preference for basing decisions on intuition

than on ample supporting information. Women in the sample were found to be more susceptible than men to the biasing effects of affect, as well as to the biasing effects of anchoring and adjustment. Similar to the findings with reference to framing, as well as to previous research, the level of experience of respondents was not an indicator of susceptibility to the biases of misconceptions of chance, misconceptions of regression to the mean, overconfidence, and anchoring and adjustment. Older respondents were found to be significantly less susceptible to misconceptions of regression to the mean bias than younger respondents. Gender could not be confirmed to indicate susceptibility to the misconceptions of chance bias, the misconceptions of regression to the mean bias, and overconfidence bias. Age was not found to indicate susceptibility to misconceptions of chance bias, overconfidence bias, anchoring and adjustment heuristic bias, and affect bias. With reference to affect, experience could not be confirmed as an indicator of bias susceptibility. Preference for either ample supporting information or intuition did not indicate susceptibility to the biases of misconceptions of chance, misconceptions of regression to the mean, anchoring and adjustment, and affect. The position which respondents occupied, being either traditional management accountant positions or general managerial positions, was not found to indicate higher susceptibility to any of the heuristic-based biases investigated in the present study.

The main findings of the various chapters discussed above provide the platform on which to base the main conclusions of the study, with reference to the research problem, research questions and hypotheses, which were generated in Chapter 1. These conclusions are highlighted in the following section.

9.2 CONCLUSIONS

9.2.1 Business decision-making involvement

The changing role of management accounting professionals from being administratively focused 'scorekeepers' and 'controllers' to more business-focused 'business partners' assisting management, highlighted the requirement to investigate the decision-making involvement and decision-making behaviour of management accounting professionals.

The conflict in the literature on the pervasiveness of the business partner role necessitated research into whether management accounting professionals were indeed becoming more involved in making business decisions **(Research Question 1)**. Research Question 1 was investigated by means of two hypotheses. Each hypothesis is discussed along with the findings of the present study with reference to the hypothesis.

Hypothesis 1:

Management accounting professionals are currently involved in business-related decision-making.

Of the respondents in the sample, 87.8% indicated some business-related decision-making involvement. However, excluding respondents who only indicated a limited involvement in making business decisions from this percentage would result in a figure which provided a better indication of management accounting professionals who were involved in business-related decision-making to the level which was compatible with the business partner role. Consequently, 58.6% of respondents in the sample indicated that they were moderately to constantly involved in making business-related decisions. *Management accounting professionals were therefore involved in making business decisions at the time the study was conducted.* This finding corroborates studies which indicate the emergence of a business partner role, including a more commercial orientation (CGMA, 2016:2; Goretzki *et al.*, 2013:55; Kim *et al.*, 2012:11; Komakech, 2009:42; Siegel *et al.*, 2003:42). Nonetheless, the finding that 41.4% of respondents were only involved in business decision-making to a limited extent or not at all substantiates the arguments by Lambert and Sponem (2011:566) that the business partner role is not required by all organisations and that the more traditional management accounting role of 'scorekeeper' and 'controller' still remains valid and valued.

A further contribution to the literature by the present study is the findings of how the levels of decision-making involvement differ between the various positions in which management accounting professionals are employed. Table 9.1 presents the percentage of respondents who reported moderate to constant decision-making involvement, categorised according to the positions occupied by the respondents.

The comparatively high current level of business decision-making involvement of respondents in the chief executive officer (and its equivalents) position is in accordance with expectations of the role of CEO, which is to make high-level business decisions in managing the company. However, more unexpected but encouraging is the high level of business decision-making involvement of the top management accounting-related position of chief financial officer (and its equivalents). The chief financial officer, as representative of the whole management accounting function, is therefore the valuable business partner link between the work of the management accountants in the management accounting function, and the rest of the business. Accordingly, it seems that the business partner role is currently more pervasive at higher managerial levels in the business than at operational level. It remains to be seen to what extent the business partner role will permeate to the middle and lower levels of the organisational hierarchy in future.

Table 9.1: Decision-making involvement, categorised by position

Position	Percentage of total respondents (n = 304)	Percentage who indicated moderate to constant involvement
Chief Executive Officer (CEO), Managing Director (MD), President, Chief Operating Officer (COO).	6.9% (21)	95.2%
Chief Financial Officer (CFO), Financial Director (FD), Vice-president (VP) Finance.	15.1% (46)	89.1%
Operational Manager.	11.2% (34)	64.7%
Controller, Management Accountant, Financial Manager, Accountant.	61.8% (188)	46.8%
Other.	4.9% (15)	46.7%

Hypothesis 2:

The extent of the involvement of management accounting professionals in business-related decision-making has increased during the last decade.

The findings with reference to Hypothesis 2 focus only on the traditional role of controller, management accountant, financial manager or accountant, because career progression by respondents to the other roles could bias the extent to which the role in the profession has changed over the last decade. Of respondents in the traditional role, 81.6% indicated some increase in business decision-making involvement during the last decade. However, excluding the respondents who only experienced limited increase in business decision-making involvement from this percentage would be a more representative indicator of the substantial change in decision-making involvement required to justify the emergence of a new role. Respondents who indicated a moderate to comprehensive increase in involvement in business decisions represented 53.4% of the respondents in the sample. *Accordingly, the extent of the involvement of management accounting professionals in business-related decision-making has increased during the last decade*. Therefore, arguments that the roles of some management accounting professionals are changing are valid. However, this is not true for all management accounting professionals because 46.6% of respondents in the traditional management accounting position indicated a limited or no increase in involvement in making business decisions. The finding that business decision-making involvement varied between different positions, as well as within a particular position, corroborates the argument by Nielsen *et al.* (2015:79) that the roles of management accounting professionals in business vary and are complex in nature.

Based on the findings related to Hypotheses 1 and 2, management accounting professionals are becoming more involved in making business decisions. However, this involvement is not universal to all management accounting positions in all organisations.

9.2.2   Behavioural aspects that influences decision-making

Findings that the roles of many management accounting professionals are changing to include business decision-making involvement substantiate the requirement to investigate the business decision-making behaviour of these professionals with reference to the possible influence of cognitive bias on their decisions. The business decision-making

behaviour of management accounting professionals was investigated by means of two research questions, as follows:

- Which behavioural aspects from a list of frame dependence factors identified from the literature are present in the decision-making behaviour of management accounting professionals? **(Research Question 2)**; and

- Which behavioural aspects from a list of behavioural heuristics identified from the literature are present in the decision-making behaviour of management accounting professionals? **(Research Question 3)**

Research Question 2 was dealt with in six hypotheses which relate to specific frame dependence-based biases. Each hypothesis is presented and the findings discussed, in turn, before the answer to Research Question 2 is presented.

Hypothesis 3:

Management accounting professionals are influenced by loss aversion in making business-related decisions.

A significant proportion of 11.9% of respondents in the sample exhibited preference reversal based on loss aversion when presented with a gain frame and a loss frame of the same decision scenario. *Accordingly, management accounting professionals are influenced by loss aversion when making business-related decisions*. However, the proportion of respondents who exhibited the bias was *substantially lower* than the proportion of biases found by previous studies on other populations (example: Bazerman, 1994:17; Tokar *et al.*, 2016:17; Tversky & Kahneman, 1981:453).

Hypothesis 4:

Management accounting professionals are influenced by concurrent decisions framing that obscure the true decision options in making business-related decisions.

When the decision scenario was framed as two concurrent decisions, 80.1% of respondents selected the suboptimal option. However, when the decision scenario was framed more transparently, 84.6% of respondents selected the optimal solution. Accordingly, 64.7% of

respondents reversed their preference between the two frames and were therefore biased by the concurrent frame. According to Shefrin (2002:26), individuals who are biased by the concurrent decision frame, fail to correctly view the decisions as a single 'decision package'. *Consequently, management accounting professionals are influenced by concurrent decisions framing in making business-related decisions.* The proportion of respondents who were influenced by the concurrent decisions bias *was similar* to the proportion of biased participants and respondents in previous studies on other populations (example: Sebora & Cornwall, 1995:51; Shefrin, 2002:26; Tversky & Kahneman, 1981:211).

Hypothesis 5:

Management accounting professionals are influenced by the certainty effect in making business-related decisions.

Biased preference for an economically suboptimal option which provides certainty, as opposed to preference for an economically optimal option which does not provide certainty, was exhibited by a significant 45.9% of the respondents. *Therefore, management accounting professionals are influenced by the certainty effect in making business-related decisions.* The proportion of respondents in the present study who were influenced by the certainty effect bias was lower than the proportion in the seminal study by Tversky and Kahneman (1981:455), yet *similar* to the findings of a more recent study by Mather *et al.* (2012:808) from a more general population than the sample of the current study.

Hypothesis 6:

Management accounting professionals are influenced by pseudo-certainty, stemming from the certainty effect, in making business-related decisions.

The option which seems to create certainty (referred to as pseudo-certainty) was selected by 50.7% of the respondents in the present study. The percentage of respondents who changed their preference between the pseudo-certainty frame and the clear frame was 9.6%. This preference reversal is statistically significant. *Accordingly, management accounting professionals are influenced by pseudo-certainty when making business-related decisions.* The proportion of respondents who selected the suboptimal pseudo-certainty

option *was similar* to the proportions found by previous studies (example: Sebora & Cornwall, 1995:53; Slovic *et al.*, 1982:481; Tversky & Kahneman, 1981:455).

Hypothesis 7:

Management accounting professionals are influenced by the effects of mental accounting in making business-related decisions.

Although the proportion of respondents who selected each option was almost the same in both mental accounting frames (being loss and expense from same account, as opposed to loss and expense from different accounts), a proportion of 34.2% of respondents changed their preferences between the two frames. Accordingly, preference reversal took place in both directions. This finding differs from the findings of previous studies on which the question was based, where only one-directional preference reversals were analysed (Sebora & Cornwall, 1995:55-56; Tversky & Kahneman, 1981:457). However, the presence of significant preference reversal in the present study between mental accounting frames confirms that *management accounting professionals are influenced by the effects of mental accounting in making business-related decisions.*

Hypothesis 8:

Management accounting professionals are influenced by the endowment effect in making business-related decisions.

A statistical significant difference was identified between the lower purchase price which respondents indicated that they were willing to pay to purchase a property on behalf of their company, and the higher selling price at which respondents indicated that they were willing to sell the company's property. *Management accounting professionals are therefore influenced by the endowment effect in making business-related decisions.* The finding of the presence of the endowment effect in the present study corroborates previous findings by Glöckner *et al.* (2015:224) that the endowment effect may still influence individuals' behaviour, even with reference to goods owned by their employing organisation.

The findings in support of Hypotheses 3 to 8 endorse that management accounting professionals are influenced by the frame dependence-related biases of loss aversion, concurrent decisions framing, the certainty effect, the pseudo-certainty effect, mental accounting and the endowment effect. Management accounting professionals were found to be less susceptible to loss aversion than populations in previous studies. However, these professionals' susceptibility to commit the other frame dependence biases in the current study is similar to the susceptibility of other populations in earlier studies.

Research Question 3 was dealt with in four hypotheses which individually related to a specific heuristic and its possible biases. Each hypothesis is presented and the findings discussed, in turn, before the answer to research Question 3 is presented.

Hypothesis 9:

Management accounting professionals are influenced by biases related to the use of the representativeness heuristic when making business-related decisions.

The present study considered three biases which emanated from reliance on the representativeness heuristic, namely misconceptions of chance bias, confirmation bias and misconceptions of regression to the mean bias. The analysis of the misconceptions of chance bias identified that 15.1% of respondents exhibited this specific bias. However, the decision scenario presented respondents with a third option, not presented in the research on which the question was based, to ensure that the scenario was similar to actual business scenarios that could be encountered. An additional 46.1% of respondents were biased by this option, which could be the influence of either the insensitivity to base rates bias or the insensitivity to sample size bias on their behaviour. Consequently, a total of 61.2% of respondents were biased by representativeness-related bias in this scenario. Granting that the proportion of respondents in the present study who were biased by the misconceptions of chance bias was lower than the proportion found for previous studies on other populations, the total bias proportion of the present study's respondents was still *lower than* the proportions found for previous studies (refer to Huber *et al.*, 2010:452 for a summary).

With reference to the confirmation bias, 91.5% of respondents were biased by only seeking confirming evidence. The proportion of respondents in the sample who requested disconfirming evidence as part of any combination of evidence was only 14.9%. This proportion was higher than that of the original study by Wason (1969:475). However, Einhorn and Hogarth (1978:413-414) indicate that professionals who are trained to seek evidence should be less biased than other individuals even though training and education alone will not fully eliminate the bias. The respondents in the present study's sample, who were all management accounting professionals, were trained as part of their controller role to seek evidence for transactions. The proportion of 14.9% who sought disconfirming evidence was, although higher than that found by Wason (1969:475) on a more general population, still substantially lower than the proportion of statisticians with training on seeking evidence by Einhorn and Hogarth (1978:400). Accordingly, the level of bias was *substantially higher* than in the previous study of individuals trained to seek evidence. This is a cause for concern for both management accounting professionals in the traditional management accounting controller role and professionals in the business partner role, because both these groups would encounter situations where seeking disconfirming evidence is a crucial part of their controller and decision-making duties.

The proportion of respondents who was found to be influenced by the misconceptions of regression to the mean bias was 50%. This proportion was *substantially lower* than found for previous studies on professional property investors (Lowies, 2012:124) and for investors who invested in stock markets (De Bondt & Thaler, 1985:804; 1987:579). The findings of all three biases related to the representativeness heuristic therefore indicate that *management accounting professionals are influenced by biases related to the use of the representativeness heuristic when making business-related decisions*.

Hypothesis 10:
Management accounting professionals are influenced by bias related to overconfidence when making business-related decisions.

On average, respondents in the study's sample considered their business decision-making abilities to be better than those of other management accounting professionals, as well as

better than those of other business managers. Although statistically significant, the level of overconfidence found in the current study was *slightly lower* than the level found by Menkhoff and Nikiforow (2009:325) with reference to a sample of professional fund managers, as well as lower than the level found by Lowies (2012:128) with reference to professional property investors. However, when confronted with a comparatively difficult decision scenario, on average, the respondents did not consider themselves to be better or poorer decision-makers for the task than other decision-makers. This specific finding differs from the findings by Moore and Healy (2008:504) that individuals rate themselves as poorer performers than others on difficult tasks. Accordingly, the respondents in the present study were *more overconfident* on difficult tasks than the individuals in the previous study. The relative high prevalence of overconfidence bias in the decision-making behaviour of management accounting professionals on difficult tasks is concerning, as previous studies suggest a link between overconfidence of accounting professionals and financial reporting fraud (Ben-David *et al.*, 2007:29; 2013:1577; Meikle *et al.*, 2016:129). Based on the preceding discussion, *management accounting professionals are influenced by bias related to overconfidence when making business-related decisions.*

Hypothesis 11:

Management accounting professionals are influenced by biases related to the use of the anchoring and adjustment heuristic when making business-related decisions.

Due to restrictions on the number of questions that could be included in the questionnaire, this study researched anchoring on an initial value and subsequent conservative adjustment of this value as a combined bias, without segregating it into anchoring on the one side and conservative adjustment on the other. Respondents in the current study exhibited anchoring and conservative adjustment bias to a *similar* degree to the auditors in the original study (Joyce & Biddle, 1981a:135) on which the question is based. *Consequently, management accounting professionals are influenced by biases related to the use of the anchoring and adjustment heuristic when making business-related decisions.*

Hypothesis 12:

Management accounting professionals are influenced by bias related to use of the affect heuristic when making business-related decisions.

Irrelevant affective reactions to a decision-scenario biased 38.4% of respondents in the present study. This proportion was *substantially lower* than the proportion of managers in the study by Kida *et al.* (2001:1342). Although the influence was lower than in the previous study, it was still present in the behaviour of a statistically significant proportion of respondents in the current study. *Accordingly, management accounting professionals are influenced by bias related to use of the affect heuristic when making business-related decisions.*

Support in favour of Hypotheses 9 to 12 endorses that management accounting professionals were influenced by the biases related to the representativeness heuristic, overconfidence, the anchoring and adjustment heuristic, and the affect heuristic when making business decisions. Management accounting professionals were found to be less susceptible to the biases misconceptions of chance, misconceptions of regression to the mean, overconfidence in their general decision-making abilities, as well as to the biasing influence of affect than other professional populations in previous studies. Management accounting professionals were found to be influenced to a similar degree than other populations by the anchoring and conservative adjustment bias. A higher proportion of management accounting professionals than other professional populations were influenced by confirmation bias, and overconfidence in their own abilities when performing difficult tasks.

In summary, a substantial proportion of management accounting professionals were becoming involved in making business decisions due to their evolving role as business partner. The study found that, contrary to traditional concerns by general managers, the judgemental decision-making behaviour of management accounting professionals should not hamper quality business decision-making due to their relatively similar susceptibility to judgemental biases than other decision-makers in general. Their slightly lower levels of bias

susceptibility to some biases may indeed benefit the quality of business decision-making in a firm.

9.2.3 Limitations

The conclusions of this study should be considered within the framework of the main limitations which applied to the present study. A non-random convenience sampling method was applied. This sampling method provides sufficiently valid population samples for widely dispersed populations, if specific measures are in place. The sample was collected through three different sample collection avenues, ensuring a wider coverage of the population. This was confirmed by the demographic composition of the respondents in the sample, which was comparable with previous studies on the same population. Accordingly, generalisations were made to the population of management accounting professionals, both those registered as members of international institutes and those practising management accounting without being registered with the main international institutes. However, these generalisations should be evaluated with due consideration of the convenience sampling method.

The length of the questionnaire ensured the capture of a wide array of data, but resulted in two accompanying limitations. Firstly, the length of time required to complete the questionnaire resulted in fewer management accounting professionals being willing to complete the questionnaire, thereby limiting the size of the convenience sample. Consequently, the power of the logistic regression analyses to identify a higher number of relevant indicators of decision-making involvement and bias susceptibility was limited. Secondly, fatigue resulted in a number of respondents discontinuing their completion of the questionnaire. As a result, some of the behavioural aspect questions were not completed by all the respondents. This effect was mitigated by the random order of the presentation of questions to respondents, resulting in the attrition rate not significantly influencing a particular question.

The behavioural aspects which were investigated in the present study were limited to the biases specifically indicated, due to the need to limit the length of the questionnaire.

Although these biases were the biases most commonly found in the literature, additional biases and behavioural influences not part of the current study may also influence the business decision-making behaviour of management accounting professionals.

The implications of the findings and conclusions of the study, as well as possible areas for future research, are presented in the following section.

9.3 IMPLICATIONS OF FINDINGS AND RECOMMENDATIONS FOR FUTURE RESEARCH

9.3.1 Contributions to the field of knowledge

This study provides important contributions to the current field of knowledge in two main areas. Firstly by providing an additional contribution to the contentious debate surrounding the development of the business partner role of management accounting professionals, focussing specifically on developments regarding business decision-making involvement of management accounting professionals. The contribution includes the identification of possible variables which may correlate with a higher level of business decision-making involvement. Secondly, and most importantly, the study identified and estimated the presence and level of behavioural biases among a hitherto under-researched group of financial decision-makers, namely management accounting professionals. The investigation of the behavioural decision-making behaviour of these professionals are especially relevant due to the changing decision-making role of these professionals within the companies in which they are employed. Identification of possible indicators of susceptibility to the biases, also contributes to the understanding of the decision-making behaviour of management accounting professionals.

The contributions of the present study are reinforced by the characteristics of the study's sample. Firstly, in contrast to many previous studies who used student samples, the current study's sample consisted of professionally employed respondents. Secondly, the sample of the study is fairly unique in terms of the wide geographical composition of the sample, while previous behavioural studies were limited to single regions.

The implications of the findings and the possible areas for future research that were identified from the findings, are discussed in more detail in the two sections which follow. The sections are organised according to the two areas of contribution, namely business decision-making involvement of management accounting professionals, and cognitive decision-making behaviour of these professionals.

9.3.2 Decision-making involvement of management accounting professionals

The findings of the present study highlight the complex nature of the roles and functions of management accounting professionals in businesses. The findings indicate that management accounting professionals were employed in positions varying from traditional management accounting positions, to business partner positions, to general business management positions and to top management positions. The role of management accounting professionals in the traditional management accounting positions also differed between companies. The complex nature of the roles and functions that management accounting professionals are required to fulfil in different companies provides challenges in terms of the education, training and continued professional development. Institutes and education providers must take note that the traditional controller and financial skills remain a requirement at many companies, but that business, decision-making and interpersonal skills are increasingly required competencies. The increase in decision-making involvement reported by at least 65.1% of respondents (53.4% for respondents in the 'traditional' position) during the last decade, emphasises the importance of adjusting syllabi to deal with the increased significance of business decision-making and interpersonal skills. The finding that 42.0% of the business decisions in which respondents were involved required the use of intuition and judgement is also significant in terms of indicating areas in which management accounting professionals' skills should be improved. The present study contributes to the body of knowledge on understanding the current judgement and intuition decision-making competences of management accounting professionals by identifying their susceptibility to the most common cognitive decision biases.

An avenue for future research which emanates from the present study is to identify the possible reasons for the differences in the roles of management accounting professionals in businesses. Previous studies have initiated research into possible company-related causes and the present study identified some demographic indicators related to both the management accounting professional and the company. However, a more focused study can build on these findings to provide a more comprehensive understanding of the role requirements of companies with reference to their management accounting function and the characteristics of individuals who tend to be employed in the respective roles. The present study identified that older management accounting professionals were less involved in business decision-making than their midlife colleagues. A future study should investigate this phenomenon in more detail to identify possible reasons for this anomaly. The current study also suggests that an overly prudent approach to decision-making by preferring to limit the use of judgement, limits the extent to which general management were involving management accounting professionals in business decisions. Developing the judgemental decision-making skills of management accounting professionals are therefore a vital area which should be addressed by the management accounting profession.

9.3.3 Cognitive decision-making behaviour of management accounting professionals

Management accounting professionals were found to recognise the importance to seek disconfirming evidence only to a very limited degree when compared with other professionals with training on seeking evidence and to exhibit a higher tendency to be overconfident on difficult tasks. Apart from these two biases, management accounting professionals were found to be susceptible to behavioural biases to a similar or lower degree than other populations where comparisons were possible. Specifically, management accounting professionals were found to be less susceptible than other populations to loss aversion bias, certainty effect bias (compared with a seminal study), misconceptions of chance, misconceptions of regression to the mean, general overconfidence, and affect. This lower susceptibility indicates to general management the value of taking the judgement of management accounting professionals into consideration when making business decisions when limited information is available. Additionally, this lower susceptibility to bias than other

populations indicates that the opinion of management accounting professionals will regularly differ from other decision-makers who are more prone to the influences of the biases. Accordingly, the lower bias susceptibility may provide a possible reason why the literature documents a tension between management accounting professionals and general managers, and why general management may view these professionals as inhibiting business decision-making.

The enhanced understanding of the decision-making behaviour of management accounting professionals as afforded by the present study provides a basis for future studies to identify which debiasing strategies would be most successful to lower the susceptibility of management accountants to the biases. Initial research should focus specifically on debiasing the overconfidence of these professionals in their abilities to perform difficult tasks, and on modifying their evidence-seeking approach to include looking for disconfirming evidence. These biases were present in a higher proportion of management accounting professionals in the present study than in other populations from previous studies. It is imperative that strategies to lower the presence of overconfidence in the difficult task of earnings forecast receive research attention because earlier studies indicate that overconfidence bias in these earnings forecasts could result in management committing reporting fraud.

Management accounting professionals who prefer to base decisions on ample supporting information, as opposed to on intuition (endowment effect), should pay particular attention to the information in the frame dependence chapters of this study, because this trait serves as an indicator which suggest that they are more susceptible to at least one particular frame dependence bias (particular bias indicated in brackets) than other management accounting professionals. The above indicator of higher susceptibility to frame dependence biases was identified in the current study. The findings of the present study also indicate that management accounting professionals who preferred to rely on their intuition, as opposed to gathering ample supporting information (overconfidence), women (anchoring and conservative adjustment, and affect), and younger professionals (misconceptions of regression to the mean) were more susceptible to certain heuristic-based biases (particular bias indicated in brackets) than other management accounting professionals. The chapters

in this study on heuristics and its related biases are especially valuable to individuals exhibiting these characteristics. Future studies with increased sample sizes could identify additional indicators of higher susceptibility to each particular bias.

The particular manner in which mental accounting influences the behaviour of management accounting professionals would benefit from additional future research. The present study identified preference reversal in both directions, based on the business decision scenario presented to respondents to the questionnaire. This is an area which has not received adequate research attention in past studies on behaviour in general, and accordingly, has resulted in difficulty to interpret the findings of the current study in this regard.

Behavioural research into human decision-making behaviour in general should note the finding that susceptibility to different biases resulting from reliance on the same heuristic may differ between individuals. The current literature generally assumes that an individual is susceptible to a similar degree to the different biases which emanate from the same heuristic, even though limited support for this assumption could be found.

9.4 EPILOGUE

This study makes a contribution to understanding the cognitive decision-making behaviour of management accounting professionals to assist these professionals in anticipating when the "cognitive thought processes that serves [them] so well are likely to lead [them] astray" (Bazerman & Moore, 2012:45).

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APPENDIX 1 – Questionnaire

Faculty of Economic and Management Sciences

Letter of Introduction and Informed Consent

Dept. of Financial Management

BEHAVIOURAL ASPECTS THAT INFLUENCE BUSINESS DECISION-MAKING BY MANAGEMENT ACCOUNTING PROFESSIONALS

<u>Research conducted by</u>:
Mr Z Enslin (20174404)
Cell number: +-27 83 643 2794

Dear Participant

You are invited to participate in an academic research study conducted by Zack Enslin, Doctoral student from the Department of Financial Management at the University of Pretoria.

The purpose of the study is twofold; firstly to determine the current level of involvement of management accounting professionals in business decision-making, and secondly to determine which behavioural aspects may be present in the decision-making processes of management accounting professionals, when faced with decisions with inherent uncertainty.

Please note the following:
- This is an <u>anonymous</u> study survey as your name will not appear on the questionnaire. The answers you give will be treated as strictly <u>confidential</u> as you cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible.
- The results of the study will be used for academic purposes only and may be published in academic and professional journals. We will provide you with a summary of our findings on request.
- Please contact my study leaders, Prof JH Hall and Dr E du Toit if you have any questions or comments regarding the study (click here for their contact details).

Please select an option below before you click the continue button:
- ❍ I have read and understand the information provided above and I hereby consent to participate in the study on a voluntary basis.
- ❍ I prefer not to participate in the study.

Thank you for taking the time to complete this survey!

The results from this study will provide valuable input into processes to **enhance the management accounting profession**. Therefore, if you are interrupted at any stage, you are welcome to continue completing the survey at a later time, as long as it is within one week of starting.

A **red progress bar** is presented at the **top of the page** to indicate your progression through the survey.

If you complete the survey <u>in full</u> you stand a chance to win one of ten Amazon.com vouchers to the value of US$200 each.

DEMOGRAPHICAL SECTION

Question 1:

Of which professional association(s) are you a member, if any? You may select more than one.

- o CMA
- o ACMA
- o CGMA
- o FCMA
- o ACCA
- o CPA

- o CA
- o No professional association
- o Management accounting student
- o Other (specify) _____

Question 2:

Gender:

- o Male

- o Female

Question 3:

Age:

- o 20 - 29 years
- o 30 - 39 years
- o 40 - 49 years

- o 50 - 59 years
- o 60+ years

Question 4:

How many years of work experience do you have as a management accounting professional?

- o 0 - 1 year
- o 1 - 5 years
- o 6 - 10 years

- o 11 - 15 years
- o 16 - 20 years
- o 20+ years

Question 5:

Which country is most representative of your culture and mind-set?

Select from a dropdown list of 193 countries

Question 6:

In which country do you currently work?

Select from a dropdown list of 193 countries

Question 7:

In which industry does the company where you work, operate?

- ○ Agriculture/Environment
- ○ Construction
- ○ Consumer package goods
- ○ Educational services
- ○ Energy/utilities
- ○ Financial services/consulting
- ○ Government/Non-profit
- ○ Information technology
- ○ Legal services

- ○ Manufacturing
- ○ Mining
- ○ Pharmaceutical/Health services
- ○ Retail/Wholesale
- ○ Telecom/Media services
- ○ Tourism
- ○ Transportation/Logistics
- ○ Other (indicate) _____

Question 8:

What is the relative size of the company where you work in terms of its annual sales/turnover/revenue (roughly translated into US Dollars):

- ○ $10 million or less
- ○ Between $10.1 million and $100 million
- ○ Between $100.1 million and $1 billion (billion = 1 000 000 000)

- ○ Between $1.1 billion and $5 billion (billion = 1 000 000 000)
- ○ More than $5 billion (billion = 1 000 000 000)
- ○ I honestly do not know

Question 9:

What is the relative size of the company where you work in terms of the number of employees?

- ○ 100 or fewer
- ○ Between 101 and 1 000
- ○ Between 1 001 and 5 000
- ○ Between 5 001 and 10 000

- ○ Between 10 001 and 50 000
- ○ More than 50 000
- ○ I honestly do not know

ROLE AND DECISION-MAKING INVOLVEMENT SECTION

Question 1:
What is your position in the firm where you work?

- o CEO (Chief Executive Officer)/ Managing Director/ President
- o CFO (Chief Financial Officer)/ Vice-President of Finance/ Director of Finance/ Financial Director
- o COO (Chief Operational Officer)

- o CIO (Chief Information Officer)
- o Controller/accountant/financial manager
- o Operational manager (general business/business unit)
- o Other (indicate) _____

Before you continue, note the following:

In this survey the term '**business decisions**' refers to decisions related to **management of a business**, and **_not_** _to ordinary decisions related to the traditional_ _controller role of management accountants (e.g. which variances to investigate)._

Question 2:
What is your current involvement in business decision-making?

o None   o Limited   o Moderate   o Extensive   o Constant

Question 3:
To what degree has your involvement in business decision-making increased in the last decade?

- o Not at all
- o Slightly
- o Moderately

- o Substantially
- o Comprehensively

Question 4:

To what extent do you prefer making decisions supported by specific calculations and other supporting facts, as opposed to making intuitive/judgement-based decisions?

My personal preference is:

I prefer having specific supporting facts before making decisions.	I do not have a particular preference.	I prefer making decisions based on my intuition/judgement.

Scale: 0   1   2   3   4   5   6   7   8   9   10

Question 5 (only displayed if respondent indicated some decision-making involvement in question 14):

When you are involved in business-related decisions, for what percentage of decisions is there ample information to support the decision, compared to the percentage of decisions that require intuition or judgement?

The percentage of decisions with ample supporting information is:

Scale: 0   10   20   30   40   50   60   70   80   90   100

Before you continue, note the following:

Some of the scenarios below may seem very similar, but there are important **small differences.**
Please consider each question separately.

There are no right or wrong answers to these questions – the purpose of the survey is to investigate decision-making <u>processes</u> based on your choices.

FRAME DEPENDENCE SECTION

Question 1:

A car manufacturer experienced economic setbacks. Three plants may have to be closed and 6 000 employees laid off. The vice-president of production has developed two plans. Which plan would you choose?

  A. The plan that will save one of the three plants and 2 000 jobs.
  B. The plan that has a 1/3 (33.33%) probability of saving all three plants and all 6 000 jobs, but has a 2/3 (66.67%) probability of saving no plants and no jobs.

Question 2:

A car manufacturer has experienced economic setbacks. Three plants may have to be closed and 6 000 employees laid off. The vice-president of production has developed two plans. Which plan would you choose?

  A. The plan that will result in the loss of two of the three plants and 4 000 jobs.
  B. The plan that has a 2/3 (66.67%) probability of resulting in the loss of all three plants and all 6 000 jobs, but there is a 1/3 (33.33%) probability of losing no plants and no jobs.

Question 3:

Choose between the following two options for your company:

  A. A 25% chance of gaining $240 million in value but a 75% chance of losing $760 million in value.
  B. A 25% chance of gaining $250 million in value but a 75% chance of losing $750 million in value.

Questions 4:

As the CEO of CHARLIE Corporation you must decide whether your firm should acquire SIERRA Limited.

If you make a bid for the company, you face the following pair of concurrent decisions, because it is rumoured that you may be the target for acquisition by another firm.

Examine both decisions, then indicate your preferred options, bearing in mind that Decision 1 and Decision 2 **must be made at the same time**.

Decision 1: Choose between:
- A. A certain increase of $240 million in CHARLIE's value.
- B. A 25% chance of increasing CHARLIE's value by $1 billion and a 75% chance of gaining nothing.

Decision 2: Choose between:
- C. A certain loss of $750 million in CHARLIE's value.
- D. A 75% chance of losing $1 billion in CHARLIE's value and a 25% chance of staying as you currently are.

Question 5:

Your company is currently insured against 70% of the possible occurrences of Event 1 and 80% of the possible occurrences of Event 2. As the probability of each event occurring and the expected loss from each event is the same, the insurance premium to fully cover Event 1 is the same as the insurance premium to fully cover Event 2.

Choose between the following (assuming that you can only afford one increase):
- A. **Increase** coverage for Event 1 from 70% to 90% at an **additional** premium cost of $2 450 per month.
- B. **Increase** coverage for Event 2 from 80% to 100% (**full coverage**) at an **additional** premium cost of $2 500.

Question 6:

Which of the following options would you prefer?
- A. A 25% chance of increasing the value of your company by $60 million.
- B. A 20% chance of increasing the value of your company by $90 million.

Question 7:

You are the CEO of LIMA Corporation. You must decide whether your firm should acquire FOXTROT Limited.

- There is a 75% chance that FOXTROT will resist your take-over bid, resulting in failure to acquire FOXTROT.
- There is a 25% chance that your take-over bid will be successful.

If there is no resistance, depending on the amount of your bid, you may be able to increase LIMA's total value by choosing between the two options below. You have to choose between the two options before you know the outcome of your bid. Which option would you choose?

    A. A certain increase of $60 million.
    B. An 80% chance of a $90 million increase.

Question 8:

As the CEO of a company, you have signed a contract and have paid $10 000 to an entertainment company, MAMBO Limited ('MAMBO'), to host a staff function. After paying over the $10 000, you are informed that MAMBO has been declared bankrupt and will not be able honour its contract with you. You are unlikely to get any of your money back.

Would you contract another company to host the staff function that you wanted originally, provided that you are still in a position to cancel the staff function?

    A. Yes. I would pay another $10 000.
    B. No. I would not pay another $10 000.

Question 9:

As the CEO of a company, you have approached an entertainment company, NANO Limited, to host a staff function. Before you sign the final contract with NANO, you hear that your firm has lost $10 000 in the last quarter due to the unforeseeable bankruptcy of one of your customers, BRAVO Consolidated (an event unrelated to the staff function).

Would you still sign the contract with NANO and pay the $10 000 for the staff function, provided that you are still in the position to cancel the staff function?

A. Yes. I would still sign the contract.
B. No. I would not sign the contract.

Question 10:

Your company owns a seaside holiday house. The house is made available to executives and their families on a rotating basis and is leased to the public when it is not being used by the executives.

- A good rental income is earned on the house when it is leased to the public, as the house is a sought-after property in its area.
- The current average value of properties in this particular seaside area is $120 000, with a standard deviation of around $20 000.

Based only on the information provided, what is the minimum price at which you think your company should consider **selling** the property?

- ○ <$70 000
- ○ $70 000-$90 000
- ○ $90 001 - $110 000
- ○ $110 001 - $130 000
- ○ $130 001 - $150 000
- ○ $150 001 - $170 000
- ○ $170 001 - $190 000
- ○ $190 000<

Question 11:

Your company is considering **buying** a seaside holiday house. The house will be made available to the executives and their families on a rotating basis and will be leased to the public when it is not being used by the executives.

- A good rental income can be earned on the house when it is leased to the public, as the house is a sought-after property in its area.
- The current average value of properties in this particular seaside area is $120 000, with a standard deviation of around $20 000.

Based only on the information provided, what is the maximum price at which you think that your company should **acquire** the property?

- o <$70 000
- o $70 000-$90 000
- o $90 001 - $110 000
- o $110 001 - $130 000
- o $130 001 - $150 000
- o $150 001 - $170 000
- o $170 001 - $190 000
- o $190 000<

HEURISTICS SECTION

Question 1:

Your company uses a recruitment agency to appoint senior personnel from outside your company.

- The agency claims that 75% of the long-term personnel appointments made with the aid of the agency are satisfactory (this claim is correct, based on historical facts).
- However, you are about to hire the fourth new central-region sales director this year with the aid of this recruitment agency, because the last three sales directors did not perform well.

Given that the **historical average probability of success** for the recruitment agency is **75%**, in your opinion, what is the probability of appointing a suitable director in this **fourth attempt**?

- A. Less than 75%.
- B. 75%.
- C. More than 75%.

Question 2:

A consultant claims that when he/she says the market will rise (i.e. the consultant provides a favourable report), it always does rise. You are required to check the consultant's claim and can observe any of the outcomes or predictions listed below. Choose the **minimum** predictions and outcomes that are required to confirm the consultant's claim.

- A. A favourable report.
- B. An unfavourable report.
- C. A rise in the market.
- D. A fall in the market.

Question 3:

Choose the scenario you prefer from the following:

A. Investing in a business that has performed slightly above average in comparison to its peers in the recent past and is accordingly priced slightly higher than the average price, because you feel that the business's above average performance is likely to be repeated in future.
B. Investing in a business that has performed slightly below average in comparison to its peers and is accordingly priced slightly lower than the average price, because you feel that the business's performance should improve somewhat in future.

Question 4:

How would you describe your ability to make **business-related decisions**, as compared to the ability of other **business managers**?

- ○ Well below average
- ○ Below average
- ○ Average
- ○ Above average
- ○ Well above average

Question 5:

How would you describe your ability to make **business-related decisions**, as compared to the ability of other **management accounting professionals**?

- ○ Well below average
- ○ Below average
- ○ Average
- ○ Above average
- ○ Well above average

Question 6:

You were asked earlier to indicate the size of the company where you work in terms of its number of employees.

What percentage of survey respondents do you expect will indicate that they are employed at a company consisting of 100 or fewer employees (the smallest category).

Percentage of respondents employed at companies of 100 or fewer employees:
Scale: 0   10   20   30   40   50   60   70   80   90   100

Question 7:

Relative to the other survey respondents, how close to the actual percentage do you rate your estimate (above) to be? My estimate would be closer to the actual percentage than that of …. % of the respondents.

Closer than ....%:
Scale: 0   10   20   30   40   50   60   70   80   90   100

Question 8:

Note that this is the second last question of the survey.

You consider proposing that your company acquire GOLF Corporation, as GOLF is developing a revolutionary new product.

All five the following steps are essential for GOLF to introduce the new product successfully:

1. successful defence of patent rights (95% probability of success);
2. product approval by the relevant national standards authority (90% probability of obtaining approval);
3. successful labour negotiations between the construction firms contracted to build the necessary addition to the present plant and the building trade unions (80% probability of success);
4. successful negotiation of a long-term raw materials contract with a foreign supplier (90% probability of success); and
5. successful conclusion of distribution contract talks with a large national retail distributor (90% probability of success).

The probability estimates above were provided by experts.

Based on your intuition (i.e. without doing calculations), what is your judgement of the probability of successful introduction of the new product by GOLF (upon which your acquisition decision would be based)?

o   0%-39%   o   70%-79%
o   40%-49%   o   80%-89%
o   50%-59%   o   90%-100%
o   60%-69%

Question 9:

This is the last question of the survey.

You are the manager of a division and need to make an investment decision based on two investment options. The risk of the investment options are judged to be the same.

If you choose investment **Option A**, you will have to work with Manager Y from a sister division of your company, namely Division Delta. You have worked with another manager, Manager A, from Division Delta in the past. You recall that Manager A continually indicated to you that he was a key player in the company and that you could learn from him, even though you hold a similar position to him in the company and have comparable experience. Manager A also boasted that his superior management skills ensured that his staff performed more efficiently than your staff. The possibility that you may have to collaborate with Manager A again on some minor tasks related to this investment decision cannot be excluded.

If you choose investment **Option B**, you will have to work with Manager Z from another sister division of your company, namely Division Echo. You have worked with Manager B from Division Echo in the past, and maintained a friendly business relationship with him. The possibility that you may have to collaborate with Manager B again on some minor tasks related to this investment decision cannot be excluded.

The possible return profiles of the investment options are presented below. Which investment option would you choose?
- o Investment **Option A**: Possible return of $550 000 (55% probability), or $450 000 (45% probability); and working with Manager Y, with the possibility of having to collaborate with Manager A again.
- o Investment **Option B**: Possible return of $550 000 (45% probability), or $450 000 (55% probability); and working with Manager Z, with the possibility of having to collaborate with Manager B again.

We thank you for participating!

If you wish to be considered for the random draw of the US$200 Amazon.com vouchers, your e-mail address is required to allow us to contact you if you are selected for a voucher. This details will only be used for the random draw, the rest of your response will be treated as anonymous.

Do you wish to be considered?

o   Yes, thank you! My e-mail address
    is: _____
o   No, thank you!

APPENDIX 2 – Initial e-mail (e-blast) for IMA members

Email subject line: Decision-making behavior of Management Accounting Professionals

Date: around June 7, 2017

Management Accounting Professionals and Intuitive Business Decisions

Dear {first name},

IMA® (Institute of Management Accountants) is supporting a doctoral student's study assessing the intuitive decision-making behavior of management accountants. In the past, some business and operational managers have criticized the decision-making behavior of management accountants as inhibiting their ability to make business decisions when time is of the essence and intuition needs to be applied. This study aims to understand:

(1) The level of involvement of management accountants in business decision-making; and

(2) How specific psychological processes influence the intuitive decision-making behavior of management accountants.

Please take **20-25 minutes** to complete this survey. Ten randomly selected respondents who fully complete the survey will each receive a $200 Amazon.com voucher.

Click here to begin the survey

Your responses are anonymous. At completion of the survey, you will have the opportunity to voluntarily provide your e-mail address and indicate if you wish to receive an aggregated report of the survey results.

Thank you for your participation.

Sincerely,
Kip R. Krumwiede, CMA, CPA, Ph.D.
Director of Research
IMA® (Institute of Management Accountants)
kkrumwiede@imanet.org

APPENDIX 3 – Article published as marketing to CIMA members

Can management accounting professionals make *business related* decisions? *(and do they?)*

Just over 20 years ago, an article entitled 'Can management accountants make decisions?' was published in the Management Accounting magazine. The author, Paul Harris, argued that business requires a balance between 'sensory' and 'intuitive' decision-makers as measured by the widely accepted Myers-Briggs personality-type indicator. 'Sensory' decision-makers prefer to have concrete facts, figures and details to support their decision-making, while 'intuitive' decision-makers prefer to use their judgement to make decisions. Harris duly points out that both 'sensory' and 'intuitive' decision-making is important to business. 'Sensory' decision-making ensures that decisions are based on sound supporting information, while 'intuitive' decision-making is more future orientated and extremely useful when complex decisions should be made within limited timeframes.

Harris argue that the personality characteristics of individuals who select management accounting as a profession is overwhelmingly skewed toward 'sensory' decision-making. If one considers general management accounting syllabi and training, management accountants are trained to provide and interpret supporting information for decision-making purposes. In other words, they are largely developed in the 'sensory' decision-making realm. Providing sound supporting information to assist in making business decisions is indeed one of the pillars of strength of the management accounting profession. However, a limited ability to make intuitive decisions is also noted as a key weakness of management accounting professionals within their emerging role as business partner in decision-making!

Research on the changing role of management accounting professionals from the traditional 'bean-counter' and 'controller' role to the emerging role as 'business partner' has become plentiful since the above-mentioned article by Harris was published. Advanced enterprise information systems became the 'bean-counters' which collect and assimilate information for decision-making purposes. However, the financial expertise of management accounting professionals remain valuable to businesses, albeit in a different role. Management accounting professionals are increasingly becoming involved in business decision-making as, amongst other things, interpreters of financial and related information – referred to as the 'business partner' role. Research on the level to which this involvement entails actually *making* business related decisions, or at least the level to which management accounting professionals are part of business related decision-making teams, is comparatively scarce.

Past research has identified that some operational managers were reluctant to involve management accountants in the operational decision-making side of the business, as they argued that management accountants inhibited business decision-making. The two main reasons why management accountants were deemed to inhibit business decision-making are; firstly an unbalanced focus on 'the numbers' compared to limited understanding of general business requirements, and secondly a reluctance to make intuitive business decisions when business pressures require swift decision-making. The profession has done much to address the first issue by incorporating strategic thinking in management accounting syllabi and professional development programmes. However, the development of intuitive decision-making skills of management accounting professionals has not yet been adequately addressed.

Humans possess valuable psychological tools to assist us in making intuitive judgement-based decisions. However, in order to ensure that these psychological tools are correctly applied by decision-makers, it is necessary to understand the intuitive decision-making processes and tendencies of particular decision-makers. Once this is understood, the skills of the particular decision-makers can be developed to ensure that they correctly apply the psychological tools in various situations.

Accordingly, investigating the intuitive decision-making tendencies of management accounting professionals are the primary objective of a research study currently in progress. This research should provide CIMA and other professional and educational bodies with information to create strategies that aim to develop and improve the intuitive decision-making skills of management accounting professionals. A secondary objective of the research study is to identify the current level of involvement of management accounting professionals in *making* business decisions.

How can I contribute?
A link to the electronic survey is available on the CIMA Global website (also provided below). It would be greatly appreciated if you would access and complete the survey questionnaire. As an added bonus, a US$200 Amazon.com voucher will be awarded by means of random selection to ten management accounting professionals that complete the questionnaire in full.

Link: http://www.cimaglobal.com/Thought-leadership/Research-Funding/News-and-updates/
Author:
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PhD student and senior lecturer at the Department of Financial Management, University of Pretoria, South Africa.
* Chartered Accountant (South Africa)

APPENDIX 4 – Descriptive statistics to each binary logistic model tested in the study

The influence of fatigue and other factors resulted in a number of respondents not completing the full questionnaire. Consequently, the samples for the logistic regression analyses differed in terms of size and composition. Therefore, descriptive statistics are provided in this appendix for all the binary logistic regression models tested in the study to provide clarity on the composition of the sample for each logistic regression model.

Respondents employed in the traditional management accounting position:

The descriptive statistics for the respondents who were employed in the traditional management accounting position is provided here. As this sample sub-set is relevant to the decision-making involvement analyses of this study, descriptive statistics are provided for both the demographic data of respondents as well as for the demographic data related to the employment of the respondents.

Table A4.1: Descriptive summary of demographic data for logistic regression analyses of respondents in full sample

Demographic variable	Categories	Frequency (*n*) *N* = 304	Percentage (%)
Gender	Male	200	65.8%
	Female	104	34.2%
Age	Young, 20 to 29 years	77	25.3%
	Midlife, 30 to 49 years	185	60.9%
	Older, 50 years and above	42	13.8%
Years of work experience	Little experience, 0 to 5 years	114	37.5%
	Moderate experience, 6 to 15 years	116	38.2%
	Experienced, more than 15 years	74	24.3%
Preference for supporting information	*M* = 5.96, *Mdn* = 7, *SD* = 2.656		
Regional culture to which respondents subscribe	Africa	54	17.7%
	Asia	86	28.3%
	Europe	44	14.5%
	North America	113	37.2%
	Other	7	2.3%

Table A4.2: Descriptive summary of demographic data of employment for logistic regression analyses of respondents in full sample.

Demographic variable	Categories	Frequency (*n*) *N* = 304	Percentage (%)
Position employed in	Management accounting position	188	61.8%
	Top management accounting position	46	15.1%
	Business management position	55	18.1%
	Not specified	15	4.9%
Employment company size in terms of revenue in US dollar	Small, less than $10 million	72	23.7%
	Medium, $10.1 million to $1 billion	126	41.4%
	Large, more than $1 billion	79	26%
	Unknown	27	8.9%
Employment company size in staff numbers	Small, 100 or less	81	26.6%
	Medium, 101 to 5 000	135	44.4%
	Large, more than 5 000	84	27.6%
	Unknown	4	1.3%
Region currently employed in	Africa	52	17.1%
	Asia	89	29.3%
	Europe	43	14.1%
	North America	114	37.5%
	Other	6	2%
Industries in which respondents are most commonly employed	Financial services and consulting	73	24%
	Manufacturing	57	18.8%
	Information technology	23	7.6%
	Educational services	23	7.6%
	Retail and wholesale	21	6.9%
	Construction	15	4.9%
	Pharmaceutical and health	15	4.9%
	Other	77	25.3%

Table A4.3: Descriptive summary of demographic data of respondents in management accounting positions

Demographic variable	Categories	Frequency (*n*) *N* = 188	Percentage (%)
Gender	Male	114	60.6%
	Female	74	39.4%
Age	Young, 20 to 29 years	50	26.6%
	Midlife, 30 to 49 years	118	62.8%
	Older, 50 years and above	20	10.6%
Years of work experience	Little experience, 0 to 5 years	76	40.4%
	Moderate experience, 6 to 15 years	74	39.4%
	Experienced, more than 15 years	38	20.2%
Preference for supporting information	*M* = 6.3, *Mdn* = 7, *SD* = 2.516		
Regional culture to which respondents subscribe	Africa	35	18.8%
	Asia	56	30.1%
	Europe	23	12.4%
	North America	72	38.7%
	Other	2	1.1%

Table A4.4: Descriptive summary of demographic data of employment data of respondents in management accounting positions.

Demographic variable	Categories	Frequency (*n*) *N* = 188	Percentage (%)
Employment company size in terms of revenue in US dollar	Small, less than $10 million	40	21.3%
	Medium, $10.1 million to $1 billion	76	40.4%
	Large, more than $1 billion	56	29.8%
	Unknown	16	8.5%
Employment company size in staff numbers	Small, 100 or less	43	22.9%
	Medium, 101 to 5 000	76	40.4%
	Large, more than 5 000	68	36.4%
	Unknown	1	0.5%
Region currently employed in	Africa	32	17%
	Asia	55	29.3%
	Europe	23	12.2%
	North America	76	40.4%
	Other	2	1.1%
Industries in which respondents are most commonly employed	Financial services and consulting	39	20.7%
	Manufacturing	41	21.8%
	Information technology	18	9.6%
	Educational services	8	4.3%
	Retail and wholesale	14	7.4%
	Construction	7	3.7%
	Pharmaceutical and health	9	4.8%
	Other	52	27.7%

Respondents in traditional management accounting position with at least one year working experience

The analyses on a possible recent increase in business decision-making involvement of management accounting professionals were conducted on management accountant with at least one year of working experience.

Table A4.5: Descriptive summary of demographic data of respondents in management accounting positions

Demographic variable	Categories	Frequency (*n*) *N* = 174	Percentage (%)
Gender	Male	106	60.9%
	Female	68	39.1%
Age	Young, 20 to 29 years	39	22.4%
	Midlife, 30 to 49 years	115	66.1%
	Older, 50 years and above	20	11.5%
Years of work experience	Little experience, 0 to 5 years	62	35.6%
	Moderate experience, 6 to 15 years	74	42.5%
	Experienced, more than 15 years	38	21.8%
Preference for supporting information	$M = 6.38$, $Mdn = 7$, $SD = 2.486$		
Regional culture to which respondents subscribe	Africa	27	15.5%
	Asia	52	29.9%
	Europe	21	12.1%
	North America	72	41.4%
	Other	2	1.1%

Table A4.6: Descriptive summary of demographic data of employment data of respondents in management accounting positions.

Demographic variable	Categories	Frequency (*n*) *N* = 174	Percentage (%)
Employment company size in terms of revenue in US dollar	Small, less than $10 million	36	20.7%
	Medium, $10.1 million to $1 billion	70	40.2%
	Large, more than $1 billion	54	31%
	Unknown	14	8%
Employment company size in staff numbers	Small, 100 or less	40	23.1%
	Medium, 101 to 5 000	71	40.8%
	Large, more than 5 000	62	35.6%
	Unknown	1	0.6%
Region currently employed in	Africa	22	12.6%
	Asia	52	29.9%
	Europe	23	13.2%
	North America	75	43.1%
	Other	2	1.1%
Industries in which respondents are most commonly employed	Financial services and consulting	30	17.2%
	Manufacturing	40	23%
	Information technology	17	9.8%
	Educational services	7	4%
	Retail and wholesale	14	8%
	Construction	7	4%
	Pharmaceutical and health	9	5.2%
	Other	50	28.7%

Respondents in bias susceptibility samples

Demographic information related to the composition of each sample analysed in the binary logistic regression analyses with reference to demographic indicators of susceptibility to each bias, is limited to the descriptive information of the respondents only, as the employment information (apart from position employed in) is deemed relevant only to the decision-making involvement analyses. No indications were found in the literature to suggest

that demographic information of the employer of a respondent may have an effect on bias susceptibility. Accordingly, variables included in the analyses were limited to variables related to the respondent.

Table A4.7: Descriptive summary of demographic data of respondents in susceptibility to loss aversion sample

Demographic variable	Categories	Frequency (*n*) *N* = 219	Percentage (%)
Gender	Male	144	65.8%
	Female	75	34.2%
Age	Young, 20 to 29 years	59	26.9%
	Midlife, 30 to 49 years	135	61.6%
	Older, 50 years and above	25	11.4%
Years of work experience	Little experience, 0 to 5 years	87	39.7%
	Moderate experience, 6 to 15 years	85	31.5%
	Experienced, more than 15 years	47	21.5%
Position occupied	Traditional management accountant	124	56.6%
	Top management accounting position	37	16.9%
	Business management position	49	22.4%
	Position not specified	9	4.1%
Preference for supporting information	*M* = 5.93, *Mdn* = 7, *SD* = 2.599		
Regional culture to which respondents subscribe	Africa	39	17.8%
	Asia	61	27.9%
	Europe	37	16.9%
	North America	75	34.2%
	Other	7	3.2%

Table A4.8: Descriptive summary of demographic data of sample respondents in susceptibility to bias from concurrent decisions frame analysis

Demographic variable	Categories	Frequency (*n*) *N* = 152	Percentage (%)
Gender	Male	97	63.8%
	Female	55	36.2%
Age	Young, 20 to 29 years	42	27.6%
	Midlife, 30 to 49 years	97	63.8%
	Older, 50 years and above	13	8.6%
Years of work experience	Little experience, 0 to 5 years	58	38.2%
	Moderate experience, 6 to 15 years	64	42.1%
	Experienced, more than 15 years	30	19.7%
Position occupied	Traditional management accountant	91	59.9%
	Top management accounting position	26	17.1%
	Business management position	28	18.5%
	Position not specified	7	4.6%
Preference for supporting information	*M* = 5.87, *Mdn* = 7, *SD* = 2.674		
Regional culture to which respondents subscribe	Africa	31	20.4%
	Asia	42	27.6%
	Europe	30	19.7%
	North America	48	31.6%
	Other	1	0.7%

Table A4.9: Descriptive summary of demographic data of respondents in sample for susceptibility to the certainty effect analysis

Demographic variable	Categories	Frequency (*n*) *N* = 246	Percentage (%)
Gender	Male	162	65.9%
	Female	84	34.1%
Age	Young, 20 to 29 years	63	25.6%
	Midlife, 30 to 49 years	151	61.4%
	Older, 50 years and above	32	13%
Years of work experience	Little experience, 0 to 5 years	92	37.4%
	Moderate experience, 6 to 15 years	95	38.6%
	Experienced, more than 15 years	59	24%
Position occupied	Traditional management accountant	146	59.3%
	Top management accounting position	39	15.9%
	Business management position	49	19.9%
	Position not specified	12	4.9%
Preference for supporting information	*M* = 5.88, *Mdn* = 7, *SD* = 2.602		
Regional culture to which respondents subscribe	Africa	43	17.5%
	Asia	68	27.6%
	Europe	38	15.4%
	North America	90	36.6%
	Other	7	2.8%

Table A4.10: Descriptive summary of demographic data of respondents included in the sample to analyse indicators of susceptibility to the pseudo-certainty effect

Demographic variable	Categories	Frequency (*n*) *N* = 192	Percentage (%)
Gender	Male	123	64.1%
	Female	69	35.9%
Age	Young, 20 to 29 years	50	26%
	Midlife, 30 to 49 years	120	62.5%
	Older, 50 years and above	22	11.5%
Years of work experience	Little experience, 0 to 5 years	75	39.1%
	Moderate experience, 6 to 15 years	75	39.1%
	Experienced, more than 15 years	42	21.9%
Position occupied	Traditional management accountant	111	57.8%
	Top management accounting position	31	16.1%
	Business management position	41	21.4%
	Position not specified	9	4.7%
Preference for supporting information	*M* = 5.91, *Mdn* = 7, *SD* = 2.583		
Regional culture to which respondents subscribe	Africa	36	18.8%
	Asia	52	27.1%
	Europe	29	15.1%
	North America	69	35.9%
	Other	6	3.1%

Table A4.11: Descriptive summary of demographic data of respondents in susceptibility to mental accounting sample

Demographic variable	Categories	Frequency (*n*) *N* = 219	Percentage (%)
Gender	Male	144	65.8%
	Female	75	34.2%
Age	Young, 20 to 29 years	59	26.9%
	Midlife, 30 to 49 years	135	61.6%
	Older, 50 years and above	25	11.4%
Years of work experience	Little experience, 0 to 5 years	87	39.7%
	Moderate experience, 6 to 15 years	85	31.5%
	Experienced, more than 15 years	47	21.5%
Position occupied	Traditional management accountant	124	56.6%
	Top management accounting position	37	16.9%
	Business management position	49	22.4%
	Position not specified	9	4.1%
Preference for supporting information	*M* = 5.93, *Mdn* = 7, *SD* = 2.599		
Regional culture to which respondents subscribe	Africa	39	17.8%
	Asia	61	27.9%
	Europe	37	16.9%
	North America	75	34.2%
	Other	7	3.2%

Table A4.12: Descriptive summary of demographic data of respondents in the sample for analysis of susceptibility to the endowment effect

Demographic variable	Categories	Frequency (*n*) *N* = 180	Percentage (%)
Gender	Male	126	70%
	Female	54	30%
Age	Young, 20 to 29 years	47	26.1%
	Midlife, 30 to 49 years	111	61.7%
	Older, 50 years and above	22	12.2%
Years of work experience	Little experience, 0 to 5 years	73	40.6%
	Moderate experience, 6 to 15 years	65	36.1%
	Experienced, more than 15 years	42	23.3%
Position occupied	Traditional management accountant	103	57.2%
	Top management accounting position	33	18.3%
	Business management position	40	22.2%
	Position not specified	4	2.2%
Preference for supporting information	*M* = 5.9, *Mdn* = 7, *SD* = 2.641		
Regional culture to which respondents subscribe	Africa	29	16.1%
	Asia	52	28.9%
	Europe	33	18.3%
	North America	59	32.8%
	Other	7	3.9%

Table A4.13: Descriptive summary of demographic data of respondents in the sample for analysis of susceptibility to misconceptions of chance bias and misconceptions of regression to the mean bias

Demographic variable	Categories	Frequency (*n*) *N* = 258	Percentage (%)
Gender	Male	173	67.1%
	Female	85	32.9%
Age	Young, 20 to 29 years	65	25.2%
	Midlife, 30 to 49 years	157	60.9%
	Older, 50 years and above	36	14%
Years of work experience	Little experience, 0 to 5 years	95	36.8%
	Moderate experience, 6 to 15 years	98	38%
	Experienced, more than 15 years	65	25.2%
Position occupied	Traditional management accountant	155	60.1%
	Top management accounting position	37	14.3%
	Business management position	52	20.2%
	Position not specified	14	5.4%
Preference for supporting information	*M* = 5.99, *Mdn* = 7, *SD* = 2.68		
Regional culture to which respondents subscribe	Africa	48	18.6%
	Asia	70	27.1%
	Europe	41	15.9%
	North America	92	35.7%
	Other	7	2.7%

Table A4.14: Descriptive summary of demographic data of respondents in the sample for analysis of susceptibility to overconfidence bias

Demographic variable	Categories	Frequency (*n*) *N* = 303	Percentage (%)
Gender	Male	199	65.7%
	Female	104	34.3%
Age	Young, 20 to 29 years	77	25.4%
	Midlife, 30 to 49 years	184	60.7%
	Older, 50 years and above	42	13.9%
Years of work experience	Little experience, 0 to 5 years	114	37.6%
	Moderate experience, 6 to 15 years	115	38%
	Experienced, more than 15 years	74	24.4%
Position occupied	Traditional management accountant	188	62%
	Top management accounting position	46	15.2%
	Business management position	54	17.8%
	Position not specified	15	5%
Preference for supporting information	*M* = 5.97, *Mdn* = 7, *SD* = 2.658		
Regional culture to which respondents subscribe	Africa	54	17.8%
	Asia	85	28.1%
	Europe	44	14.5%
	North America	113	37.3%
	Other	7	2.3%

Table A4.15: Descriptive summary of demographic data of respondents in the sample for analysis of susceptibility to anchoring and adjustment bias

Demographic variable	Categories	Frequency (*n*) *N* = 257	Percentage (%)
Gender	Male	167	65%
	Female	90	35%
Age	Young, 20 to 29 years	64	24.9%
	Midlife, 30 to 49 years	158	61.5%
	Older, 50 years and above	35	13.6%
Years of work experience	Little experience, 0 to 5 years	95	37%
	Moderate experience, 6 to 15 years	99	38.5%
	Experienced, more than 15 years	63	24.5%
Position occupied	Traditional management accountant	154	59.9%
	Top management accounting position	40	15.6%
	Business management position	51	19.8%
	Position not specified	12	4.7%
Preference for supporting information	*M* = 5.98, *Mdn* = 7, *SD* = 2.617		
Regional culture to which respondents subscribe	Africa	41	16%
	Asia	75	29.2%
	Europe	36	14%
	North America	98	38.1%
	Other	7	2.7%

Table A4.16: Descriptive summary of demographic data of respondents in the sample for analysis of susceptibility to affect bias

Demographic variable	Categories	Frequency (*n*) *N* = 268	Percentage (%)
Gender	Male	176	65.7%
	Female	92	34.3%
Age	Young, 20 to 29 years	66	24.6%
	Midlife, 30 to 49 years	167	62.3%
	Older, 50 years and above	35	13.1%
Years of work experience	Little experience, 0 to 5 years	98	36.6%
	Moderate experience, 6 to 15 years	105	39.2%
	Experienced, more than 15 years	65	24.3%
Position occupied	Traditional management accountant	162	60.4%
	Top management accounting position	41	15.3%
	Business management position	53	19.8%
	Position not specified	12	4.5%
Preference for supporting information	*M* = 5.98, *Mdn* = 7, *SD* = 2.631		
Regional culture to which respondents subscribe	Africa	42	15.7%
	Asia	77	28.7%
	Europe	40	14.9%
	North America	102	38.1%
	Other	7	2.6%