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The Role of AIS in Organisational Sustainability:
An Empirical Study of Saudi Organisations

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ABSTRACT

Over the past 30 years, the concept of sustainability has attracted public attention all over the world, encouraging organisations to progressively seek sustainability. A sustainable organisation is basically an organisation that considers not only financial measures but also non-financial measures to manage its overall performance. The relevant literature suggests that the role of accounting information system (AIS) is critical as it provides information on performance leading to facilitation of management decisions. However, the literature is unclear on the role of AIS in helping organisations to manage their sustainable organisational performance (SOP); this results in incomplete understanding of the relationship between AIS and SOP.

The present study focused on addressing this gap in knowledge by investigating whether both the quality of AIS and managers’ use of AIS information are associated with SOP. Additionally, this study investigated the role of two other independent variables in the relationship, family control of management and industry dynamism. 18 hypotheses were developed based on an integrative review of theories and studies relating to the variables in the research model.

As an empirical investigation, the present study collected data for hypotheses testing through a questionnaire survey and the hypotheses were tested using independent two-sample t-test and partial least square regression. Further, qualitative data were collected through in-depth interviews to provide additional insight into the results of the survey. A total of 103 questionnaires were submitted by CFOs of Saudi listed organisations and 5 of whom participated in the interviews.
The data analysis of the present study highlighted a number of findings. First, the results showed significant and positive relationship between the quality of AIS and the managers' use of AIS, clarifying the effectiveness of quality AIS in facilitating the sustainability management of organisations and increasing the usage of the AIS information. Second, the results revealed significant and positive relationships between the managerial use of AIS information and the financial, customer and environmental and social performances of organisations, highlighting the role of managers' utilisation of AIS information in improving these perspectives of organisational performance. Third, the results indicated significant and positive relationships between the family control of management and the internal business process, learning and growth, and environmental and social performances of organisations, showing the focus of family managers on non-financial performance of organisations. Fourth, the results revealed non-significant impacts of the family control of management on managers' use of AIS information. Fifth, the results showed significant and positive relationships between industry dynamism and managers' use of AIS information, the financial, customer, the internal business process, learning and growth, and environmental and social performances of organisations.
# TABLE OF CONTENTS

**ABSTRACT** ....................................................................................................................... i  
**TABLE OF CONTENTS** ........................................................................................................ iii  
**LIST OF FIGURES** ........................................................................................................... viii  
**LIST OF TABLES** ............................................................................................................... x  
**LIST OF ABBREVIATIONS** ................................................................................................ xii  
**STATEMENT OF ORIGINALITY** ........................................................................................ xiii  
**ACKNOWLEDGEMENT** ...................................................................................................... xiv  

## CHAPTER ONE: INTRODUCTION

1.0 An overview of the study ................................................................................................. 1  
1.1 Motivations for the study ............................................................................................... 6  
1.2 Objectives of the study ................................................................................................. 7  
1.3 Research method ......................................................................................................... 8  
1.4 Research setting .......................................................................................................... 9  
1.5 Organisation of the study .............................................................................................. 11  

## CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction .................................................................................................................. 12  
2.1 Accounting information systems (AIS) ...................................................................... 12  
   2.1.1 A brief background of AIS .................................................................................. 13  
   2.1.2 Definition of AIS ................................................................................................ 14  
2.2 Sustainability and organisational performance ......................................................... 16  
   2.2.1 Organisational sustainability and accounting research .................................... 17  
   2.2.2 Reporting of sustainability performance ......................................................... 18  
   2.2.3 Challenges to accounting for sustainability .................................................... 18  
   2.2.4 The sustainability balanced scorecards (SBSC) .............................................. 20  
   2.2.5 The structure of SBSC ..................................................................................... 21  
2.3 Resource-based view (RBV) theory .......................................................................... 22  
   2.3.1 An overview ...................................................................................................... 22  
   2.3.2 RBV theorisation and accounting research .................................................... 23  
   2.3.3 The role of AIS in SOP ..................................................................................... 26
2.4 Legitimacy theory ........................................................................................................... 29
  2.4.1 An overview ............................................................................................................... 29
  2.4.2 Legitimacy theorisation and accounting research ................................................. 30
  2.4.3 Family control of management ............................................................................... 31
2.5 Contingency theory ....................................................................................................... 33
  2.5.1 An overview ............................................................................................................... 33
  2.5.2 Contingency theorisation and accounting research ............................................... 33
  2.5.3 Industry dynamism .................................................................................................. 34
2.6 Chapter summary .......................................................................................................... 35

CHAPTER THREE: HYPOTHESES DEVELOPMENT
3.0 Introduction .................................................................................................................. 37
3.1 Review of the theoretical model .................................................................................. 37
3.2 The impact of family control of management ............................................................. 38
  3.2.1 Family control of mana. and financial performance ............................................. 39
  3.2.2 Family control of mana. and customer performance ......................................... 43
  3.2.3 Family control of mana. and internal business process performance ............... 45
  3.2.4 Family control of mana. and learning and growth performance ....................... 48
  3.2.5 Family control of mana. and environmental and social performance .............. 50
  3.2.6 Family control of mana. and use of AIS ................................................................. 52
3.3 The quality of AIS and the use of AIS .......................................................................... 54
3.4 The use of AIS and SOP .............................................................................................. 56
  3.4.1 The use of AIS and financial performance ......................................................... 57
  3.4.2 The use of AIS and customer performance ....................................................... 59
  3.4.3 The use of AIS and internal business process performance ............................... 60
  3.4.4 The use of AIS and learning and growth performance ........................................ 62
  3.4.5 The use of AIS and environmental and social performance .............................. 64
3.5 The impact of industry dynamism ............................................................................... 66
  3.5.1 Industry dynamism and financial performance .................................................... 67
  3.5.2 Industry dynamism and customer performance ................................................. 68
  3.5.3 Industry dynamism and internal business process performance ...................... 70
  3.5.4 Industry dynamism and learning and growth performance ............................... 72
  3.5.5 Industry dynamism and environmental and social performance ...................... 74
  3.5.6 Industry dynamism and use of AIS ....................................................................... 76
3.6 Chapter summary ........................................................................................................... 78
CHAPTER FOUR: RESEARCH METHOD AND MEASUREMENTS

4.0 Introduction ............................................................................................................. 80
4.1 Rationale for the research design ........................................................................... 80
4.2 Sample selection ..................................................................................................... 81
4.3 Participants ............................................................................................................. 83
4.4 Administration of questionnaire and responses ................................................... 84
  4.4.1 Designing a paper-based questionnaire ......................................................... 85
  4.4.2 Pilot testing the paper-based questionnaire ..................................................... 85
  4.4.3 Designing a web-based questionnaire .............................................................. 86
  4.4.4 Pilot testing the web-based questionnaire ........................................................ 88
  4.4.5 Distribution and return of the e-questionnaire .................................................. 88
  4.4.6 Description of the response rate ..................................................................... 89
  4.4.7 Non-response bias ......................................................................................... 90
4.5 Measurements of variables, reliability and validity of instruments .................... 91
  4.5.1 Sustainable organisational performance (SOP) .............................................. 92
    4.5.1.1 Financial performance .............................................................................. 93
    4.5.1.2 Customer performance .......................................................................... 95
    4.5.1.3 Internal business process performance .................................................... 97
    4.5.1.4 Learning and growth performance ........................................................... 99
    4.5.1.5 Environmental and social performance .................................................. 101
  4.5.2 Quality of AIS ............................................................................................... 103
  4.5.3 Managers' use of AIS information ............................................................... 106
  4.5.4 Industry dynamism ...................................................................................... 109
  4.5.5 Family control of management .................................................................... 111
  4.5.6 Control variable ......................................................................................... 112
4.6 In-depth interviews ............................................................................................ 112
4.7 Chapter summary ............................................................................................... 114

CHAPTER FIVE: RESULTS OF DATA ANALYSIS

5.0 Introduction .......................................................................................................... 115
5.1 Statistical techniques ....................................................................................... 115
5.2 Descriptive analysis of the variables .................................................................. 117
5.3 Quality assessment of the collected data ............................................................ 119
  5.3.1 Adequacy of sample size ............................................................................ 119
5.3.2 Absence of outliers ......................................................................................120
5.3.3 Absence of multicollinearity and singularity ............................................121
5.3.4 Existence of normality ................................................................................122
5.3.5 Existence of linearity, homoscedasticity and independence of errors ........127
5.3.6 Absence of common method bias .................................................................131
5.4 Results of hypotheses testing .........................................................................132
  5.4.1 Independent two-sample t-test ................................................................132
    5.4.1.1 Testing for H1a to H1e .........................................................................133
    5.4.1.2 Testing for H2 ......................................................................................135
  5.4.2 Partial least square (PLS) ..........................................................................135
    5.4.2.1 Assessment of measurement model ......................................................138
    5.4.2.2 Assessment of structural model .............................................................142
    5.4.2.3 Testing for H3, H4a to H4c, H5a to H5e, and H6 ...............................147
5.5 Summary of results of testing hypotheses .......................................................152

CHAPTER SIX: DISCUSSION OF RESULTS, CONTRIBUTIONS,
LIMITATIONS AND CONCLUSIONS

6.0 Introduction ....................................................................................................153
6.1 Discussion of results .......................................................................................153
  6.1.1 Hypothesis H1a ......................................................................................153
  6.1.2 Hypothesis H1b ......................................................................................155
  6.1.3 Hypothesis H1c ......................................................................................157
  6.1.4 Hypothesis H1d ......................................................................................158
  6.1.5 Hypothesis H1e ......................................................................................160
  6.1.6 Hypothesis H2 ......................................................................................161
  6.1.7 Hypothesis H3 ......................................................................................163
  6.1.8 Hypothesis H4a ......................................................................................164
  6.1.9 Hypothesis H4b ......................................................................................166
  6.1.10 Hypothesis H4c ....................................................................................167
  6.1.11 Hypothesis H4d ....................................................................................168
  6.1.12 Hypothesis H4e ....................................................................................169
  6.1.13 Hypothesis H5a ....................................................................................170
  6.1.14 Hypothesis H5b ....................................................................................172
  6.1.15 Hypothesis H5c ....................................................................................173
## List of Figures

| Figure 1.1: | The five perspectives of sustainable organisational performance (SOP) | p.2 |
| Figure 1.2: | Research model | p.5 |
| Figure 2.1: | AIS and organisations relationship | p.13 |
| Figure 4.1: | Top management expectations of the CFOs | p.84 |
| Figure 4.2: | The development process for the questionnaire | p.84 |
| Figure 5.1: | Normality test for regression of financial performance, use of AIS information and industry uncertainty | p.124 |
| Figure 5.2: | Normality test for regression of customer performance, use of AIS information and industry uncertainty | p.124 |
| Figure 5.3: | Normality test for regression of internal business process performance, use of AIS information and industry uncertainty | p.125 |
| Figure 5.4: | Normality test for regression of learning and growth performance, use of AIS information and industry uncertainty | p.125 |
| Figure 5.5: | Normality test for regression of environmental and social performance, use of AIS information and industry uncertainty | p.126 |
| Figure 5.6: | Normality test for regression of the use of AIS information, quality of AIS and industry uncertainty | p.126 |
| Figure 5.7: | Linearity, homoscedasticity and independence of error of the variable test for the regression of financial performance, use of AIS and industry uncertainty | p.128 |
| Figure 5.8: | Linearity, homoscedasticity and independence of error of the variable test for the regression of customer performance, use of AIS and industry uncertainty | p.128 |
| Figure 5.9: | Linearity, homoscedasticity and independence of error of the variable test for the regression of internal business process performance, use of AIS and industry uncertainty | p.129 |
| Figure 5.10: | Linearity, homoscedasticity and independence of error of the variable test for the regression of learning and growth performance, use of AIS and industry uncertainty | p.129 |
Figure 5.11: Linearity, homoscedasticity and independence of error of the variable test for the regression of the environmental and social performance, use of AIS and industry uncertainty

Figure 5.12: Linearity, homoscedasticity and independence of error of the variable test for the regression of the use of AIS, quality of AIS and industry uncertainty

Figure 5.13: PLS results for the structural model testing
List of Tables

| Table 3.1: | Differences of capitalism in four regions of the world | p.40 |
| Table 3.2: | Quality Dimensions of AIS | p.54 |
| Table 3.3: | A list of the developed hypotheses | p.79 |
| Table 4.1: | Research design overview | p.81 |
| Table 4.2: | TASI organisations | p.82 |
| Table 4.3: | Comparison between mail, fax and email/web based survey | p.87 |
| Table 4.4: | Description of the response rate | p.90 |
| Table 4.5: | Reliability analysis and correlation matrix for instrument measuring financial performance | p.93 |
| Table 4.6: | Factor loadings for instrument measuring financial performance | p.94 |
| Table 4.7: | Reliability analysis and correlation matrix for instrument measuring customer performance | p.96 |
| Table 4.8: | Factor loadings for instrument measuring customer performance | p.96 |
| Table 4.9: | Reliability analysis and correlation matrix for instrument measuring internal business process performance | p.98 |
| Table 4.10: | Factor loadings for instrument measuring internal business process performance | p.98 |
| Table 4.11: | Reliability analysis and correlation matrix for instrument measuring learning and growth performance | p.100 |
| Table 4.12: | Factor loadings for instrument measuring learning and growth performance | p.100 |
| Table 4.13: | Reliability analysis and correlation matrix for instrument measuring environmental and social performance | p.101 |
| Table 4.14: | Factor loadings for instrument measuring environmental and social performance | p.102 |
| Table 4.15: | Reliability analysis and correlation matrix for instrument measuring the quality of AIS information | p.105 |
| Table 4.16: | Factor loadings for instrument measuring the quality of AIS information | p.106 |
Table 4.17: Reliability analysis and correlation matrix for instrument measuring the use of AIS information  p.107
Table 4.18: Factor loadings for instrument measuring the use of AIS  p.108
Table 4.19: Reliability analysis and correlation matrix for instrument measuring industry dynamism  p.110
Table 4.20: Factor loadings for instrument measuring industry dynamism  p.111
Table 4.21: Post-survey interviews data matrix  p.113
Table 5.1: Descriptive statistics of the variables  p.117
Table 5.2: Correlation among the variables  p.121
Table 5.3: Skewness and Kurtosis results for the variables  p.123
Table 5.4: Independent two-sample t-test for H1a to H1e  p.134
Table 5.5: Group statistics for H1c, H1d and H1e  p.134
Table 5.6: Independent two-sample t-test for H2  p.135
Table 5.7: Guidelines for PLS usage  p.136
Table 5.8: Results for internal consistency reliability  p.139
Table 5.9: Results for convergent validity  p.140
Table 5.10: A cross-loading of all items in the research model  p.141
Table 5.11: Correlation among construct scores  p.142
Table 5.12: The coefficient of determination ($R^2$) for the dependent variables  p.143
Table 5.13: Effect size for the structural relationships  p.144
Table 5.14: The blindfolding results  p.146
Table 5.15: PLS results for hypotheses testing  p.148
Table 5.16: Critical z-values  p.148
LIST OF ABBREVIATIONS

AIS    Accounting information system
AVA    Average variance accounted for
AVE    Average variance extracted
BSC    Balanced scorecard
CEO    Chief executive officer
CFO    Chief financial officer
CMA    Capital market authority
CSR    Corporate social responsibility
EMAS   Environmental management accounting system
MAS    Management accounting system
MIS    Management information systems
PFC    Public family-controlled organisations
PLS    Partial least square
PNC    Public nonfamily-controlled organisations
RBV    Resource-based view
SAIS   Social accounting information system
SAM    Sustainability assessment model
SAMA   Saudi Arabian monetary agency
SBSC   Sustainability balanced scorecard
SEM    Structural equation modelling
SMC    Squared multiple correlation
SOP    Sustainable organisational performance
TASI   Tadawul all share index
TBL    Triple bottom line
VIF    Variance inflation factor
WCED   World commission on environment and development
STATEMENT OF ORIGINALITY

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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CHAPTER 1

Introduction

1.0 An Overview of the Study

Over the last three decades, the business environment has become more competitive due to globalisation and technological development, which have placed increasing pressure on improving organisational performance. As a result, managers are becoming increasingly concerned with how to succeed in achieving superior performance. One recent initiative, the concept of sustainable organisations, has attracted both public and academic attention all over the world, resulting in organisations progressively seeking sustainability.

In general, the term ‘sustainability’ concerns the capability of being sustained in the future. It comes in response to concerns that current growth patterns may jeopardise the future of societies (Blackburn, 2007). An important shift in this concept emerges as growth in the macro-system (society) goes beyond economics to the well-being of individual members of society. In 1988, the World Commission on Environment and Development (WCED) described sustainable development as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1988, p.8).

At an organisational level, the focus of the present study, the concept of organisational sustainability is seen as meeting the current stakeholders’ needs without compromising the ability of future stakeholders to meet their own needs. It concerns the ability of organisations to achieve sustainable performance by adopting a business model that equitably favours financial as well as non-financial performance (Hitchcock & Willard, 2009). This is in line with the stakeholder view of organisational performance introduced by Freeman (1984), which emphasised that financial performance of organisations is insufficient and that other requirements of stakeholders must be addressed in the current age.
Kaplan and Norton (1992) developed the balanced scorecard (BSC) system, which is consistent with the stakeholder view of organisational performance and gives a broad view of organisational performance by linking both the financial and operational measures into a single framework of four perspectives: (1) financial, (2) customer, (3) internal process and (4) learning and growth. In addition, Elkington (1999) introduced the triple bottom line (TBL) reporting framework, which implies that organisational performance should be measured against three dimensions: (1) economic performance, (2) social performance and (3) environmental performance.

More recently, Figge et al. (2002) integrated the TBL dimensions into the BSC framework in order to develop the sustainability balanced scorecard (SBSC) system. By adding a social and environmental perspective to the classic four perspectives of BSC, a comprehensive stakeholder view of organisational performance is formed (Graham, 2006). Based on this view, the current study defines sustainable organisational performance (SOP) in accordance with the five perspectives of the SBSC framework: (1) financial performance, (2) customer performance, (3) internal business process performance, (4) learning and growth performance, and (5) environmental and social performance (Figure 1.1).

![Figure 1.1: The five perspectives of sustainable organisational performance (SOP)]
The role of accounting information system (AIS) in SOP is significant as it provides information on performance that leads to facilitation of management decisions. Research linking AIS to sustainability issues started in the early 1990s and has continued to receive growing interest at both academic and professional levels (Lamberton, 2005). However, researchers have shown concern that, in reality, organisations have failed to incorporate sustainability measures into their performance (e.g. Gray, 2010). As a consequence, organisations know neither how to account for sustainability nor how to report information in relation to it. Gray and Bebbington (2000) asserted that “Maunders & Burritt (1991), Hines (1991), Gray (1992), Bailey & Tozer (1993), Bebbington & Gray (1993), Burritt & Lehman (1995), Tomimasu (1996), Milne (1996) and Lamberton (1998) all offer analyses which conclude that accounting is not only implicated in the environmental crisis and the growing levels of unsustainability but that accounting and business are, in their current form, fundamentally inimical to any serious attempts to move towards sustainability” (p.19).

The present study argues that the failure of organisations’ attempts towards incorporating sustainable performance measures may be due to the poor qualities of AIS, which has led to less managerial use of AIS. In addition, there are other factors, such as family control of management and industry dynamism, which also may have significant effects on SOP. Despite the potential effects of these factors on SOP, there has been a limited amount of empirical research to provide an understanding of the issue. The importance of this area of research is highlighted by Hopwood (2009), who stressed that there is a “real potential of research which seeks to explore the role and functioning of accounting in the sustainability spheres. Being at such an early stage of our understanding of this area, both of the opportunities and need for research are very real” (p.439).

In an attempt to contribute towards a better understanding of how to improve SOP, the present study investigates the roles of the quality of AIS as well as its use by managers in managing the SOP of their organisations. This is because greater use of AIS increases the availability of information that helps managers to better understand the decision matter at hand, enabling them to make accurate decisions (see section 3.4 in Chapter 3). AIS is an organisational resource that supports decision making and facilitates achievement of competitive advantage (Elbashir et al., 2008; Grande et al.,
2011; Masli et al., 2011). According to the resource-based view theory, organisational resources contribute significantly to the long-term performance of organisations by sustained achievement of a competitive advantage (Lockett et al., 2009). The current study presents the view that the higher the quality is of AIS, the greater is the managers’ use of AIS information will be, which in turn will increase SOP.

Additionally, the present study investigates the effects of both family control of management and industry dynamism on SOP and the managerial use of AIS information. From a legitimacy perspective, organisations have a social contract with the society they operate in, and consequently are concerned about the interests of that society (Gray, 2010). Disclosing the social commitment to the public, for instance, is intended to avoid any potential sanctions upon organisations, such as boycotting of their products or services (Deegan, 2002). Studies such as Lee (2006), Lin and Hu (2007), Chu (2011), and Acquah et al. (2011) reported significant effects on family control of management on organisational performance. However, these studies have largely focused on financial performance related indicators. Also, these studies have neglected the institutional and cultural differences that may nourish the expansion of current understanding of the legitimacy concerns (see section 2.4.3 Chapter 2). The current study therefore seeks to expand the existing knowledge beyond the effect on the financial performance of organisations by considering the five perspectives of SOP in Saudi Arabia. This examination is imperative for enhancing the existing knowledge about the effect of family control of management (conceptualised in having a family CEO who is a member of the owner family) on organisational performance as well as the use of AIS (see section 3.2 Chapter 3).

From a contingency perspective, the level of dynamism has been posited to differ across industries because in terms of changes in innovation, technology, customer preferences and demands, market growth, and level of competitors, the business environment varies from one industry to another1. Previous research suggests that while highly dynamic industry generally faces rapid change in the production technology, variable demands and intensive competition (Hauschild et al., 2011),

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1 The terms ‘industry dynamism’, ‘industry uncertainty’, and ‘dynamism/uncertainty at the industry level’ are interchangeable for the present study because they all refer to the degree of turbulence that varies from industry to industry due to differences in business environment.
industries with low dynamism enjoy relatively more stable customer demand and little competitive change (Desarbo et al., 2005). However, previous studies such as Link and Siegel (2003), Carmeli and Tishler (2005), and Wang and Li (2008) has focused mainly on dynamism at the organisation level only\(^2\) (see section 2.5.3 Chapter 2). The present study seeks to expand the existing knowledge by focusing on dynamism at the industry level. The examination of the potential effect of dynamism at the industry level is imperative for enhancing the current knowledge about the effect of dynamism on organisational performance as well as the use of AIS (see section 3.5 Chapter 3). Figure 1.2 presents the research model.

\[\text{Figure 1.2: Research model}\]

\(^2\) Differences between dynamism at organisational level and dynamism at industry level are explained in section 2.5.3 page 34.
1.1 Motivations for the Study

Studying the impact of AIS, family control of management and industry dynamism on SOP is motivated by five main considerations. Firstly, prior research has focused on the TBL evaluation of performance only and has not clearly clarified the effects on specific dimensions of performance such as customer, internal business process, human resources, and environmental and social performances (Figge et al., 2002). Recognising this shortcoming of performance assessments, the present study focuses on incorporating each of the perspectives of the SBSC system (financial, customer, internal business process, learning and growth, and environmental and social perspectives) to assess the SOP.

Secondly, research on the association between AIS and SOP has been scarce. As explained later, several challenges and debates about sustainability heighten the need to understand relevant factors affecting SOP. One of these factors involves the investigation of the effects of AIS quality on managers’ use of AIS. Past research focuses mainly on information-related dimensions of AIS quality such as scope and relevance (Brecht & Martin, 1996). Little attention is paid to the system-related dimensions of AIS quality, such as integration and aggregation. As a consequence, the second motivation of the present study is to identify important quality dimensions of AIS and to investigate their effects on managers’ use of AIS information.

Thirdly, this study has identified a deficiency in our existing knowledge regarding the effects of family control on SOP. Most of the family business related research focuses on the impacts on only financial organisational performance. Other aspects of performance such as customer, internal business process, human resources, and environmental and social performance have been ignored. The present study aims to fill the gap. As well, the study addresses the confusion found in the literature due to the mixed results reported in the previous studies. For instance, Martinez et al. (2007) reported a positive relationship between family control of organisations and financial performance, while Demsetz and Villalonga (2001) failed to report that such a relationship is statistically significant. Thus, examination of family control of management is imperative for enhancing the existing knowledge.
Fourthly, the current study is motivated by previous research on the impacts of industry dynamism on SOP. The literature suggests that industries with high dynamism usually face rapid changes in technology, customer demand, competitive rivalry and market growth; this escalates the pressure on managers to improve the performance of their organisations (Clark, 2000; DeSarbo et al., 2005). Some studies (e.g. Chong & Chong, 1997) reported a significant positive correlation between market competition (one factor of industry dynamism) and financial performance, whereas other studies (e.g. Patiar & Mia, 2008) reported a negative influence of market competition on financial performance. In other words, previous research results are inconclusive and therefore the current understanding of the issue is unclear.

Final motivation for this study is the lack of literature from the Saudi business environment in relation to the perspectives of family control of management and industry dynamism on the use of AIS information. Those perspectives are predicted to vary in Saudi organisations from that in Western organisations, where managers prefer different outcomes and tend to utilise different approaches for decision-making (Dik, 2011) (see section 1.4 Chapter 1). Yet, the majority of previous research has largely been conducted in advanced economies such as Australia, the United Kingdom and the United States. Considering the lack of Saudi studies since the 1990s (Al-Yahya, 2009), this examination adds to the existing body of literature on the relationship between the managers’ use of AIS information and those influential factors, as well as providing investors with a better understanding of their effects on Saudi organisations.

1.2 Objectives of the Study

The ultimate aim of the present study is to extend the existing understanding of the role of AIS in SOP, including the impacts of family control of management and industry dynamism. To achieve that goal, the following specific objectives are identified:

i) Examining the relationship between the quality of AIS and the managers’ use of AIS information;

ii) Examining the relationship between the managers’ use of AIS information and SOP;
iii) Examining the relationship between family control of management and SOP;
iv) Examining the relationship between family control of management and the managers' use of AIS information;
v) Examining the relationship between industry dynamism and SOP; and
vi) Examining the relationship between industry dynamism and the managers' use of AIS information.

1.3 Research Method

The present study follows a multi-method approach, as data has been collected through two phases, questionnaires and in-depth interviews with chief financial officers (CFOs). This combination of methods is chosen because the data from the interviews can provide a better understanding of the survey responses and can enhance the validity and reliability of the study (Creswell, 2009).

The first phase of the study is a questionnaire survey. Questionnaires are distributed to the CFOs of each the 144 organisations listed in the Saudi stock market. While the design of the questionnaire is enhanced by using well-established instruments, the use of the questionnaire is also strengthened by relying on a web-format design. The e-questionnaire is used to overcome problems associated with the low response rates commonly observed in Saudi studies (Al-Subaihi, 2008). Lower costs, longer availability time and better usage flexibility are all examples of the e-questionnaire advantages (Greenlaw & Brown-Welty, 2009) (see section 4.4.3 in Chapter 4).

The second phase of the study involves a number of in-depth interviews with participated CFOs. The importance of such interviews is to clarify the quantitative results, particularly in regard to the quality of AIS, the managerial use of AIS information, and SOP.

Two statistical techniques have been utilised to analyse the quantitative data in the present study. The first, independent two-sample t-test, has been employed using statistical software ‘SPSS’ while the second, Partial Least Square (PLS), has been employed using statistical software ‘SmartPLS’. Essentially, PLS is a statistical
technique that tests and estimates causal associations, allowing the simultaneous analysis of a series of structural equations (Hair et al., 2006). Hoyle (1995) has defined PLS as "a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables" (p.1).

PLS is considered a powerful technique that overcomes the problems and limitations inherent in multiple regression techniques. Smith and Langfield-Smith (2004) have asserted that PLS has the ability to make the results more informative for accounting researchers than the traditional multiple regressions do, for two reasons. Firstly, by adopting a more holistic approach to model building, a number of recursive and non-recursive associations between variables can be recognised in PLS analysis. Secondly, by accounting for the effects of estimated measurement error of the latent variables PLS decreases the bias in the estimation of coefficients in the use of interactive associations.

1.4 Research Setting
This study is carried out using data from Saudi listed organisations. Saudi Arabia, an oil-based economy with the largest reserves of petroleum in the world, ranks as the largest exporter of petroleum (EIA, 2010). Recently, the Saudi government has launched a wave of economic reforms for diversifying its oil-based economy (SAGIA, 2010a). One example of these efforts, joining the World Trade Organisation in 2005, aimed at improving the business atmosphere for both consumers and entrepreneurs. Official reports show that with over 28 billion American dollars, foreign direct investment inflows to Saudi Arabia are ranked as the largest amount in the Middle Eastern region and the 12th in the world (UNCTAD, 2011). With increasing foreign investment, competition has become more intense.

Saudi organisations need to cope with this intense competition by improving their performance, fulfilling their customers' needs and reducing operating costs without compromising product/service quality. These are all real challenges in the Saudi business environment (Weir, 2009; Alsmadi et al., 2012). Bromwich (1990) argued

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3 A latent variable is "a hypothesised and unobserved concept that can only be approximated by observed or measurable variables" (Hoyle, 1995, p.385).
that in a more competitive business environment, the use of AIS becomes even more important. A study by Mia and Clarke (1999) reported that the use of MAS (an integrated part of AIS) is positively associated with managers' perceived levels of competition: managers utilising more information to successfully face the intense competition which, in turn, improve performance. Therefore, the role of AIS information becomes more significant in enabling Saudi organisations to deal with high competition and to improve SOP.

With regard to SOP, Saudi government owned organisations began to promote the notion of SOP via conferences and initiatives. The government was officially committed to the goal of creating economic conditions that would make Saudi Arabia one of the world's top ten competitive nations by the end of 2010 (SAGIA, 2010b). The Saudi Arabian General Investment Authority has started a research program that looks into the corporate social responsibility (CSR) of the 40 largest and most influential organisations in order to construct a 'competitiveness index'. A recent report has claimed that Saudi organisations are increasingly interested in the concept of CSR because of the increased number of CSR programs (Boone et al., 2009). Despite these indications, however, an examination of the association between the use of AIS and SOP has not been conducted in Saudi Arabia.

The majority of previous research on the use of AIS has largely been conducted in advanced economies such as Australia, the United Kingdom and the United States (O'Donnell & David, 2000). The findings of such previous studies are not applicable to the Saudi business environment for two reasons. Firstly, due to differences in managerial styles, Saudi managers are potentially expected to make decisions "autocratically and paternally" (Bjerke & Al-Meer, 1993, p.31). Hence, the use of AIS for decision-making in Saudi organisations is predicted to be different from that in Western organisations, where managers tend to utilise different approaches such as joint decision-making policies (Francesco & Gold, 2005).

Secondly, due to cultural differences, Saudi managers prefer to have immediate outcomes rather than long-term outcomes (Idris, 2007). The Saudi national culture is a short-term oriented culture in which managers strive towards steadiness and have less interest in long-term planning (Bjerke & Al-Meer, 1993). These two reasons justify
the need to conduct a study in Saudi Arabia, especially considering the lack of Saudi studies since the 1990s (Al-Yahya, 2009). Moreover, this study is of international interest, since it provides foreign investors and managers with a better understanding of influential factors such as family control of management and industry dynamism in Saudi organisations.

1.5 Organisation of the study

The remainder of this study is presented in the following chapters. Chapter 2 reviews relevant literature through defining the variables of interest in the study: AIS, family control of management, industry dynamism, as well as their theoretical foundations: resource-based-view theory, legitimacy theory, and contingency theory. The chapter concludes with a summary of the research objectives. While Chapter 3 reviews the research model and develops eighteen hypotheses for the study in a sequent order, Chapter 4 covers the research design, sample selection, administration of the questionnaire, measurements of variables, reliability and validity of instruments, and in-depth interviews. Chapter 5 presents the statistical tests and shows results of examining the research hypotheses. The final chapter, Chapter 6, draws conclusions, acknowledges the key limitations of the research and provides suggestions for future research.
CHAPTER 2

Literature Review

2.0 Introduction

This chapter examines the theoretical concepts that underlie the research model in order to build up the research hypotheses. Section 2.1 presents a brief historical background and definitions of AIS. The discussion in section 2.2 covers sustainability and organisational performance related issues with accounting, along with the sustainability balanced scorecards system. Section 2.3 introduces the theory behind the resource-based view of organisations and clarifies the role of AIS in SOP. Section 2.4 discusses the legitimacy theory, then explains family control of management and its effects on the managerial use of AIS information and SOP. Section 2.5 explains the contingency theory and provides clarification of industry dynamism effects on the managerial use of AIS information and SOP. Section 2.6 summarises the chapter.

2.1 Accounting Information Systems

One of the central components of organisations nowadays is an accounting information system (AIS). Traditionally, AIS is considered only as a source of financial information focused on historical data within organisations. Nevertheless, the development of technology and information systems has paved the way for advanced perspectives and extended scope of AISs. Starting as a bookkeeping function performed manually, processes of AIS are currently computerised and integrated with other organisational systems; “accounting is a data management function dependent upon information technology” (Kee 1993, p.187).

Not only is financial data included in modern AISs: non-financial data is now included from both historical and future perspectives. Presently, AIS is viewed as the application of technology to capturing, verifying, storing, sorting and reporting data relating to an organisation’s activities (Considine et al., 2010). This perception of AIS has gone through three major stages of development as shown in Figure 2.1.
In the 1970s, information systems were seen as a subset of accounting that helped to process the data of an organisation's activities. As technology continued to expand, and with the introduction of advanced technologies such as microcomputers, organisations realised the potential of computerisation for other functional areas such as marketing and manufacturing. This led information systems to become an important function for organisations' management along with the accounting function. As multipurpose applications and technologies continue to emerge, information systems now pervade the whole organisation and accounting has become one of the divisions that relies on the technologies of information systems.

2.1.1 A Brief Background of AIS

Perspectives on AIS and its relationship with organisations have changed over the years. Before the introduction of computers, AIS was basically manually operated bookkeeping, double-entry based system, which consisted of journals, ledgers and chart of accounts. Such AISs were a fundamental part of organisations that assisted in organising, storing, retrieving and processing data related to economic activities. With
the development of technology, some AIS processes became automated: AISs were the leading systems to be automated in organisations (McMickle, 1989). Thus, the role of technology during these times was to enable accountants to process data automatically.

As the development of technology continued, organisations realised the potential usage of technology beyond accounting processes. As a result, the function of information systems found its own identity in business. The concept of management information systems (MIS) was then developed service a much wider range of processes in the non-AIS functions of organisations (Romney et al., 2009). This separation between MIS and AIS divisions extended even further as accountants were focused on pure accounting issues such as the formats of financial statements and the standardisation of professional practices (Sutton, 2004). Thus, although AIS was still an essential part of organisations, MIS grew in significance and became a strong and mature discipline.

Since the 1990s, information system technologies have radically changed the way business is conducted, creating more pressure on managements of organisations. With the emergence of integrated technologies, MIS became an exceptionally vital division of organisations. Nowadays, all functional areas of organisations, including AIS, depend on sophisticated MIS (Gelinas et al., 2011). As a result, the traditional view of AIS along as the most essential part of organisations is no longer accurate (Hunton, 2002). This final shift of functional importance has placed AIS as a core subset of MIS.

2.1.2 Definition of AIS

One of the greatest challenges in carrying out any research activity related to the boundaries of AIS research is the definition of AIS itself. This is because the specification of AIS frontiers is vague and no consensus among researchers has yet been reached. Thus some perceive the AIS to be a discipline area with no boundaries (Sutton, 2010), while other researchers condemn previous attempts in defining AIS. “Much of the debate revolves around the breadth of a given definition with criticisms ranging from the too narrow to the too broad” (Arnold & Sutton, 2002, p.3). However, there is a consensus that AIS is a cross-discipline area relying on three
streams of knowledge: accounting, information and systems (Considine et al., 2010). Accordingly, it is a prerequisite to begin devising the definition of AIS by looking briefly at these three concepts.

**Accounting** is traditionally seen as the art of recording, classifying and reporting financial transactions that occur in organisations. It aims at capturing data for the organisations’ activities and converting it into a set of meaningful reports—financial statements—which in turn can be used by different decision makers (Birt et al., 2010). With the development of business operations and models, the role of accounting becomes even more significant for clarifying the net results of complex business transactions. Today, accounting is considered to be the language of business, providing information to stakeholders of organisations in accordance with a number of concepts, principles and standards (Hongren et al., 2010). Thus, producing information of different purposes to users is the main goal of accounting.

**Information** is generally considered as the outcome of processing data. All raw facts relating to or describing an event are called data, implying limited usefulness. Having gone through the processing phase, these data can be converted into useful information (Benson & Standing, 2008). For example, while details of sales transactions over the whole year may be of limited use to sales managers, summarising such details monthly or weekly makes them more useful. From an accounting perspective, users of this information are organisations’ decision-making stakeholders. Whether these decisions are for investing, buying, monitoring, measuring, taxing, lending, evaluating or something else, organisations are accountable for providing the relevant information to decision makers. The scope of the information has extended beyond financial transactions to non-financial as focusing only on financial performance is no longer adequate: other operational performances need to be considered as well (Kaplan & Norton, 1996).

**Systems**, in simple forms, are seen as three linked parts (inputs-process-outputs) that seek to accomplish specific goals. By taking inputs and processing them, a system can produce outputs. According to systems theory, the main contribution of a system is in decision making (Beynon-Davies, 2002). This is because the process of making decisions requires gathering information relevant to the matter under analysis.
Organisations build and implement different MIS with advanced technologies, ensuring the quality of their decisions (Gordon & Gordon, 2004). Their most essential decisions are related to economic activities: that is, those which are dealt with by AIS.

**Accounting information system (AIS)** is defined in the present study as a subsystem of management information systems (MIS) that comprises the application of human resources and technologies for recording, classifying and reporting the economic information about organisational activities. In line with Considine *et al.* (2010), the present study considers AIS as a systematic structure of people and technology that facilitates the provision of the financial and non-financial information required for making decisions.

AIS is also viewed as a provider of financial and non-financial data for managerial functions such as planning and controlling (Caillouet & Lapeyre, 1992). Likewise, Kaplan *et al.* (1998) perceived AIS as retaining and generating the information used by organisations to plan, evaluate and analyse the operations and decisions. AIS is thus a major source of information for decision-makers, as it influences organisational behaviour by capturing and providing information to be used for planning, monitoring or controlling organisational actions (David *et al.*, 1999).

From a comprehensive view, Hall (2008) identified three major AIS subsystems:

i) The transaction processing system, which supports daily operations with documents and updates for users within organisations;

ii) The general ledger/financial reporting system, which produces the traditional financial statements (e.g. balance sheets, income statements, cash flow statements and other reports required by regulations); and

iii) The management accounting system (MAS), which provides management with special-purpose reports (e.g. budgets, variance reports and responsibility reports) and information needed for decision-making.

For the purpose of this study, AIS includes all the above subsystems, as the assessment of SOP requires both internal and external reports, whereas MAS, for example, usually concentrates on internal reporting and does not produce external reports.
2.2 Sustainability and Organisational Performance

Essentially, “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1988, p.8) is the best depiction of the concept of ‘sustainability’. It reflects the vision that economic well-being of societies may imperil their future because human activities have the potential to influence everything and everyone (Blackburn, 2007). From an organisational perspective, the focus of the present study, organisational activities have also both short- and long-term effects on stakeholders. Meeting current stakeholders’ needs without jeopardising the ability of future stakeholders to meet their own needs portrays organisations to be sustainable entities.

Hitchcock and Willard (2009) argued that organisations can achieve sustainable performance by adopting a business model that favours financial and non-financial performance equitably. This notion is in line with the stakeholder view of organisational performance, introduced by Freeman (1984), that financial performance of organisations alone is insufficient and that other requirements of stakeholders must be addressed in the current age. Since then, the issue of integrating organisational sustainability into performance mechanisms has attracted growing attention in accounting research.

2.2.1 Organisational Sustainability and Accounting Research

Research linking accounting to the concept of organisational sustainability surfaced in the early 1990s and has received continuing attention in academic and professional accounting literature (Lamberton, 2005). Sustainability accounting or accounting for sustainability is a new accounting approach that involves measuring and reporting the triple bottom line of performance. It is an extension of traditional financial accounting that takes account of sustainability effects at the organisational level (Hopwood et al., 2010). It aims to produce information that allows fair representation of the sustainability features of organisations as well as empowering management to make economically, socially and environmentally informed decisions (Lamberton, 2005). Therefore, sustainability accounting is best defined as “the generation, analysis and use of monetarised environmental and socially related information in order to improve corporate environmental, social and economic performance” (SIGMA Project, 2003, p.7).
There is growing debate in the literature of whether sustainability accounting is truly accounting for sustainability. Some academics have begun to observe that organisations would like to be seen as sustainable entities rather than as reporting for actual sustainability (Mayhew, 1997; Bebbington & Gray, 2001; Gray & Milne, 2002). This is only natural, as those organisations are either incapable of accounting for sustainable performance or have failed to incorporate environmental and social information into their financial information (Gray & Bebbington 2000; Schaltegger & Burritt, 2010). The following sections present some controversial issues regarding organisations’ attempts to integrate sustainability aspects into their performance systems.

2.2.2 Reporting of Sustainability Performance

Rationalisation of sustainability disclosure divides the opinion of accounting researchers. On one hand, positivists assert that because of political costs organisations choose to voluntarily disclose such information. The Political Cost Hypothesis implies that large profits (large size organisations) encourage social and environmental reporting in response to fears of the misuse of the monopoly of power (Watts & Zimmerman 1978; 1986; 1990). This type of reporting is intended to minimise reported earnings in order to reduce the visibility to the public and, therefore, to avoid any political action such as rising taxes. Many studies provide empirical evidence of the association between the size of organisations and their environmental and social reporting (e.g. Guthrie & Parker, 1990; Hackston & Milne, 1996; Parsa & Kouhy, 2008).

On the other hand, some researchers argue that the contribution of positive accounting theory to the development of sustainability reporting is insufficient. This is because positive theories are not about what reporting should be, but about what it is (Gray et al., 1995). Other rationales such as the Legitimacy Theory offer a more acceptable explanation. According to this theory, organisations have a social contract with the society that they operate in, which leads to the need to consider the interests of the whole society (Milne & Patten, 2002). Reporting this commitment is intended to avoid any potential sanctions upon organisations, such as boycotting their products or services (Deegan, 2002).
2.2.3 Challenges to Accounting for Sustainability

Several barriers to the successful integration of sustainability accounting into organisational processes were highlighted by Prince's Accounting for Sustainability Project (2007; 2009). The first difficulty is the ambiguity and dynamism of the subject matter, beginning with the definition of 'sustainable development'. No available definitions make it clear how to locate the timing and geographical limitations of sustainability impacts. The second obstacle is the complexity revolving around the link between sustainability and capital growth. This causes a lack of proven association between long-term profitability and sustainability practices. The final barrier is that current accounting systems and their outcomes, such as balance sheets, do not facilitate the inclusion of environmentally and socially external elements to an organisation's operations. This particular barrier needs further clarification.

While it is true that the balance sheet is one of the classical accounting reports, there are other reports that can facilitate the inclusion of environmental and social information. Some are internally directed, such as internal performance reports, which have no content limitations (Atkinson et al., 2004). In addition, externally directed reports may have no content limitations, as in the case of voluntary reporting (Meeke et al., 1995). Consequently, the lack of support for sustainability should not be attributed to the accounting systems. Rather, it may be the unwillingness of organisations' management to implement the concepts of sustainability that is responsible for such a lack of information. Thus, the argument that poor sustainability is caused by ineffective accounting systems remains doubtful.

The speculation about sustainability accounting goes even further: Gray (2010) suggested that "the key, it seems, will therefore be to re-habilitiate the experiments considered in what does accounting for sustainability look like?" (p.13). The present study claims that there are two reasons for the re-questioning of what accounting for sustainability looks like. First, the attention towards the establishment of sustainability accounting has been limited to external reporting. Several standardised initiatives, such as the Global Reporting Initiative (2006), focus on communicating sustainability performance only, creating concerns over accounting for actual sustainability. Second, measuring sustainability performance appears to be troublesome. No consensus has been reached on how to quantify sustainability because it is not easy to translate the
concepts of sustainability into daily operations of organisations (Bonacchi & Rinaldi, 2006).

One way for measuring and reporting sustainability is the sustainability assessment model (SAM). It uses the concept of full cost accounting to measure the sustainability of specific projects conducted by an organisation (Bebbington, 2007). Although this tool was developed by British Petroleum company to articulate sustainability issues accurately, the possibility of successfully implementing SAM in other organisations is rather limited. SAM has a project focus that excludes any activities taken by an organisation outside this focus: it is merely an evaluation of a project that is unlikely to provide mechanisms for managing sustainability at the organisational level. This leads to different way that would help in managing sustainability performance more sufficiently at any organisation: the Sustainability Balanced Scorecards.

2.2.4 The Sustainability Balanced Scorecards

The Sustainability Balanced Scorecards (SBSC) system, basically a modification of the Balanced Scorecard system, operates by using strategy maps to integrate sustainability into decision-making processes (Kaplan & Norton, 1992; 1996; 2000; 2006). Integrating the three dimensions of sustainability into a single framework differentiates SBSC from other approaches to environmental and social management systems: in SBSC all organisational activities are accounted for. For this reason, the use of SBSC in evaluating organisational sustainability is considered appropriate to the current study.

Essentially, the Balanced Scorecard system is an approach to performance management developed by Kaplan and Norton in 1992. Focusing only on financial performance is no longer appropriate: other operational performances need to be considered. Given this, and having said that ‘what you measure is what you get’, the Balanced Scorecard system gives managers a broad view of organisations by identifying casual relationships among activities and by linking both the financial and operational measures. The balance of indicators not only enables managers to meet their needs for effectively managing the performance of essential sectors in an organisation (Kaplan & Norton, 1992; Cobbold & Lawrie, 2002; Hill et al., 2007), but also addresses the criticisms that are associated with historically based financial

Briefly, the Balanced Scorecard system provides a framework of four major perspectives for managing performance:

i) Financial perspective: to succeed financially, how should we appear to our shareholders?

ii) Customer perspective: to achieve our vision, how should we appear to our customers?

iii) Internal business perspective: to satisfy our shareholders and customers, what business processes must we excel at?

iv) Learning and growth perspective: to achieve our vision, how must we sustain our ability to change and improve?

As shown above, the Balanced Scorecard framework takes into consideration non-financial success factors, which are critical to the profitability of organisations. This paves the way to incorporate environmental and social elements in an integrative framework of both sustainability and Balanced Scorecards: building SBSC.

2.2.5 The structure of SBSC

Although few studies of SBSC are available (Figge et al., 2001; 2002; Epstein & Wisner, 2001; Moller & Schaltegger, 2005; Schaltegger & Wagner, 2006), two possible ways of formulating the SBSC are presented. The first one is to reconstruct the existing four perspectives by combining environmental and social elements. This process requires a creation of targets and measurements (lagging and leading indicators) that are strategically relevant for driving organisational performance. By doing this, sustainability issues are therefore integrated with other activities into a single system. The second way to formulate the SBSC is to add a fifth perspective that takes all environmental and social issues into consideration. This process requires a reconsideration of strategies, targets, and measurements, as well as a new type of data regarding organisational activities.

As a single fifth perspective, environmental and social-related performance concerns how effectively the organisations interact with their natural environments and
societies. With increasing attention on environmentally and socially friendly products or services, organisations are realising the significance of adopting environmental and social initiatives for their competitiveness in the market. The present study finds it appropriate to use a SBSC that combines environmental and social elements with the four perspectives as a single framework in evaluating sustainability performance. Using this method not only helps the consideration of all sustainability issues but also offers better insights into the reported performance.

2.3 Resource-Based View Theory

2.3.1 An Overview

In principle, resource-based view (RBV) theory is a management paradigm that concentrates on using limited resources to generate competitive advantages. The RBV of organisations emphasises that variation in organisational performance is largely due to organisational heterogeneity rather than due to industry structure (Dyer & Singh, 1998). It is proposed that an organisation's internal resources, and not its external environment, give the organisation a sustained competitive advantage.

This view of organisations is initially derived from the work of Penrose (1959), who, as cited in Fahy and Smithee (1999), stated that “a firm is more than an administrative unit; it is also a collection of productive resources the disposal of which between different users and over time is determined by administrative decision” (p.24). However, the RBV principle developed after Wernerfelt’s (1984) seminal article, which explored the value of analysing organisations from RBV. Wernerfelt argued that by efficient utilisation of its resources, an understanding of how and to what extent an organisation can improve its performance is attainable. Essentially, the RBV theory implies that organisations have several resources, a subset that facilitates achieving competitive advantage and a further subset that leads to superior long-term performance. This theory proposes that organisations should be considered as a collection of resources linked together in their structure because these resources, which could be tangible or intangible assets, differentiate the competitiveness and performance between organisations.

A number of frameworks on the classification of resources are proposed. One example is Penrose’s (1959) identification of two types of resources: (1) physical
resources that consist of tangible components such as equipment and raw materials; and (2) human resources represented in the organisational staff. Another classification is that of Grant (1991) and Barney (1995), where organisational resources are sorted into four clusters: (1) financial resources; (2) culture of organisation; (3) reputation; (4) technological resources. From a RBV perspective, Wade and Hulland (2004) reviewed information system literature and define organisational resources as “assets and capabilities that are available and useful in detecting and responding to market opportunities or threats” (p.109). The present study adopts Wade and Hulland’s view because the definition of AIS (see section 2.1.2) is consistent with their RBV-based theorisation of organisational resources.

2.3.2 RBV Theorisation and Accounting Research

RBV theorisation is frequently used in strategic management literature as studies report significant effects of organisation-specific resources on organisational performance. The studies of Armstrong and Shimizu (2007) and of Newbert (2007) reviewed relevant literature analysing the empirical development of the RBV theory and showed the diversity of its applications. However, these reviews reveal the limited research on the RBV theory in AIS literature.

One of the few examples that have directly used RBV theorisation in AIS literature is Henri’s (2006) study. The author examined the relationships between the use of management control systems (MCS: a subset of AIS), organisational capabilities and organisational performance. Examination of top management teams working in 383 Canadian organisations indicates that the use of MCS affects four organisational capabilities (market orientation, entrepreneurship, innovativeness, and organisational learning); these in turn affect organisational performance. However, effects on non-financial performance are neglected because organisational performance in Henri’s (2006) study is measured from only the financial perspective.

Another study using RBV theorisation in AIS literature is Masli et al. (2011). The authors evaluated the impacts of superior information technology capabilities on organisational performance over the 1988–2007 period. The results showed that a subset of organisations that won multiple awards for innovative information technology sustains better performance than that of other organisations. However, as
with Henri’s (2006) study, Masli et al. (2011) focuses only on financial perspective of organisational performance. The present study argues that AIS can further benefit from using a RBV framework. By considering both financial and non-financial aspects of performance, RBV theory provides a comprehensive view of organisations, leading to the understanding of how the specific resources of an organisation (such as AIS) may affect the organisation’s performance. “The RBV, through its focus on attributes and its recognition of the importance of resources complementarity, will uncover an enhanced role for information systems in sustained firm competitiveness” (Wade & Hulland, 2004, p.132).

As an organisational resource, effective processing and provision of information by AIS assist managers in making informed decisions quicker, giving organisations an additional advantage in attaining sustainable performance (Barney, 1991). It is evident that AIS is a key resource in most organisations, as it provides managers with important information for their decision making. For instance, Lucas (1975) hypothesised that AIS-based actions taken by managers of an organisation’s branches have an influence on the performance of each branch. Lucas’s study reveals that more reliance on AIS information by branch managers results in improved financial performance. In another study, Chong (1998) reported that, when managers use more information provided by MAS (a subsystem of AIS), their individual performance increases.

Similarly, Mia (2000) investigated the effects of the provision of MAS information on the financial performance of organisations and finds that this performance improves as the provision of information increases. A more recent study that examined the effects of broad-scope AIS information on business unit performance also showed that greater managerial use of broad-scope AIS is positively associated with higher financial performance (Boulianne, 2007). Other studies in AIS literature have extended their scope beyond AIS to investigate the relationship between organisational performance and integrated information systems. For instance, Delaining and Stratopoulos (2002) used archival analysis to compare organisations with advanced information systems to their opponents. They found that a successful utilisation of information systems pays off in a combination of increased profitability and efficiency, resulting in an improved return on assets.
Another example is the study of Banker et al. (2002), in which the authors conducted case studies and empirical investigations of productivity growth in five offices of an international public accounting firm that heavily invested in MIS. The results demonstrated the value impact of information systems as the growth of monthly revenue was significantly associated with the adoption of those systems. Furthermore, Hunton et al. (2003) conducted an archival longitudinal study to examine the impact of implementing integrated MIS on organisational performance. In a matched-pair design, where a three-year performance before and after adoption was compared, the authors find that adoption of integrated MIS technologies creates positive and significant differences on the financial performance of organisations. By a similar design, Nicolaou (2004) reported on a study that evaluates the effects of adopting integrated information systems on the financial performance of organisations. The findings show that, over a two-year time frame, organisations perform financially better after the implementation of integrated systems.

Nevertheless, the extant literature on AIS effects is limited, for two reasons. Firstly, as shown above, previous studies focus only on the managerial and financial performance of organisations. Little is known about the effects of AIS on organisational performance incorporating both financial and non-financial perspectives. Two studies, by James and Elmezughi (2010) and Bangchokdee et al. (2011), sought to investigate the effects of MAS (including activity-based costing and performance subsystems) on both financial and non-financial performance of organisations. However, those studies focused only on the use and scope of MAS information, leading to the next limitation.

Secondly, the majority of AIS studies so far concentrate on only three dimensions of AIS quality: focus, quantification, and time horizon; more research is needed to cover other dimensions (IMA, 1995). Here, ‘focus’ concerns the direction of provided information, ‘quantification’ relates to the type of provided information and ‘time horizon’ concerns the time zone of the information (Boulianne, 2007). Research on other dimensions of AIS quality such as the diversity of AIS information that covers different management areas (aggregation), the provision of information on request (response time), and the coordination of the different divisions within the organisation (integration) has been limited (Boulianne, 2007) (see section 3.3 Chapter 3).
With the development of sophisticated information systems, it becomes essential to define the quality of AIS as a multidimensional construct that combines both system- and information-related dimensions, as implied by Chenhall and Morris (1986). The relevant research suggests that the quality of information systems is significantly associated with the managers' use of these systems because managers as decision makers would rely heavily on quality information (Keren & Bruin, 2003). Such reliance improves the outcomes of managers' decisions by, for example, providing a deeper understanding of organisations (Chang et al., 2003) and broader views of external, non-financial and future-oriented information surrounding organisations (Considine et al., 2010) (see section 3.3 Chapter 3). Thus, incorporating the four dimensions of AIS quality (integration, aggregation, response time and scope) in examining the relationships between AIS and SOP is imperative to enhance the current limited understanding of AIS effects.

2.3.3 The Role of AIS in SOP

Quality AIS plays a fundamental role in improving SOP by facilitating the management of organisational sustainability. For this study, sustainability management is about the measuring, monitoring and simultaneous control of the sustainable aspects of the organisational performance (Weybrecht, 2010). It aims at increasing both financial and non-financial performance of organisations, so that economic development, social advancement and environmental protection are maximised in unison. Thus, since a successful management of organisational sustainability is reflected in superior SOP (Bennett & James, 1999), the role of AIS in SOP is significant in many ways, as outlined below.

Firstly, by providing financial, environmental and social information, AIS can enable users to respond more effectively to the emerging requirements of SOP. An overview by Allenby et al. (2001) of the integration of information systems and environmental schemes showed that better and richer information is required to meet the environmental challenges of the organisations' future. Also, a number of executives anticipated that organisations will maintain their focus on SOP by deploying more information systems resources and by establishing positions of accountability within their boundaries, thus ensuring the achievement of necessary objectives (EIU, 2009).
Secondly, the Prince’s Accounting for Sustainability Project (2010) identified ten elements for successfully embedding sustainability measures in organisations: (1) ensuring board and senior management commitment; (2) understanding and analysing the key sustainability drivers for the organisations; (3) integrating the key sustainability drivers into organisations' strategies; (4) ensuring that sustainability is the responsibility of everyone in organisations and not just of a specific department; (5) breaking down sustainability targets and objectives of organisations into targets and objectives which are meaningful for individual subsidiaries, divisions and departments; (6) organising extensive and effective sustainability training; (7) including sustainability targets and objectives in performance appraisal; (8) encouraging champions to promote sustainability to celebrate success; (9) ensuring that processes enabling sustainability measures are taken into account clearly and consistently in day-to-day decision-making; and (10) monitoring and reporting sustainable performance. From these elements, it appears that quality AIS can effectively support the management of organisational sustainability, leading to better SOP.

Thirdly, there are two managerial practices that illustrate the role of quality AIS in managing SOP: sustainability cost allocation and sustainability life cycle costing (Brooks et al., 2008). Sustainability cost allocation provides the isolation of sustainability performance related costs from overhead cost pools. Thus managers have a greater insight into alternative production processes. Such identification and classification require effective AIS that is capable of identifying and tracing sustainability performance related costs. Sustainability life cycle costing involves making more informed decisions concerning the inputs and outputs generated through organisational activities. By using a general input/output chart of accounts, decision makers can manage and evaluate the impacts of resources during their life cycle, resulting in better ways for utilising the resources and minimising wastes.

Fourthly, it is suggested that AIS can pave the way for management to cope with the increasing pressure and challenges related to SOP. A recent report by Deloitte (2011) indicated that sustainability management is a difficult coming of age because of the high dynamics facing organisations. Therefore, as the demands for sustainability performance information increase, establishing effective AIS for processing that
information is essential for success. Another study by Albelda (2011) showed that the role of AIS information in meeting environmental challenges as explained by environmental and accounting managers in Spanish factories is to facilitate the ability to (1) commit to the continual improvement of the environmental performance; (2) comply with environmental legislation; (3) communicate with interested parties; and (4) involve employee in sustainability initiatives as such the European Community’s Eco-Management and Audit Scheme. In addition, interviews with managers in leading German organisations affirmed that to effectively administrate carbon emission related matters, related information has to be gathered, processed, supervised and communicated internally (Burritt et al., 2010). Only effective AIS can provide such assistance and support for managers.

Fifthly, the importance of quality AIS producing sustainability related-information is highlighted in several integrative reviews of accounting literature. For instance, Schaltegger and Burritt (2010) discussed the role of ‘sustainability accounting’ as it represents an extension of traditional financial accounting that takes account of sustainability effects at the organisational level to assist managers in improving SOP. It provides “the generation, analysis and use of monetarised environmental and socially related information in order to improve corporate environmental, social and economic performance” (SIGMA Project 2003, p.7). Effective AIS is the facilitator that can assist in producing information that allows fair representation of the sustainability features of organisations as well as empowering management to make economically, socially and environmentally informed decisions (Lamberton, 2005).

Sixthly, Wall and Greiling (2011) differentiated between two ways of how AIS information affect managerial decision making: directly and indirectly. Information can influence decision making either directly, by being input to decisions, or indirectly, by influencing the behaviour of managers. Hall (2008) also proposed that AIS information is used by managers to develop their knowledge of the work environment. Incorporated with the context of SOP, management of organisational sustainability could be affected directly, by both the use of AIS information, and indirectly, by the quality of AIS.
Following the previous discussion, it is therefore argued that poor management of organisational sustainability (low SOP), as indicated in previous research, may be attributed to low qualities of AIS. Studies by Gray and Bebbington (2000) and Gray (2010) reviewed the relevant literature and concluded that many organisations fail to manage their sustainable performance. The present study associates this failure with the low qualities of AIS, which reduce the managerial use of AIS, resulting in declined SOP. For example, when AIS lacks environmental and social information, it disables users to respond effectively to the emerging requirements of SOP (EIU, 2009). Also, if AIS is incapable of producing information that allows fair representation of the sustainability features of organisations, it would hinder management to make economically, socially and environmentally informed decisions (Lamberton, 2005). The present study therefore expects quality AIS to play a pivotal role in measuring, monitoring and control of the sustainable aspects of the organisational performance, so that a successful management of organisational sustainability is reflected in superior SOP.

2.4 Legitimacy Theory

2.4.1 An Overview

From a business point of view, the term ‘legitimacy’ concerns “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995, p.573). The process of legitimation evolves around the notion that societies judge the value and legitimacy of organisations’ operations because these organisations utilise the available resources of their societies (Hybels, 1995). In other words, the theoretical perspective of legitimacy presumes that there is an association between an organisation and the society in which it operates. Alignment between the values of organisational activities and principles of generally accepted behaviour in the society at large is a critical success factor for the organisation (Capaldi, 2005). As explained by Kaplan and Ruland (1991), “underlying organisational legitimacy is a process, legitimation, by which an organisation seeks approval (or avoidance of sanction) from groups in society. Legitimation may be necessary to ensure an organisation’s continued existence” (p.370).
Because of such commitment towards society, organisations employ different strategies to show that they are submitting to the implicit and explicit desires of that society (Milne & Patten, 2002). Also because of such commitment, organisations seek to consider the interests of different groups of the society (stakeholders), rather than just the interest of its owners (shareholders). If the organisations stall on fulfilling their responsibilities, members of the society may lay sanctions upon the organisations. These sanctions may vary from taking legal action against the organisations to decreasing demands for the organisations' products and services (Meijer & Schuyt, 2005). As such, the legitimacy theory postulates that organisations are consequently encouraged to conduct practices to attain, retain and repair the views of organisational commitments towards societies (Deegan, 2007). Research in accounting literature uses a legitimacy perspective to theorise different impacts on organisations.

2.4.2 Legitimacy Theory and Accounting Research

The legitimacy theory posits that organisations have a 'social contract' with members of the society in which they operate. If those members find that the advantages exceed the disadvantages of the organisations' products and services, then the organisations have legitimacy to operate and perform. A significant shift in the public perceptions regarding organisational performance has been a greater emphasis on organisations to be accountable for the non-financial aspects of their performance (Deegan, 2002). As a result, managers nowadays seek to consider sustainability related issues in their decision-making process in order to avoid threats to the legitimacy of their organisations (Schaefer & Kerrigan, 2008). Managers may also endeavour to associate their organisations with particular processes of operation, principles or symbols that have better perceptions of legitimacy. For instance, managers may try to show their successful integration of environmental solutions to the production process by publicising environmental awards won in the media (Patterson & Allen, 1997).

Tilling and Tilt (2010) reviewed the accounting literature and concluded that the link between accounting research and the legitimacy theory revolves mostly around annual reports and related disclosures. The authors, however, agreed with Zeghal and Ahmed’s (1990) criticism that focusing on only one document source can lead to incomplete and limited understanding. “One cannot judge corporate performance on
social responsibility solely on the basis of information disclosed in the annual reports. Social information disclosure may also take place through company staff newspapers, press releases, paid newspaper, television and radio advertising and company brochures" (Zeghal & Ahmed, 1990, p.39). To this extent, the present study deems that the link between accounting research and the legitimacy theory can also be examined within a family business context. That is, managers/owners of family organisations utilise AIS information and reporting of SOP to legitimise the products and services provided by their organisations. The following section explains a legitimacy variable, family control of management, and briefly introduces its effects on SOP and the use of AIS information.

2.4.3 Family Control of Management

Family control of management is used in the present study to refer to the degree to which the management of organisation is influenced by members of the owner family. On one hand, families can effect an organisation when they hold a substantial share of its capital (50 per cent or more). On the other hand, controlling families can influence organisations by appointing a family-related member as Chief Executive Officer (CEO). Based on these criteria, two types of organisations can be identified:

i) Organisations with family related CEOs; and

ii) Organisations with non-family related CEOs.

In the Saudi stock exchange market, which is the setting of the current study, many listed organisations are clearly influenced by family members as they own substantial percentage of the capital. The present study finds that 66 per cent of seats on the boards of directors of the Saudi listed organisations are occupied by family members (Appendix A). Such ownership and control by families in publicly traded organisations is commonly observed all over the world. In Western Europe, for example, the majority of listed organisations are family controlled as a substantial share of their capital are owned by members of particular family or/and members of those family hold executive managerial positions in that organisations (Porta et al., 1999; Faccio & Lang, 2002). In the United States, one-third of organisations in the Standard and Poor’s index are family-controlled (Anderson & Reeb, 2003). In contrast, public non-family organisations represent organisations that belong to individuals or groups of partners who separately own a minority of shares. These
organisations also include all government-owned organisations and multinational organisations that are listed in the Saudi stock exchange market.

Such family control of organisations has significant consequences for SOP. For example, with 2713 observations from 403 organisations listed on the Standard and Poor’s index, Anderson and Reeb (2003) found that family controlled organisations perform financially better than non-family controlled organisations. However, the authors revealed that this positive relationship is non-linear because organisational performance begins to decline as the controlling family increases its shares of the organisation’s equity. By using a similar sampling frame, Lee (2006) uncovered significant consequences of family control on SOP. The findings asserted that non-financial performance in family controlled organisations is significantly higher than in non-family controlled organisations.

In addition, both types of organisations differ significantly in terms of the managerial use of AIS information. For instance, Barth et al. (2005) noted that, family organisations managed by family CEOs are significantly less productive than those managed by non-family members. One reason is that middle managers are unlikely to get higher positions and are unmotivated to perform more productively when there is a family CEO. Consistent with this explanation, Lybaert’s (1998) examination of 208 Belgian organisations found that more information is prone to be utilised as the family ownership in organisations declines.

Furthermore, a study by Lema and Durendez (2007) looked at the differences between family and non-family organisations with regard to managerial behaviour. The findings showed that organisations owned and managed by families are more likely to under-employ accounting techniques and information, particularly MAS information. Therefore, negative consequences of family CEOs on the managerial use of AIS information and SOP are implied in an empirical body of the literature. The next chapter on hypotheses development (from section 3.4.1 to section 3.4.6) clarifies these consequences.
2.5 Contingency Theory

2.5.1 An Overview

In general, the contingency theory of organisations is a subset of the contingency approach in science, implying that the influence of one variable on another is subject to a third variable. Thus, for example, the effect of X on Y depends on the status of Z. The relationship between X and Y can possibly be positive but only when impact of Z is low/relatively less strong, and vice versa. In other words, "the relationship between X and Y is part of a larger causal system involving the third or more variables, so that the valid generalization takes the form of a trivariate or multivariate relationship" (Donaldson, 2001). The contingency theory of organisations attempts to explain what differentiates successful organisations from their failing parallels. The theory suggests that there is no best way to improve organisations' performance (effectiveness), yet organisational mechanisms have to be contingent with their external environments.

AIS is a significant mechanism for management tasks and, eventually, for the performance of organisations. Differences in requirements for managerial decision making are likely to result in differences in the organisational mechanisms (O'Donnell, & David, 2000; Ismail & King, 2005). The contingency theory of organisations can therefore advocate relevant views on what the critical success factors for effective design of these mechanisms are. The issue of designing an internally and externally consistent organisational mechanism for improving managerial and organisational performance has been the main theme in business-related literature (Vaassen, 2002; Zimmerman, 2009). Research in accounting literature uses a contingency perspective to theorise different impacts on organisations.

2.5.2 Contingency Theorisation and Accounting Research

The contingency theory of AIS implies the idea that there is not one single universal information system that is equally suitable to all organisations in all environments. As Otley (1980) stated, “accounting systems are an important part of the fabric of organisational life and need to be evaluated in their wider managerial, organizational and environmental context” (p.422). Contingent factors such as operating environment, organisational structure, technology, organisational strategy and
organisation size have significant effects on the role of AIS in organisations (Chenhall, 2003).

Nicolaou (2000) reviewed relevant literature regarding the effects of working environment, structure of organisation, information technology, strategy of organisation and organisation size on design of AIS (including MAS). For instance, it is found that the operating environment positively influences the use of MAS because managers seek for a broader scope of information as their working environment become turbulent (Gordon & Narayanan, 1984).

It is evident that when the design of AIS is appropriate for a particular organisation’s environment, the role of AIS in that organisation is significant (Nicolaou, 2000). AIS is an internal organisational mechanism that is vital for effective decision making in organisations; differences in the organisational requirements for management are more likely to cause differences in the role of AIS (Zimmerman, 2009). While researchers confirm that results from contingency models are useful for managers to ensure the effectiveness of AIS, a contingency theorisation will be useful for this study to explore its effects on the role of AIS. More particularly, industry dynamism is a contextual variable that influences the managerial use of AIS information, and that ultimately affects the SOP. The following section explains this factor and its impacts more specifically.

2.5.3 Industry Dynamism

While ‘dynamism’ refers to the unpredictability of contingent variables influencing organisational performance (Miller, 1993), its effects can be examined at organisational level or industry level (McCarthy et al., 2010). Dynamism at the organisational level relates to organisations’ operating environment such attributes/designs of their products, availability and prices of raw material, and labour union actions (Maurice, 2011) whereas dynamism at industry level relates to the degree of change in technology, changes in customer demand, competitive rivalry and market growth in the industry (Hauschild et al., 2011).
It is possible that a particular industry such as food-processing industry may enjoy relatively slow changes in the production technology (low dynamism at industry level) while one of its organisations faces increasing challenges in obtaining raw material (high dynamism at organisational level). The present study focuses on dynamism at industry level only. Highly dynamic industries face rapid change in production technologies, unstable customer demand, volatile growth and intense competition. In contrast, industries with low dynamism have relatively more stable customer demand and little competitive change (Desarbo et al., 2005).

The two important factors of industry dynamism, market competition and technological change, reveal significant effects on the SOP, as cited in the previous research (Hoque, 2004; Seaman & Williams, 2006). On one hand, technological change is defined as "an exogenous technical innovation that modifies the components, systems, techniques, or methods required for producing organisational outputs" (Lavic, 2006, p.154). On the other hand, market competition refers to the notion of organisations striving for a greater share of a market and a larger number of customers. The next chapter, hypotheses development (from section 3.5.1 to section 3.5.6), describes the effects of these dynamics extensively.

2.6 Chapter Summary

Discussions throughout this chapter highlight the limitations of previous studies. From these limitations the objectives and research hypotheses of the present study are formed. As explained earlier, several challenges and debates about organisations’ attempts to integrate sustainable performance measures heighten the need to understand various factors affecting SOP. The present study focuses on studying four main factors: quality of AIS, managers’ use of AIS information, family control of management and industry dynamism.

In terms of studying the role of AIS in SOP, the literature review shows two reasons why research on AIS is limited. Firstly, the effects of AIS on SOP incorporating non-financial perspectives are unclear, because the focus of previous studies was on only the managerial and financial performance of organisations. Thus, the first objective of the present study is to examine the relationship between the managers’ use of AIS
information and SOP, incorporating five perspectives of SBSC: financial, customer, internal business process, learning-growth, and environmental and social perspectives.

Secondly, the effects of aggregated, integrated, timely and broad-scope information of AIS on the managerial use of AIS are unexplored, because the majority of AIS studies so far concentrate on only three dimensions of AIS: focus, quantification and time horizon of AIS information. As a consequence, the second objective of the present study is to examine the relationship between the quality of AIS that combines four quality dimensions (aggregation, integration, response time and scope) and the managers’ use of AIS.

With regards to the relationship between the family control of management and SOP, the present study identifies an incomplete understanding of this relationship. Most family business-related research focuses only on the impact of family control on the financial performance of organisations. Other aspects of SOP such as customer, human resource, and environmental performances have been ignored. Accordingly, the third objective of the present study is to investigate the effects of family control of management on SOP, by incorporating five perspectives of the SBSC system. In addition, the present study argues that, because of family CEOs, the managers’ use of AIS is expected to decline. To examine this proposition, the fourth objective of the present study is to assess the effects of family control of management on the use of AIS information.

Furthermore, prior research on the relationship between industry dynamism and SOP reported inconclusive results. Some studies find significant impacts of industry dynamism on the financial performance of organisations; others do not. Thus, the fifth objective of the present study is to examine the effects of industry dynamism (represented by market competition and technological change) on SOP. Also, previous studies on the relationship between industry dynamism and the use of AIS are limited only to manufacturing organisations and do not apply for other types of organisations. To address this, the sixth objective of the present study is formulated to investigate the effects of industry dynamism on managers’ use of AIS information. To achieve all the research objectives, 18 hypotheses have been developed, as discussed in the following chapter.
CHAPTER 3

Hypotheses Development

3.0 Introduction

This chapter develops eighteen hypotheses based on the conceptual model presented in Figure 2. Section 3.1 offers a brief review of the theoretical model. Rationale for the hypothesised associations among variables within the model as presented in section 3.2 to section 3.5. Section 3.4 summarises the chapter and briefly introduces the following chapter.

3.1 Review of the Theoretical Model

As discussed in section 1.2, the ultimate aim of the present study is to extend the existing understanding of the role of AIS in SOP, including the impact of family control of management and industry dynamism. To achieve that goal, the following specific objectives are identified:

i) Examining the relationship between family control of management and SOP;

ii) Examining the relationship between family control of management and the managers’ use of AIS information;

iii) Examining the relationship between the quality of AIS and the managers’ use of AIS information;

iv) Examining the relationship between the managers’ use of AIS information and SOP;

v) Examining the relationship between industry dynamism and SOP; and

vi) Examining the relationship between industry dynamism and the managers’ use of AIS information.

Based on the above objectives, 18 hypotheses have been developed throughout the subsequent sections.
3.2 The Impact of Family Control of Management

Family control of management is used in the present study to refer to the degree to which the management of organisation is influenced by a family member. Families can control an organisation when they hold a substantial share of its capital. Those controlling families can also manage the organisations by appointing a family-related member as Chief Executive Officer (CEO). Based on these criteria, two types of listed organisations in stock markets are identified:

i) Organisations run by family related CEOs; and

ii) Organisations run by non-family related CEOs.

A legitimacy theorisation supports the positive impacts of family control of management on organisational performance. That is, organisations have a social contract with the society they operate in, and consequently are concerned about the interests of that society (Gray et al., 1995; Gray, 2010). For example, organisations avoid any potential sanctions upon organisations, such as boycotting of their products or services by reporting their social commitment to the public (Deegan, 2002). Yet the literature review finds that, while there are mixed results of the impact on financial performance, there is a paucity of empirical study of the impact on non-financial performance of family organisations. Further, the review suggests that there are types of environmental or cultural considerations that may determinate the impact of family control of management on organisational performance. For example, while Western studies found family control of management to be positively associated with SOP (Berrone et al., 2010; McGuire et al., 2012), low awareness of environmental issues in Saudi Arabia may offset those positive impacts on SOP.

The SBSC framework is used to conceptualise SOP for evaluating performance with both financial and nonfinancial measures. This SBSC framework paves the way for examining SOP from five important perspectives: financial, customer, internal business process, learning and growth, and environmental and social.

In addition, the present study argues that family control of management may have an adverse effect on the use of AIS information. From a domination point of view, having a CEO who runs and owns the organisation may discourage senior managers from utilising AIS information in their decision-making process. As owner-managers
have a strong preference for control, the process of decision-making by senior managers in organisations with family CEOs is limited to the views of the CEO who runs and owns the organisation (Barth et al., 2005; Cruz et al., 2011). The following sections discuss the hypothesised relationships between family control of management, perspectives of SBSC and the managerial use of AIS information.

3.2.1 Family Control of Management and Financial Performance:
While it has been commonly observed that family organisations are the most prevalent type of business (Schuman et al., 2010), the issue of whether family control of management is an absolute advantage for organisations remains ambiguous (O’Boyle et al., 2012). One of the well-known studies on this issue is Anderson and Reeb’s (2003) study. The authors examined the Standard and Poor’s index on the United States stock exchange where one-third of the organisations are family-controlled. The reported results revealed a positive relationship between the family control of management and the financial performance of organisations, concluding that organisational performance is better when a family member serves as a CEO. Yet this positive relationship appeared to be non-linear, as organisational performance begins to decline when the controlling family increases its shares to more than one-third of the organisations’ capital. In contrast to the previous findings, Miller et al. (2007) examined listed organisations in the United States and found that organisations that are owned by families and employ relatives as top managers perform financially worse than organisations with non-family managers.

With a similar data set, Villalonga and Amit (2006) differentiated three fundamental elements in examining family effects in organisational performance: ownership, control, and management. Ownership refers to the degree to which a family holds shares of a listed organisation, while control relates to the voting and cash flow rights that allow family members to control a public organisation. Villalonga and Amit's results indicated that organisational performance gains financial benefits only when the family founder serves as a CEO or Chairman of the family-owned organisation. However, Villalonga and Amit noted that their results are limited because their research sample included listed organisations only in the United States, concluding “further research may show how our findings about the differential effects of founders and descendants, the incremental effects of different family firm generations, or the
relative costs of the two major agency problems, are affected by institutional differences across countries” (p.415).

Steier (2009) stressed that while families' involvement influences business activity all over the world, their effect varies according to the institutional and cultural context that determines the degree and type of family governance in organisations. Steier used a variety of capitalism perspectives to demonstrate his view, arguing that country, culture and regional differences continue to influence business activities more than are commonly observed. For instance, transition and emerging economies with less developed legal and financial institutions are associated with higher levels of family control over organisations than regions with well-developed institutions. Table 3.1 presents differences of capitalism in four regions of the world according to patterns of governance systems in organisations.

<table>
<thead>
<tr>
<th>Type of capital</th>
<th>Anglo-American</th>
<th>Continental Europe/Developed Asia</th>
<th>Emerging markets/developing</th>
<th>Transition economies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholder/alliance</td>
<td>Alliance/bank and familial</td>
<td>Familial and state/dirigiste</td>
<td>State/dirigiste</td>
<td></td>
</tr>
<tr>
<td>Market (dispersed ownership)</td>
<td>Alliance control</td>
<td>Direct control</td>
<td>Direct control</td>
<td></td>
</tr>
<tr>
<td>Shareholders</td>
<td>Broader stakeholders (employees)</td>
<td>Family/owner</td>
<td>Family/owner, ethnic groups</td>
<td></td>
</tr>
<tr>
<td>Individualism and autonomy</td>
<td>Collective, authority</td>
<td>Networks</td>
<td>Post-socialist culture</td>
<td></td>
</tr>
<tr>
<td>Disclosure rules and market for Corporate Control</td>
<td>Interlocking investments and directors; Banks</td>
<td>Reliance on reputation of families</td>
<td>Reliance on family</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3.1: Differences of capitalism in four regions of the world**
(adapted from Steier, 2009)
To illustrate the view of institutional differences among countries, Maury (2006) examined 1672 organisations across Western Europe to compare the financial performance of three types of organisations: non-family organisations, family organisations with family CEOs, and family organisations with non-family CEOs. Maury's study found that family control of management is positively associated with higher profitability of organisations, as the family organisations with family CEOs outperform other organisations. The author attributed these positive effects of family control of management to the level of transparency and regulation in the economy, whereby controlling families in a well-regulated economy do not act detrimentally towards minority shareholders. The author claimed that, unlike Asian economies, the effects of family control in Western European organisations are a whole paralleled those found in organisations in the United States where the economy is well-regulated.

Nevertheless, other researchers provided contradicting results to the previous claim of Maury. For instance, Sciascia and Mazzola (2008) examined family organisations in Italy and reported a negative relationship between family control of management and the financial performance of organisations. Also, Lin and Hu (2007) used data from organisations listed in the stock market of Taiwan and found no significant differences in financial performance between family and non-family CEOs. The authors concluded that both family and non-family CEOs can assist organisational performance as long as there are appropriate governance mechanisms in the organisation. More recently, Cai et al. (2012) used a sample of Chinese listed family organisations and reported that family CEOs, as a whole, relate positively to the financial performance of organisations.

In synthesis, the empirical evidence on whether family control of management benefits or harms financial performance of organisations is mixed and requires further investigation. This is because some studies found that family CEOs improve organisational performance (Anderson & Reeb, 2003; Barontini & Caprio, 2006; Sraer & Thesmar, 2007; Villalonga & Amit, 2006), while others found negative effects (Barth et al., 2005; Jiang & Peng, 2011; Peng & Jiang, 2010; Westhead & Howorth, 2006). Also, the empirical evidence on this relationship is limited because of over-emphasis on Western economies. Studies using data from Asian countries
included only nine emerging economies: Taiwan, China, Hong Kong, Indonesia, Malaysia, Singapore, South Korea, Philippines and Thailand (Filatotchev et al., 2005; Lin & Hu, 2007; Steier, 2009; Peng & Jiang, 2010; Jiang & Peng, 2011; Cai et al., 2012). No study to date has focused on one of the twenty major economies in the world, Saudi Arabia (G20, 2012), despite its strong familial culture (Alesina & Giuliano, 2010; Weir, 2009).

The present study argues that in strong familial societies, family control of management has significant positive impacts on the financial performance of organisations for two reasons. Firstly, in those cultures, people’s destiny depends largely on the welfare of their families (Karam, 2010). This makes family managers directly associated with higher levels of financial performance than non-family managers who may have other sources of wealth (Weir, 2009). McConaughy (2000) hypothesised that family CEOs have more incentives to maximise the value of organisations, so they need less pay to do what non-family CEOs would do. Secondly, family control of management reduces the costs of the agency problem between owners and managers: owners of an organisation are at the same time managers of it. Therefore, maximising and maintaining organisational profitability are in the interests of both sides and the family at large (Glassop & Waddell, 2005). Conversely, non-family organisations may face difficulties due to the principal-agent problem. Self-interest of managers (agents) may overtake the interest of owners (principals) leading to conflicting priorities between the two sides. Non-family managers, for example, might be keen on showing profits in the short-term at the expense of long-term profits because their rewards are based on performance during those terms.

Based on this argument, the present study hypothesises that the financial performance of an organisation with a family CEO is significantly higher than that of an organisation with a non-family CEO. For the purposes of statistical testing, the following research hypothesis is stated in null form:

Hypothesis 1a: The financial performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

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1 In order to avoid making any conclusion that is due to chance or random fluctuation, the present study chose to state a group of research hypotheses in null form whereby statistical testing (Chapter 5) can lead to either reject (not supporting) or accept (supporting) the stated hypotheses.
3.2.2 Family Control of Management and Customer Performance:
Although previous studies provided an understanding of how familial elements can exploit family organisations to improve their relationships with customers, there is a dearth of empirical studies comparing customer performance in family managed organisations with non-family managed organisations (Sorenson et al., 2009). Also, the majority of past research investigating customer performance was limited to small and medium family organisations. Tagiuri and Davis (1992) for example argued that family control of management has positive impacts on the customer performance of organisations due to the greater emphasis placed on customer services by family-related CEOs. The authors provided evidence that executive management of family organisations is more concerned with accomplishing excellence in the markets by creating and maintaining quality reputations for products and services provided by their organisations. A study by Cooper et al. (2005) highlighted that many family organisations compliment themselves on their outstanding customer service capabilities: “family businesses that can create and maintain superior customer relationships enjoy competitive advantages associated with customer loyalty, perceptions of trustworthiness, and goodwill” (Cooper et al., 2005, p.242).

Not only do family managers vary in viewing the concept of customer service, but customers themselves also perceive family business differently from non-family business. When dealing with a family-controlled and -managed organisation, customers may have a more positive attributes toward the services provided, resulting in a higher customer-related performance of family organisations (Miller et al., 2008). This positivity in customers’ minds might be a result of the family corporate image and responsibility. Fombrun (1996) supported this view, asserting that “reputation breeds customer loyalty, repeat business, and so dampens the effects of business downturns” (p.78). In addition, Carrigan and Buckley (2008) found that the name and reputation of family organisations play a significant role in the acquisition behaviour of customers.

Moreover, the literature review finds that studies focusing on large organisations combined central indicators of customer performance of organisations—customer satisfaction and/or market share (Kaplan & Norton, 1996)—along with financial indicators in their multidimensional measures of organisational performance. For
instance, while Westhead and Howorth (2006), Villalonga and Amit (2006), Barnett et al. (2009), Kim and Gao (2013), and O’Boyle et al. (2012) reported that the performance of family managed organisations is better than non-family managed organisations, their measurement of organisational performance incorporated not only market share and/or customer satisfaction but also sales growth, return on asset, net profit growth and return on equity. These evolutions of performance are inadequate to assess the success of today’s business organisations (Kaplan & Norton, 1992, 2006; Simons, 2000) because enjoying high sales growth, for example, does not necessarily indicate successful management: customers could possibly have a very limited range of choices or they may experience a temporary situation such as high wealth, which leads to transitory consumer behaviour (Niven, 2002). Thus, it is imperative to examine separately the effects of family control of management on customer performance of organisations.

In Saudi Arabia, family control of management can have clearer effects on customer performance of organisations considering the country’s strong familial culture (Alesina & Giuliano, 2010; Weir, 2009). Arregle et al. (2007) explained that family managed organisations are unique because they have two forms of capital: the family’s and the organisation’s. Family managers often have close relationships with customers and other types of stakeholders, leading to further improvement in the organisation’s capital. A critical component of organisations’ capital is the character of social relations over the organisations (Arregle et al., 2007). “Due to the lack of family ties, non-family managers are not emotionally bound to the company” (Lutz & Schraml, 2012, p.40), whereas family managers are personally motivated towards having healthy relationships with customers (Sharma, 2008; Miller et al., 2008). In Saudi Arabia, where strong family ties are evident (Weir, 2009; Karam, 2010), deeper and longer lasting relationships with customers are expected to play a pivotal role in increasing the customer performance of organisations with family CEOs than those with non-family CEOs.

Nevertheless, and as Sorensen et al. (2009) pointed out, there is a lack of empirical evidence explaining whether family ties can influence the relationship between family control of management and customer performance in publicly listed organisations. The current empirical evidence postulated that, with respect to customer relationship
management, family managed organisations perform as professionally as non-family organisations. Cooper et al. (2005) hypothesised that family business executives who have used customer relationship management initiatives are less likely than their non-family parallels to gain successful outcomes from those initiatives. However, the results of their survey revealed no significant differences between family and non-family organisations.

The present study emphasises that the customer performance of organisations is more about how well the organisations meet their customers' needs. It reflects the customers' perceptions and opinions towards organisations (Kaplan & Norton, 1996). Thus, while it is important to gain success when implementing customer relationship management initiatives, it is far more significant to attain positive perceptions and to maintain excellent reputations for the organisations. Especially in countries with a strong familial culture such as Saudi Arabia, family CEOs are more likely to be committed to achieving this than are non-family CEOs. This is attributed to the association between the value of customer services and the names of families and organisations. Based on this argument, the following research hypothesis is stated in null form:

**Hypothesis 1b:** The customer performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

### 3.2.3 Family Control of Management and Internal Business Process Performance

The literature review finds that previous studies on the relationship between internal business process performance and family management of organisations have overlooked the institutional and cultural differences between countries (Sharma, 2004). Studies that were conducted in Western economies reported that, within large organisations, those managed by family managers have significantly less internal business performance than those managed by non-family managers (Miller et al., 2012; Bennedsen et al., 2007; Barth et al., 2005; Chrisman et al., 2004). However, the present study argues that because of the high sensitivity toward family image and renown in the Saudi culture (Weir, 2009; Karam, 2010), internal business performance in Saudi listed organisations with family-related CEOs is significantly higher than in organisations with non-family CEOs. This is due to concerns over the
organisations’ identity in the minds of family CEOs, who may feel a greater accountability to shelter their family assets (see section 2.4 Chapter 2). Specifically, family control of management engenders reputation concerns over the family name and organisation, escalating the importance of innovative progression, operational efficiency and post-sales facilities.

By increasing the rate of innovations, work efficiency and services after sales, organisations seek to satisfy customers in a way that eliminates any legitimacy issues over the family name (Cano et al., 2004; Levenburg, 2005; Zahra, 2005). Craig and Moores (2005) stressed that “the internal process perspective captures the critical organizational activities that will determine the means by which the company will achieve the differentiated value proposition and the productivity improvements” (p.114). To do so, three steps are offered: (1) reaching higher operational efficiency; (2) encouraging innovations to develop new products and services; and (3) maintaining quality relationships with customers and all external stakeholders. Tokarczyk et al. (2007) conducted an analysis of multiple interviews with family owners and managers, revealing that operational efficiency in family organisations contributes significantly to a tendency for carrying out market-orientated strategies.

In addition, Rajagopal (2010) showed a post-sales service is one way for differentiation of brand to increase customers’ satisfaction and create higher trust for the brand performance. Familiarity of brand identity through post-sales services advances the management’s ability to persuade customers to make acquisition decisions, affecting the competitive orientation and performance of family organisations (Craig et al., 2008). Also, post-purchase support is found to be significant in enhancing the image of business, even in untraditional shopping ways, such as purchasing via the Internet (Levenburg, 2005). All these studies support the view that because family CEOs are intimately linked with the reputation of their family names, more focus on maintaining quality post-sales services is expected by those CEOs to secure the identity of their family organisations.

In terms of innovation, Kaplan and Norton (1996) asserted that the rate of innovations (new products and services) is positively associated with the level of internal business processes performance. For family businesses, Zahra (2005) pointed out that these
organisations are broadly viewed as a major source of technological innovation. “Owner-managers are expected also to support radical innovations that enhance organizational growth, utilizing the firm’s own resources or by joining alliances with companies within or from outside their industries” (Zahra, 2005, p.26). In contrast, Van-Gils et al. (2008) examined the role of family CEOs in innovative performance and found that having a family CEO negatively influences product and process innovations in family businesses.

Furthermore, Cano et al. (2004) note that the reported results on associations between market-orientated strategies and internal business process performance were inconclusive because some Western studies reported significantly positive relationships (e.g. Deshpande & Farley, 1998; Matsuno & Mentzer, 2000; Slater & Narver, 2000), whereas other studies reported negative associations (e.g. Grewal & Tansuhaj, 2001; Han et al., 1998; Siguaw & Honeycutt, 1995). The authors' analysis of the literature also shows that in Bhuian’s (1998) study, the only one that was conducted in Saudi Arabia, non-significant results were reported (Cano et al., 2004). This may indicate that the previous findings of Western studies may not be applicable to the Saudi organisations.

The literature review suggests that there is still a need to investigate these relationships between family control of management and internal business process performance of organisations because most previous research focused on Western economics, neglecting the institutional and cultural differences that may influence these associations (Bruton et al., 2003; Miller et al., 2007). It is informative to assess the effects of family control of management on organisational performance in Saudi organisations, mainly because Saudi Arabia offers an interesting laboratory by having a strong familial culture (Weir, 2009; Karam, 2010) and exercising different business practices from those in Western countries (Francesco & Gold, 2005; Bjerke & Al-Meer, 1993). For example, a study by Robertson et al. (2012) reported that American managers have slightly higher perceptions of corporate governance concepts when compared to their Saudi parallels. Also, Saudi managers were found to prefer immediate outcomes rather than long-term outcomes (Idris, 2007). Therefore, the evidence from Western studies cannot be extrapolated to Saudi Arabia.
As explained by Steier (2009) that, organisations in emerging markets and developing economies rely on their family reputation and ties to leverage their capital. The present study expects that internal business process performance in Saudi organisations with family-related CEOs is higher than in organisations with non-family CEOs. This is due to legitimacy concerns over the organisations' identity in the minds of family CEOs, who may feel a greater accountability to shelter their family assets. Increasing the rate of innovations, work efficiency and services after sales is an effective way to overcome the legitimacy challenges. Hence, family CEOs are more likely to concentrate on improving the internal business process than are non-family CEOs. The following research hypothesis is proposed in null form:

**Hypothesis 1c:** The internal business process performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

### 3.2.4 Family Control of Management and Learning and Growth Performance

The literature generally suggests that leveraging the capabilities of employees and information systems increases learning and growth performance of organisations (Kaplan & Norton, 1996). However, the motivations to enhance those capabilities are not well-established for family managed organisations. Some studies found customer satisfaction to be the driver for improving the capabilities of employees in family businesses. Wangenheim *et al.* (2007) for example explained that, because customers who are in direct contact with employees are influenced by the emotional status of employees, customer satisfaction increases when employees are highly satisfied. Increased employee satisfaction enhances organisational citizenship behaviour, so employees who do not have direct customers contact would care about the quality of products and services offered to customers. Wangenheim *et al.*'s analyses of a large German retailer proved that employee satisfaction influences customer satisfaction positively, even for employees who deal indirectly with customers. Also a study by Chi and Gursoy (2009) argued that accommodating employees within excellent working environments increases their satisfaction, enabling them to service customers better. The authors reported a positive and significant relationship between employee satisfaction and customer satisfaction.
Other studies provided another explanation for maintaining the capabilities of employees in family businesses. It is suggested that management of family organisations perceive ‘implicit contracts’ with employees, forming a commitment towards employees’ continuity and stability in the organisations. As a result, management of family organisations, as reported by Astrachan and Allen (2003), choose to stabilise employment levels and resist downsizing. Lee (2006) examined this argument and provided empirical evidence that employment stability in family organisations with family CEOs is higher than in family organisations with non-family CEOs. These results underline the positive role that family CEOs play in maintaining employment stability, even during temporary economic downturns.

In terms of information systems capabilities, previous research emphasises the value of implementing integrated information systems to customer satisfaction. Information systems can enhance the productivity of employees who interact directly with customers (Parasuraman & Grewal, 2000). For example, if a customer finds a sold-out item, an employee with effective information systems can advise the customer which other branches may have the item, when the item will be available, or what other similar items are currently available.

In spite of the above findings, the present study still recognises a need for further investigation because improving the capabilities of employees and information systems has a different value in family organisations, especially in strong familial cultures such as Saudi Arabia (Weir, 2009; Karam, 2010). It is argued that family CEOs may place greater responsibility and dependence on the capabilities of employees and information systems because retaining the family image is their top priority (Gomez-Mejia et al., 2011). Such reliance leads to higher satisfaction and stability of employees as well as to better accuracy and timeliness of information, resulting in an improved learning and growth performance. In strong familial cultures such as Saudi Arabia, organisations with family managers are proposed by Dyer (2006) to have greater human capital than organisations with non-family managers, given that family managers are more motivated and committed towards the continuity and longevity of the business than non-family managers. Yet, Dyer provided no empirical evidence for this proposition. Based on this, the present study proposes to examine the following research hypothesis as stated in null form:
Hypothesis 1d: The learning and growth performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

3.2.5 Family Control of Management and Environmental and Social Performance

The literature generally proposes that, due to the implicit concerns of organisational legitimacy, owners and managers of organisations seek to improve environmental and social performance through promoting the adoption of practices that are friendly to the environment. For family businesses, several studies supported the thesis that family organisations are less likely to be involved in socially damaging activities than are non-family organisations (Berrone et al., 2010; McGuire et al., 2012). Nevertheless, there remains a gap in the current knowledge relating to what motivates family managers to guide their organisations to adopt environmentally and socially harmless practices.

From a legitimacy perspective, a greater sensitivity of the public for the environment can motivate family CEOs not just to meet, but to exceed markets’ expectations regarding the environment. Berrone et al. (2010) compared the environmental performance of family and non-family publicly traded organisations in the United States and found that family-controlled organisations protect their ‘socioemotional wealth’ by having a better environmental performance than their non-family parallels. Similarly, McGuire et al. (2012) analysed social performance in a sample of publicly listed family and non-family organisations in the United States and found that family organisations are less likely to be involved in socially damaging activities than are non-family organisations. An opinion survey of academics directly involved in studying and consulting family sector businesses indicated that family organisations are sufficiently fulfilling their social and environmental responsibilities (Gallo, 2004). They create economic wealth, they care about the environment and they support the educational sector. With respect to family CEOs, Block and Wagner (2010) reported a statistically positive association between having family CEOs and higher levels of corporate social responsibility in organisations.
Chapter 3: Hypotheses development

As discussed above, the legitimacy view implies that organisations have a social contract with the society they operate in, and consequently are concerned about the interests of that society (Gray et al., 1995). Reporting the environmental and social commitment to the public is intended to help avoid any potential sanctions upon organisations, such as boycotting their products or services (Deegan, 2002). However, this view may not be applicable to the Saudi business environment. This is due to the nature of the environment in Saudi Arabia, as the majority of Saudi land space is a barren desert. Such a lack of biodiversity around Saudis may decrease the sensitivity of the public for the environment. The findings of Mirghani et al. (2003) and Naser and Nuseibeh (2003) showed that there is low awareness of environmental and social accountability in Saudi Arabia.

Further, the present study argues that the perceived importance of environmental and social matters for family-managed organisations is driven by nationalistic and religious considerations. Kamla (2007) included in her examination of Middle Eastern organisations twelve annual reports of the largest Saudi organisations and found that CSR disclosure in those organisations was similar to the reporting practice in Western countries. Kamla, however, noted that the content themes in the environmental and social disclosures in those organisations appear to emphasise nationalistic and religious considerations that would not usually be evident in Western annual reports. Many reports included verses from the Holy Quran (the holy book of Islam) or statements of appreciation to the rulers of the country and the citizens. This supports the view that the sensitivity of the public toward nationalistic and religious issues motivates better environmental and social performance. If organisations operate in one country with one religion, then managers of those organisations would have comparable incentives toward environmental and social performance. Contrary to the legitimacy view which associates higher levels of corporate social responsibility with the family control of organisations (Deegan, 2002; Block & Wagner, 2010), the present study expects no significant differences in environmental and social performance between organisations with family managers and those with non-family managers as they both operate in Saudi Arabia where the entire population are Muslims.
Hypothesis 1: The environmental and social performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

3.3.6 Family Control of Management and the Use of AIS

The present study presumes that family control of management has an adverse influence on the managerial use of AIS information. This is because senior/middle managers working in organisations with family CEOs are likely to be relatively less involved in the decision-making process than their counterparts in organisations with non-family CEOs. In organisations with family CEOs, the process of decision-making by senior managers is limited to the needs and views of the CEO who runs and owns the organisation (Barth et al., 2005). Less managerial use of AIS information is expected to be found in those organisations with family CEOs because owner-managers have a strong preference for centralised decision-making (Cruz et al., 2011) which dilutes senior managers’ utilisation of AIS information. However, an extensive review of AIS literature suggests that, to date, no study has investigated the effects of family control of management on the managerial use of AIS information.

A review of the management literature showed that, contrary to their non-family parallels, family CEOs tend to centralise decision-making processes (Cruz et al., 2011). The authors explained that employee involvement in family-controlled organisations is perceived as a threat to the culture of the family business as it has the potential to challenge the way an organisation is run by a family CEO. Poza et al. (1997) reported that, while family CEOs express positive views about consultation, senior managers are significantly pessimistic about these practices. While non-family managers support effective processes for joint decision-making, family CEOs fear a loss of power in their organisations. A recent study by Lutz and Schraml (2012) found that owners of family organisations are reluctant to hire senior managers from outside the family because those non-family members will influence the owners’ independence and control over important decisions.

Furthermore, Fiegener et al. (2000), Setia-Atmaja et al. (2009) and Bammens et al. (2011) reported that sharing decision-making power with non-family employees was not welcomed by family managers due to concerns about losing authority in their
organisations. Family owner-managers are thus portrayed striving to secure their control over the decision-making process which, as a consequence, reduces the usage of information by the senior managers; less involvement in decision-making relates to less usage of information. Notwithstanding the potential importance of AIS information in today's business organisations, Salvato and Moores's (2010) review of twenty-year research on accounting in family organisations as well as the literature review of the current study found no research to date on the impacts of family control of management on the use of AIS information. Further research is needed to investigate these impacts.

Based on the previous discussions, the present study argues that centralisation of decision making by family CEOs negatively affects senior managers' perceptions about their involvement in decision-making which, in turn, erodes their utilisation of AIS information. In other words, as the family CEO is a controlling family member of the organisations, significantly less managerial use of AIS information is predicted because managers' use of AIS information in organisations with family CEOs depends on the views of the CEO who runs and owns the organisation. In order to test this proposition, the following research hypothesis is stated in null form:

**Hypothesis 2:** Managers' use of AIS information in an organisation with a family CEO does not differ significantly from that in an organisation with a non-family CEO.

### 3.3 The Quality of AIS and the Use of AIS

In the information systems literature, the concept of 'quality' is an 'ill-defined' area as it has not been well identified (Nelson et al., 2005). However, in general, the quality of information systems has been investigated from two perspectives: operation and user. In the operation perspective, quality is related to system design features, whereas in the user perspective, quality is related to user-perceived quality measures (Ding & Starub, 2008). DeLone and McLean (1992) defined the quality of an information system as the key indicator for its effectiveness. They examined around 180 research articles and classified quality dimensions into two categories, information-related and system-related (Appendix B).
In the AIS literature, Chenhall and Morris (1986) defined MAS design in terms of four characteristics of information: aggregation, integration, timeliness and scope. The ‘aggregation’ of information refers to the diversity of MAS information that covers different management areas. 'Integration’ refers to the coordination of the different divisions within the organisation. ‘Timeliness’ refers to the provision of information on request. The ‘scope’ of MAS information refers to the focus, quantification, and time horizon of information provided. In line with this, the present study considers that, with the development of sophisticated information systems, it is essential to define the quality of AIS as a multidimensional construct that combines both system- and information-related dimensions, as implied by Chenhall and Morris. Table 3.2 presents the quality dimensions of AIS used in this study and explains their meanings.

<table>
<thead>
<tr>
<th>Quality Dimensions</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Aggregation</td>
<td>The ability of AIS to provide diversity information covering different management areas</td>
</tr>
<tr>
<td>Integration</td>
<td>The ability of AIS to share and transfer information from and to different functional units</td>
</tr>
<tr>
<td>Response time</td>
<td>The ability of AIS to provide necessary and diverse information on request</td>
</tr>
<tr>
<td>Scope</td>
<td>The ability of AIS to provide focused, quantitative and timed information</td>
</tr>
</tbody>
</table>

Table 3.2: Quality Dimensions of AIS

These dimensions are chosen because they have been well established in the AIS literature since Chenhall and Morris (1986) suggested them for examining MAS design and its relationship with contextual variables (Abernethy & Guthrie, 1994; Mia & Chenhall, 1994; Gul & Chin, 1994; Chong, 1996; Chong & Chong, 1997). For instance, Chung et al. (2003) utilised these dimensions to investigate the fit between AIS design and contingency variables such as decentralisation. The findings showed that, in highly decentralised organisations, broad-scope, timely and aggregated AIS information has positive and statistically significant impacts on user satisfaction. However, in their study the effects on organisational performance were neglected, because the outcome variable in the research model was user-satisfaction only.
Another study, by Ismail and King (2005), assessed managers’ perceptions on whether the design of AIS is linked to organisational performance. The quality dimensions as implied by Chenhall and Morris were used in that study to represent AIS design with two purposes: the first to measure AIS requirements and the second to measure AIS capacity. The results showed that a high alignment of AIS requirements and capacity is positively associated with organisational performance in terms of long-term profitability, availability of financial resources, sales growth, and image and client loyalty. Nevertheless, Ismail and King’s (2005) study is criticised, not only because the authors ignored the role of AIS usage in the research but also because they restricted their study to the manufacturing sector only.

Furthermore, Boulianne (2007) used Chenhall and Morris’ characteristics to investigate the relationship between AIS scope, strategic choice, and business-unit performance. The results showed that a fit between the AIS scope and strategy type is significantly associated with higher performance. However, Boulianne’s results are limited because business-unit performance was measured by only three financial indicators: return on assets, net profit margin, and revenue growth; non-financial performance was not examined. Also, other quality dimensions of AIS such as aggregation, response time and integration were not included in Boulianne’s study.

The relevant research agrees that the quality of information systems is significantly associated with the managers’ use of these systems. This is because managers in organisations are obligated to make various decisions on a daily basis. Excellent decisions making requires both good inputs (unprocessed data) and good processing of data into information (Turban et al., 2001). It is considered that a quality AIS will have a good input and processing capacity (Considine et al., 2010). Managers, the decisions-makers, would rely heavily on quality information systems (Keren & Bruin, 2003). More specifically, it is argued that the quality dimensions of AIS presented in Table 3.2 are associated with managers’ use of AIS in four ways.

Firstly, Brown et al. (2005) asserted that the capability of coordinating different divisions within the organisation is an important requirement for quality AIS, in order to aggregate information varying from unprocessed data to information that covers different responsibility centres or functional units. Thus, aggregation of AIS
information provides managers with a deeper understanding of their organisations and enhances their use of AIS (Chang et al., 2003).

Secondly, Boulianane (2007) emphasised that managers increase their use of broad-scope AIS information because it provides them with broader views by including external, non-financial, and future-oriented information. Thirdly, the AIS response time is a vital determinant of the manager’s use of AIS: quick response by the system satisfies the users and motivates them to use it more often (Au et al., 2002). Fourthly, integrating different data from different sources enriches AIS information and improves users’ decision making, which, in turn, enhances their usage of AIS (Brown et al., 2005). For these reasons, the present study argues that the quality of AIS, incorporating the four dimensions (integration, aggregation, response time and scope), is positively associated with the managers’ use of AIS. The following hypothesis summarises the discussion:

**Hypothesis 3**: There is a positive relationship between the quality of AIS and managers’ use of AIS information.

### 3.4 The Use of AIS and SOP

The current study argues that a direct link between the quality of AIS and organisational performance does not exist. This is because high quality AIS is worthless if it is not used. Researchers generally agree that managers’ utilisation of information system is a key variable in measuring the success of the systems (Burton-Jones & Gallivan, 2007). It would therefore be illogical to conclude that just having high quality AIS guarantees its success: it must be used. AIS is used when managers utilise its outputs in decision making (Moscove & Simkin, 1990).

The present study defines the use of AIS as the extent to which managers utilise AIS provided information for their decision making. It is hypothesised that incremental use of AIS information is positively associated with improved SOP. This is because greater use of AIS increases the availability of information that helps managers to better understand the decision matter at hand, enabling them to make accurate decisions (O’Donnell & David, 2000; Vaassen, 2002).
Results of several studies suggested that the use of AIS information can support management decision-making (Abernethy & Bouwens, 2005), producing better resource allocation and superior organisational performance (Baines & Langfield-Smith, 2003). Also the use of AIS information can support the business strategy and develop controls to monitor the implementation of these strategies (O'Connor & Cheung, 2007), resulting in higher performance for organisations (Mahama, 2006). An example of AIS information is customer focused information on which recent studies such as Al-Mawali et al. (2012) and McManus (2012) have reported supporting evidence that greater usage of customer accounting and marketing information significantly lead to improved organisational performance.

The current study also conceptualises SOP following the sustainability balanced scorecard (SBSC) framework to evaluate performance with both financial and nonfinancial measures (Kaplan & Norton, 1992). This SBSC framework paves the way for examining SOP from five important perspectives: financial, customer, internal business process, learning and growth, and environmental and social. The following sub-sections discuss the hypothesised relationships between each perspective and the managerial use of AIS information.

3.4.1 The Use of AIS and Financial Performance
The present study proposes that managerial use of AIS information is positively associated with the financial performance of organisations. Incremental use of AIS information improves the managers’ awareness of external factors, such as customers and rivals, enabling them to make appropriate decisions, and subsequently helping their organisations to improve profits. In addition, managers may require more AIS information to be informed about any internal factors of the organisational processes. If there are difficulties in a given process, the managers have to be capable of resolving these difficulties in a cost-efficient manner. For example, through the use of AIS information, managers can proactively detect production areas where improvements can be made, avoiding faulty products and decreasing their wastage. These improvements can further cut down the overall cost of sales. Along with increasing sales, the end consequence for the organisations is higher profits.
Managers' awareness of external elements related to customers and rivals can be improved by the use of AIS information. For instance, AIS information that includes information on market surveys can be utilised by managers to identify the current trends in the markets and their future directions (Inglis, 2008). Also, managers can employ an AIS that shows externally oriented information to study their competitive positions and to conduct strengths and weaknesses analyses of their competitors. Such utilisation of AIS information is likely to facilitate managers in making accurate decisions related to those external elements (Pelham, 1997).

Previous research has reported that an improved recognition of current and future needs of markets can help managers in creating the right products and providing the most suitable services (Ge & Ding, 2005; Inglis, 2008). As such, customers' needs are more likely to be fulfilled, encouraging them to keep buying from the organisation (Pelham, 1997); this in turn will increase sales volume and profits. Also, managers can face competitive challenges more effectively as implied by Hult and Ketchen (2001) and Dawes (2000) that products of an organisation become more satisfactory than those of its competitors when managers of the organisation utilise AIS information to conduct strategic analyses of their rivals to identify weaknesses of existing products and opportunities to improve or create new products.

Several studies in marketing literature have reported positive associations between the identification of competitive positions (including strength and weakness analyses) and financial performance of organisations. Noble et al. (2002) reported that an understanding of the strengths, weaknesses and strategies of competitors is significantly associated with superior profit performance of organisations. A review by Cano et al. (2004) also displayed supporting evidence that assert the positivity and constancy of the previous relationship.

Another reason to increase their use of AIS information is that managers seek to identify any problems in a proactive manner to avoid extra costs. Information on manufacturing defects, for example, will immediately draw the attention of managers to the problem, eliminating the production of faulty items (Lukka & Granlund, 1996). As the number of defective products decreases, production costs decline, resulting in greater profits for the organisations. Mia (2000) found that organisations working
under just-in-time environments utilising more MAS information are more likely to enjoy higher profitability. This is in line with the results of Baines and Langfield-Smith’s (2003) study reporting that more reliance on accounting information is positively associated with the financial dimension of performance.

Therefore, it is argued that managers are able to better understand current and future needs of customers through more use of AIS information. Whether this information is financial (product sales) or non-financial (customer surveys), managers can effectively fulfil customers’ needs by designing new products that match their expectations (Mia & Clarke, 1999). Satisfied customers are more likely to continue purchasing the products, which will yield greater profits for the organisations (Ge & Ding, 2005). Financial performance as defined by Kaplan and Norton (1996) is about how well organisations accomplish the planned financial objectives. It relates to improvement of profitability, increase of revenue and return on assets. Under this perspective, indicators such as sales growth, operating income and return on investment are used to assess financial performance of organisations (Hoque & James, 2000). Based on this discussion, the following hypothesis is formulated:

**Hypothesis 4a:** The more managers use AIS information, the greater is the financial performance of their organisations.

### 3.4.2 The Use of AIS and Customer Performance

The present study expects that the managerial use of AIS information is positively correlated with organisations’ customer performance because the use of AIS information can assist in meeting the needs and expectations of markets. That is, managers become capable in making effective decisions with regard to creating the right products and providing suitable services to customers (Mia & Clark, 1999). These products and services satisfy current customers, strengthen customers’ loyalty towards the organisation, and enlarge its market share. Since customers’ satisfaction and market share are core measures of customer performance as defined by Kaplan and Norton (1996), it is forecast that an increased use of AIS information by managers will lead to an improved customer performance of organisations.
The use of AIS information by managers is essential for understanding the expectations and requirements of markets. For instance, Inglis (2008) explained that using AIS which provides externally oriented information is imperative to better manage the customers’ relationships. An increased use of AIS information that includes figures of market surveys helps to identify new trends in the markets and their directions. For example, in the media industry, when newspapers post electronic versions of their papers on the internet, readers may no longer seek printed copies due to affordability and flexibility considerations as most e-copies are freely available and accessible. Such externally oriented information may cause major shifts in customers’ preferences and, if not observed by managers, can lead to severe consequences on the market share of their organisations.

Essentially, customer-related performance concerns how well organisation meeting their customers’ needs. It reflects the customers’ perceptions and opinions towards organisations. Within this perspective, information about customer satisfaction and market share are the main measurements of customer performance of organisations (Kaplan & Norton, 1996). Customer satisfaction reflects the observed value that customers can have in terms of quality, services and time, whereas market share illustrates the ‘bottom-line’ of customer performance. When organisations offer high-quality and on-time responses to customers’ inquires, the customers are more likely to become satisfied. Fully satisfied customers are more likely to return and repurchase, resulting in a larger share of organisations in the market (Kaplan & Norton, 1996). The present study, therefore, argues that increased managerial use of AIS is associated with improved customer performance of the organisations. The following hypothesis is accordingly formulated:

**Hypothesis 4b**: The more managers use AIS information, the greater is the customer performance of their organisations.

### 3.4.3 The Use of AIS and Internal Business Process Performance

The present study posits that managerial use of AIS information is positively correlated with the internal business process performance of organisations. The reason is that an increased use of AIS information enables managers to recognise the efficiency of the internal process. The internal business process as clarified by Kaplan
and Norton (1996) is divided into three parts: (1) the innovation process relating to the development of new products and services, (2) the operations process relating to the manufacture of products and delivery of services, and (3) the post-sales process relating to warranty and repair services after acquisition.

In order to recognise the efficiency of the internal business process, managers need to assess each part of the process in different manners. Firstly, managers can evaluate the innovation related processes by planning marketing campaigns for newly developed products or services that have specific sales milestones (Jimenez-Zarco et al., 2006). Secondly, managers can measure the operations related processes by laying quantitative standards for failure rate and producing time duration (Mia, 2000). Thirdly, managers can assess post-sales related processes by establishing several scales for the number of claims raised, the number of returned items and the required time to fix them (Saccani et al., 2006; Gaiardelli et al., 2007). These examples show the value of having AIS information available for managers to plan for improvements in the internal business process.

Furthermore, managers can evaluate the actual performance against the preset objectives. If the actual performance varies negatively from the objectives, possible problems related to the internal process are flagged. Managers can investigate such problems and make urgent decisions to improve the process, so that in future actual performance meets the objectives. It is also suggested that managers need to use both financial and qualitative measures in order to achieve effectively innovative process (Hertenstein & Platt, 2000). The use of MAS information provides evaluation of both planned and actual performance to enhance the competence of the internal business process performance of organisations (Hoque, 2003).

Additionally, there are other managerial techniques that can clarify the role of AIS information. The first one is activity-based costing/management, which identifies and help allocation of costs of each production activity to cost centres in order to manage the cost of products (Armstrong, 2006). This process can generate more accurate cost information (environmental, social and economical) that supports managerial decision making as well as external reporting. Benchmarking is another practice that involves identification of industry best practices, leading to excellence in performance (Hoque,
2003). It assesses management trends towards sustainability parameters and measures its progress. The third example is product lifecycle cost analysis, which endeavours to calculate the total cost of a product throughout its entire lifecycle. This practice enables managers to decide when and how to stop producing a particular product (Dunk, 2004). All these practices require an effective AIS for gathering and providing information. The contribution of AIS information is emphasised here because the greater the managerial use is, the better such practices are performed, and the better is the internal business process performance generated.

Overall, internal business process performance is about how well the organisations perform their processes. The number of innovations, the efficiency of using material, the percentage of defects and the competence of post-sales services are different examples of internal business process performance measures (Kaplan & Norton, 1996). To increase this type of performance, managers need to supervise and evaluate the innovation processes, operations processes and post-sales related processes. AIS information can provide insights into these processes, assisting managers to enhance the performance of the internal business process of their organisations. Based on this, the present study argues that an increased managerial use of AIS is associated with improved internal business process performance of organisations. Accordingly, the following hypothesis is formulated:

**Hypothesis 4c**: The more managers use AIS information, the greater is the internal business process performance of their organisations.

### 3.4.4 The Use of AIS and Learning and Growth Performance

The present study posits that managerial use of AIS information is positively correlated with learning and growth performance of organisations. This is because an increased use of AIS information facilitates better monitoring of critical factors of employees and information systems resources. Employee satisfaction and information systems efficiency are then further attained. For illustration, AIS information such as ratios of sales growth may enable managers to establish incentive systems that fairly reward hard-working employees, leading to higher employees' job satisfaction. Viewed differently, higher employee satisfaction is caused by fair rewards on their performance (Sun et al., 2012), which can be supported by an increased use of AIS.
information (Chenhall, 2006). This example shows a link between AIS information and the learning and growth performance because employee satisfaction is a driver of that type organisational performance (Kaplan & Norton, 1996).

In regard to employees’ performance, managers can utilise financial and non-financial information of AIS to assess how well employees achieve their targets. For instance, managers may use financial measures such as sales volume to assess the performance of employees in the sales department. In the maintenance department, managers may use non-financial measures such as frequency of errors, punctuality and repair timeliness to assess the performance of employees. Reliance on financial and non-financial measures nourishes managers’ enhanced understanding of employees’ capabilities and performance (Chenhall, 2006). When managers become fully conscious of their employees potential, they are more likely to design proper reward systems. In turn, incentives that fairly and comprehensively reflect an employee’s actual performance have significantly positive effects on the satisfaction of the employee (Sun et al., 2012).

In terms of information systems, managers—especially for executives who have the day-to-day responsibilities of managing and making decisions across the organisation—require an information system that enables them to perform their tasks successfully (O’Dell & Leavitt, 2004). These responsibilities rely on comprehensive and diverse information; their success depends significantly on the quality of the information. An efficient AIS that provides accurate and timely information enables managers to take the right actions and make appropriate decisions (Xu, 2003). For example, scattered details of sales transactions all over the year may be of limited benefit to sales managers because the numbers are neither updated nor explicable. However, if an AIS that gathers data relevant to the matter under analysis and summarises such details on a monthly or weekly basis, the provided information becomes more useful and meaningful for managers, ensuring the quality of their decisions. For this purpose, managers are highly motivated to implement advanced information systems that integrate data from different organisational divisions to assist them in making decisions (Naranjo-Gil & Hartmann, 2006).
All in all, it is expected that managers are able to evaluate employee performance in order to enhance learning and growth performance of organisations through the use of AIS information. This is because managers need to design suitable rewarding systems for their employees. Measures of employee performance, such as customer servicing time and sales volume for salespersons, heavily rely on information provided by MAS (Mia, 1993). In turn, appropriate rewards to employees are more likely to increase their performance and their satisfaction (Arthur, 1994). In addition, managers are expected to seek higher efficiency levels of information systems due to their roles in the decision-making process (O’Donnell & David, 2000). It is essential to mention that employee performance and satisfaction, as well as information systems efficiency, are central indicators of learning and growth performance of organisations (Kaplan & Norton, 1996). The present study argues that an increased managerial use of AIS is associated with improved learning and growth performance of organisations. Accordingly, the following hypothesis is formulated:

**Hypothesis 4d:** The more managers use AIS information, the greater is the learning and growth performance of their organisations.

### 3.4.5 The Use of AIS and Environmental and Social Performance

The present study anticipates that managerial use of AIS information is positively correlated with the environmental and social performance of organisations. This is because an increased use of AIS information supports the adoption and execution of initiatives that are friendly to the natural environment and society. Nowadays managers face increasing demands to meet environmental and societal legitimacies over the organisations’ operations. A failure in accommodating these legitimacies may result in negative consequences on the organisations, such as customer boycotts of products or services (Ruf et al., 2001). As a result, organisations need to perform in environmentally and socially responsible manner. AIS information can help with such attempts by, for example, showing environmental cost data of production to clarify the non-financial records of carbon emissions (Albelda, 2011). Based on these figures, managers may realise the problems of current processes and so may implement other processes that produce fewer emissions.
Failure to accommodate initiatives that are friendly to the natural environment and society may result in negative consequences on the organisations. With respect to customers, it has been reported that factors relating to corporate social responsibly are significant drivers of customers’ perception of organisations. A study by Dean (2004) found significant effects of social donation on customers’ view of the organisations, concluding that “charitable donation is a way for firms to demonstrate that they are committed to issues that resonate with their customers. The practice may help the company forge a relationship with the customer and build loyalty, and this has been shown to have a substantial positive effect on profits” (p.101). It also has been reported that customers in France and Germany appear to actively support eco-social businesses practices because they are more likely to consider corporate social responsibility as an important purchasing criteria (Maignan, 2001).

Furthermore, managers are able to identify the costs and profits of eco-social initiatives through an increased use of AIS information. For example, in order to control waste disposal fees for environmental protection and treatment facilities, managers need to measure expenses related to these activities. The environmental management accounting system (EMAS), a subsystem of AIS, assists the managers by tracing all environmental and material efficiency loss expenditure (Jasch, 2003). Also, in managing social initiatives there is a social accounting information system (SAIS) designed by Burke (1984), aiming to facilitate decision making by capturing the direct cost of social issues. All these subsystems of AIS can provide important information, leading to better management of environmental and social aspects of performance (Mathews, 1997).

Overall, recent studies highlight the importance of environmental and social perspective to the organisational performance as it takes all environmental and social issues into consideration (Al-khater & Naser, 2003; Maignan & Ferrel, 2004; Perrini & Tencati, 2006; Ferreira et al., 2010; Gadenne et al., 2012). This process requires a reconsideration of strategies, targets, and measurements, as well as a new type of data regarding organisational activities (Figge et al., 2002; Epstein & Wisner, 2001; Moller & Schaltegger, 2005; Schaltegger & Wagner, 2006). In terms of measurements, the sum of environmental savings, the number of green products/services, the volume of community support, and the size of charity payments
are all important indictors of environmental and social performance (Figge et al., 2001). To successfully adopt and execute such initiatives, managers need to be environmentally and socially informed (Brown et al., 2005). Through an increased use of AIS information, managers can gain deep insights into each activity of their organisations (Considine et al., 2010). The present study, therefore, argues that an increased managerial use of AIS is positively associated with improved environmental and social performance of organisations. Accordingly, the following hypothesis is formulated:

**Hypothesis 4e:** The more managers use AIS information, the greater is the environmental and social performance of their organisations.

### 3.5 The Impact of Industry Dynamism

Based on Miller’s (1992) classification of unpredictable variables influencing organisational performance, the present study defines industry dynamism as the degree of turbulence (stability/instability) that varies from one industry to another, due to the differences in market competition and technological change in the respective industries’ environments. The present study uses a contingency theoretic argument that industry dynamism affects the managerial use of AIS information and SOP in a positive way. That is, industry dynamism is more likely to encourage organisations enhancing their productivity and efficiency, resulting in improved performance (Wang & Li, 2008).

The present study conceptualises SOP using the sustainability balanced scorecard (SBSC) framework to evaluate performance with both financial and nonfinancial measures (Kaplan & Norton, 1996). This SBSC framework paves the way for examining SOP from five important perspectives: financial, customer, internal business process, learning and growth, and environmental and social. The following sections discuss the hypothesised relationships between each perspective and industry dynamism.
3.5.1 Industry Dynamism and Financial Performance

It is argued that industry dynamism (represented by market competition and technological change) positively influences the financial performance of organisations by creating more motivation for performance improvement. Market competition can be beneficial for organisations when they improve their operations process to cope with the competition. One example is from the Saudi telecommunication industry. The Saudi Telecom Company, established in 1998, has reported its largest operating profits in 2010, six years after the first competitor was allowed to enter the industry in 2004 (Alriyadh Newspaper, 2010).

The concept of open and competitive industry has been promoted as a favourable situation for the welfare of customers and organisations. This is because in competitive industries, the value of products and services, compared with their prices, becomes very reasonable, resulting in increased satisfaction of customers. In turn, satisfied customers are likely not only to continue to purchase but also to spread a reputation about the excellence of the organisations, tempting new customers to buy (Carmeli & Tishler, 2005). The final consequence is more revenue for these competitive organisations. Also, the cost of sales is prone to decrease in competitive industries due to the race between suppliers, who are offering organisations new materials in lower prices or larger volumes.

In addition, changes in the technology of production or services influence the financial performance of organisations. Henderson and Clark (1990) explained that technological change can lead to either negative or positive effects on performance. High technological change can be a disadvantage if organisations are incapable of coping with it, because the required current capabilities of organisations are rendered obsolete (Christensen & Rosenbloom, 1995; Eisenhardt & Martin, 2000). Rapid changes in technology occur in highly dynamic industries, threatening that organisations failing to maintain the pace of technological progress will experience severe market disadvantage (Link & Siegel, 2003). Thus, technological change can be beneficial only when such organisations take advantage of it.
Taking advantage of changes in the technology of production allows organisations to better meet the customers' expectations, even exceeding those goals and surprising the markets. When Apple company introduces its first smartphone in early 2007, Apple share price exceeded $100 due to a record profit of $770 million in the second quarter of 2007 (Apple, 2007). This example illustrates that changes in technology of production lines (from computers to portable digital devices, in the Apple example) open new markets for organisations and may yield superior profits.

The present study argues that industry dynamism, represented by market competition and technological change, has positive effects on the financial performance of organisations. This is because organisations in developing economies usually take advantage of their industry dynamism. In Bangchokdee et al. (2011) reported that organisations, in Thailand, a developing country, react effectively to industry-level uncertainty/dynamism by applying appropriate strategies to improve their customer satisfaction and market shares. Saudi organisations are also operating in a growing economy in which their financial performance is predicted to have a positive association with industry dynamism, resulting from an improvement in production, an increase of sales and a reduction in cost of sales. In order to test this prediction, the following hypothesis is formulated:

**Hypothesis 5a:** The more dynamic an industry is, the greater is the financial performance of an organisation within the industry.

### 3.5.2 Industry Dynamism and Customer Performance

The present study proposes that industry dynamism (represented by market competition and technological change) positively influences customer performance by placing greater emphases on the quality and competiveness of products and services provided by organisations. In quality management literature, ‘quality’ refers to the extent to which a product or service meets customers’ needs and expectations (Goetsch & Davis, 2006). Within intensively competitive industries (highly dynamic), customers have many choices, encouraging organisations to progressively seek to meet customers’ needs. Success in reaching customer expectations makes the perceived quality more satisfactory (Edvardsson, 1998).
While customer satisfaction is an important lag indicator of customer performance, underlying drivers of this satisfaction are also of great importance. This differentiation is essential for knowing where to pay the right attention and what to improve (Kaplan & Norton, 1996). In dynamic industries, customers' preferences change rapidly, creating more motivations for organisations to fill in gaps in the markets: New preferences by customers mean new opportunities for organisations. The benefit for being in dynamic industries is referred to as the 'competitive advantage of competition' (Porter, 2004). It implies that the marketplace position of organisational competitive advantage can determine the superior performance of organisations.

According to Porter (1998) there are two basic types of competitive advantages: cost advantage and differentiation advantage. Cost advantages can be accomplished by lowering the costs of production, while differentiation advantages can be attained by meeting customers' needs better than competitors do. Based on this, three generic strategies to gain greater performance in markets are identified: cost leadership, differentiation, and focus strategies (Porter, 2004). The bottom line is that organisations in dynamic industries can achieve superior customer performance through the adoption of competitive strategies (Kumar & Subramanian, 1997/1998). This suggestion is empirically supported by several studies.

For instance, Bangchokdee et al. (2011) hypothesised that organisations adopting more differentiation strategies are likely to obtain higher customer-related performance for two reasons. Firstly, the quality of products provided by differentiators helps in meeting customers' expectation, which in turn improves the satisfaction of those customers. Secondly, satisfied customers expand the market share of organisations, as those customers maintain their loyalty with the products and services of differentiators. The findings offered empirical support for this proposition, as the positive association between competitive strategy and customer performance was found significant.
In contrast, Hoque (2004) reported an insignificant relationship between non-financial performance and uncertainty/dynamism at industry level. Hoque justified these results in terms of two limitations. Firstly, uncertainty/dynamism is assessed by Gordon and Naryanan’s (1984) and Govindarajan’s (1984) instrument, which may not catch new features of dynamism. Secondly, non-financial performance of organisations, including customer-related indictors, is measured by a self-assessment method, which may produce bias in the assessed performance.

The present study, however, suspects that the instrument and measuring method are the main reasons for the insignificant results in Hoque’s (2004) study. This is because the results of validity and reliability testing of dynamism instrument are widely supported in the literature, paralleling the pre-testing results in Hoque’s (2004) study. Also, while the self-assessment method of organisational performance is found reliable and valid (Richard et al., 2009), combining 12 different indicators into a single measure of performance is rather problematic: non-financial performance in Hoque’s (2004) study included theoretically unlinked measures such as market share and workplace relations.

Overall, the role of industry dynamism, as theorised in the present study, is to trigger organisations’ attempts to adopt quality and competitive strategies that are found significantly associated with improved customer performance. When technological change in the industry is rapid, keeping up with and obtaining new technologies allows organisations to enjoy a higher competitive position and, hence, to receive better customer performance. Similarly, when market competition is intense, then quality production and servicing lead to higher customer satisfaction, ultimately improving customer performance of organisations. In order to test this prediction, the following hypothesis is formulated:

**Hypothesis 5b:** The more dynamic an industry is, the greater is the customer performance of an organisation within that industry.

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5 Hoque (2004) defined uncertainty as “a firm’s unability to predict accurately the effects of various aspects of its external environment such as customers, suppliers, deregulation and globalization, technological processes, competitors, government regulations/policies, economic environment, and industrial relations” (p.489).
3.5.3 Industry Dynamism and Internal Business Process Performance

The present study points out that industry dynamism (represented by market competition and technological change) positively influences internal business process performance by boosting innovative progression, operational efficiency and post-sales facilities. In line with this, Wang and Li (2008) asserted that industry dynamism encourages organisations to enhance their productivity and efficiency, resulting in improved performance. For example, when market competition becomes intense, organisations have to differentiate their products and services in order to live up to the markets expectation and avoid a decline in their operations. One way is to surprise the markets with creative and quality products that have longer service lives. Increasing the rate of innovations, work efficiency and post-sales services relates to higher internal business process performance (Kaplan & Norton, 1996).

Essentially, it has been noted that organisations in dynamic industries tend to develop new activities and initiatives in order to survive (Sirmon et al., 2007). Markets' needs and preferences change over time, so that new characteristics and specifications of a product or services are demanded by the current customers. Future customers also play an important role, as they represent new markets with different requirements. To address these turbulences, organisations need to focus on their innovation process as a central part of their internal business activities. Kaplan and Norton (1996) affirmed that the velocity of innovations (new products and services) is positively associated with the level of performance of internal business processes.

In addition, organisations working in dynamic industries tend to take advantage of technology developments for operational purposes (Adner, 2002). This is due to the potential that advanced technologies can create in relation to customers’ perceptions. On one hand, new technologies facilitate monitoring the production process, so that the image of organisational excellence is secured. The excellence model, as implied by the European Foundation for Quality Management (EFQM), emphasises that new control programmes can significantly assist in increasing efficiency of operations and reducing low quality products (EFQM, 2004). Organisations that manufacture products or deliver services more efficiently (fewer defective items or less waiting time) are expected to have better performance of internal business processes (Kaplan & Norton, 1996).
On the other hand, advanced technologies can help in managing customers’ perceptions, enabling organisations to design better products or services. In dynamic industries such as the high-tech sector, organisations make products with sophisticated features that are inspired from customers’ reaction to previous products. Advanced technologies allow future modifications and corrective actions to be taken more flexibly. For example, in April 2011, HTC (a Taiwanese manufacturer of telecommunications equipment) introduced a smartphone called ‘Sensation’. This phone, however, received many criticisms for its extraordinarily short battery life. Five months later, HTC announced a similar version called ‘Sensation xe’, but with a much powerful battery. Such a quick response in changing a core part of the product would not be possible in low dynamic industries such as in the manufacturing sector.

Finally, it is argued that industry dynamism may significantly contribute to underline the importance of post-sales facilities. Organisations are found to be in a better competitive position when they are providing comprehensive post-sales services, including warranty, repair and replacement privileges (Gaiardelli et al., 2007). When market competition is high, organisations start to enhance their post-sales offers in order to attract more customers. Therefore, industry dynamism may influence organisations to improve after-sales services, as they are found to be significantly associated with superior internal business process performance. In order to test the predictions in the sub-sections above, the following hypothesis is formulated:

**Hypothesis 5c**: The more dynamic an industry is, the greater is the internal business process performance of an organisation within the industry.

### 3.5.4 Industry Dynamism and Learning and Growth Performance

The present study proposes that industry dynamism (represented by market competition and technological change) positively influences learning and growth performance by increasing the capabilities of employees and information systems. In dynamic industries, rapid changes in customers’ needs and preferences may generate intensive pressure on organisations. To tackle these challenges, organisations need to support their employees in making more informed decisions while doing their jobs. (Sagie & Koslowsky, 2000). More reliance on employees and on information systems capabilities leads to higher satisfaction and productivity of employees as well as to
better accuracy and timeliness of information. These in turn produce better learning and growth performance, as suggested by Kaplan and Norton (1996).

Industry dynamism influences employees' capabilities through direct impacts on employees' involvement in decision making and in other human resources practices. Datta et al. (2005) argued that organisations should consider the industry's characteristics when conducting human resource practices to improve employees' performance. This is due to the highly dynamic markets in the present time. For example, when employees are involved in the process of making decisions regarding their jobs, they become more comfortable doing their tasks and they perform better. Increasing the employee involvement is further significant in dynamic industries, where employees experience rapid changes in customers' needs more closely than do top management (Jackson & Schuler, 1995).

Moreover, the effects of industry dynamism in human resource management policies have been highlighted throughout the relevant literature. It is posited that a match between those policies and the contextual conditions is a significant source of competitive advantages. As explained by Wright and Snell (1999), in a dynamic and unpredictable industry, "organisations might achieve this by using organic HR systems that promote the development of a human capital pool possessing a broad range of skills and that are able to engage in a wide variety of behavior" (p.758). The use of multi-source feedback, the use of participative mechanisms, and the use of information sharing are all examples of skills and practices that are found to correlate with employees' satisfaction and productivity (Wagner 1994; Datta et al. 2005).

Industry dynamism also influences information systems capabilities through increasing the demand of accurate and timely information. In dynamic industries, organisations' managers face high dynamic situations that require more information to deal with the complexity of these circumstances. Gul and Chia (1994) noted that when the dynamism is high, managers are not able to gain precise insights about the industry using traditionally common MAS: therefore, more sophisticated MAS providing broad scope and aggregative information is required. These authors, however, emphasised that such systems may cause a problem of information overload to managers, yielding sub-optimal predictions about the industry. Also, out-dated
information may cause managers to respond belatedly to markets' changes. Thus, to
deal with these problems, organisations operating in highly dynamic industries need
to improve their information systems' capabilities to provide managers with accurate
and timely information.

Essentially, learning and growth performance is about how well the organisations
utilise the capabilities of employees and information systems. In terms of employees,
satisfaction and productivity can be used as indicators of employees' capability. For
information systems, the capacity to provide accurate and timely information for users
is an indicator of the information systems' capability (Kaplan & Norton, 1996). The
present study expects that, in highly dynamic industries, organisations that have
effective employees and information systems (through higher levels of employees' satisfaction and productivity as well as more provision of accurate and timely information) are likely to have better performance from a learning and growth perspective. In order to test this prediction, the following hypothesis is formulated:

**Hypothesis 5d**: The more dynamic an industry is, the greater is of the learning and growth performance of an organisation within the industry.

3.5.5 Industry Dynamism and Environmental and Social Performance

The present study proposes that industry dynamism (represented by market competition and technological change) positively influences environmental and social performance by promoting the adoption of practices that are friendly to the natural environment and society. This is because environmentally and socially responsible behaviour assists organisations to gain a legitimacy that provides them with some protection from unpredictabilities (Figure 16). Goll and Rasheed (2004) provided empirical evidence that industry dynamism moderates the association between discretionary social responsibility and organisational performance. The authors explain that organisations deal with industry dynamism by improving their socially responsible practices in order to establish their compliance with the implicit and explicit expectations of the society.

It has been argued that organisations proactively seek to adopt environmental initiatives as a way to cope with market competition (Benito & Benito, 2006). In
small and medium sized industries, where competition is intense, Hitchens et al. (2003) investigated the motivation that drives European organisations to implement environmentally responsible practices. One motivation found is to the enhancing of organisational competitiveness in the markets. High market competition appears to pressure organisations to find new ways to operate and compete: they are at stake for maintaining current customers and attracting new ones. With the growing public sensitivity towards environmental issues, including carbon emissions and chemical wastes, organisations may attempt to be associated with certain methods of operations and practices that have a strong perception of environmental harmlessness (Etzion, 2007). Also, technological changes in the industry may allow improvements in the environmental and social performance of organisations (Gonzalez, 2005).

On one hand, rapid technological change offers organisations the advantage of constantly communicating with the community. This benefits organisations through monitoring the topical issues revolving around the society and, subsequently, taking proper actions regarding them (Barrows & Neely, 2011). Organisations also benefit from technological changes whereby insiders and outsiders can conveniently provide new insights and ideas for the organisations (Eisenhardt & Martin, 2000; Henriques & Sadowsky, 2007). One example of an organisation taking new technological changes into its socially-related advantage is one of the largest entertainment organisations in the world: Walt Disney. In 2004, Disney staffs recognised serious problems in their communication technology, as some divisions were losing business to major rivals. The introduction of new internet technology 'Web 2.0' offered a valuable solution for improving the links between the organisation and its customers in relation to corporate information issues (Creese, 2007). This solution, Web 2.0, is essentially a new generation of technology applications on the web that allows individuals to collaborate and share information (O’Reilly, 2005).

On the other hand, technological change provides organisations with the advantage of eliminating negative effects on the natural environment. When organisations operate in technologically dynamic industries, creating major changes to operational processes is more attainable than in less dynamic industries. Rothenberg and Zyglidopoulos (2007), for example, found that the higher the industry dynamism, the higher the chance that the organisation would implement a number of advanced
technologies to decrease harmful emissions to the environment. It has also been suggested that in dynamic industries, organisations attempt to increase their technological investments to enhance their ability for improving environment related performance (Aragon-Correa & Sharma, 2003; Ettison, 2007,). An investigation by Prakash (2000; 2002) showed that organisations can be capable of managing environmental turbulences, such as the accident of a Union Carbide pesticide plant in India in 1984, by leveraging advanced technological programs. From the discussion in the paragraphs above, it can be argued that both market competition and technological change play significant roles in supporting organisations’ endeavours to espouse particular practices that are friendly to the natural environment and society. Accordingly, the following hypothesis is formulated:

**Hypothesis 5e:** The more dynamic an industry is, the greater is the environmental and social performance of an organisation within the industry.

### 3.5.6 Industry Dynamism and the Use of AIS

The present study posits that industry dynamism (represented by market competition and technological change) has a significant influence on managers’ use of AIS information. When they are faced with highly dynamic situations, managers require so much information to perform their tasks. Chowdhury *et al.* (2011) and Guo (2011) affirmed that one way to reduce the unpredictability surrounding managers is to utilise more information. An increased use of AIS information (or its subsystems) improves managers’ understanding of their job complexity in the work, leading to enhanced managerial performance (Chenhall & Morris, 1986; Chong & Chong, 1997).

In a competitive hotel industry, for example, Patiar and Mia (2008) explained that hotel department managers had to anticipate demands for different products and services, such as guest bedrooms, conferences and restaurants. The use of broad scope MAS information for calculating costs, evaluating previous marketing campaigns, and forecasting customers’ needs and economic circumstances can help hotel managers to determine attractive prices, to focus on particular market divisions, and to employ proper advertising to obtain a larger share of customers. In addition, Mia (1993) reported that an increased use of MAS information can help managers to respond more effectively to the changes in customers’ needs and production technologies.
Benchmarking is an example of how MAS information can be used to help managers compare cost structure, productivity, quality, customer service and profitability of their organisations with those aspects of competing organisations (Mia & Clarke, 1999). It is, however, important to point out that previous research on the relationship between industry dynamism and the managerial use of AIS information is limited for three reasons.

Firstly, the majority of this type of research is conducted only in manufacturing organisations. Studies by Mia (1993), Chenhall and Morris (1986), Chong and Chong (1997), and Mia and Clarke (1999) covered manufacturing industries. In other industries, such as financial industries, it is possible that the effects of industry dynamism on the use of AIS information are different because decision-making needs for financial organisations vary from those of manufacturing organisations. In other words, decision makers in financial organisations may require a different set of AIS information to manage market competition from those needed by their parallels in manufacturing organisations. However, except in the work of Patiar and Mia (2008), the effects of market competition, as a factor of industry dynamism, on the managerial use of AIS in non-manufacturing industries remain unclear.

Secondly, the majority of those previous studies focused on dynamism at only the organisational level that relates to organisations' operating environment such attributes/designs of their products, availability and prices of raw material, and labour union actions (Maurice, 2011), whereas dynamism at industry level relates to the degree of change in technology, changes in customer demand, competitive rivalry and market growth in the industry (Hauschild et al., 2011). Thirdly, previous research focuses mainly on one dimension of AIS information: the broad-scope. Studies by Chong (1998), Chong and Chong (1997), Chong (1996), Linn et al. (2001), and Patiar and Mia (2008) considered the effects of broad-scope MAS information as the only aspect of AIS information.

Few studies, such as that of Lal and Hassel (1998), used the four quality dimensions of AIS information (scope, timeliness, level of aggregation, and information for integration) to investigate the relationship between industry dynamism and MAS information characteristics. The results showed that managers of large organisations
with a high tolerance of ambiguity perceive those dimensions of MAS information to be most beneficial when the industry is dynamic. Yet, Lal and Hassel's study focused on the managers' perception rather than on their use of MAS information: acknowledgment of the importance does not reflect the usage. Also, the authors conducted their study on manufacturing organisations only, which limits the generalisability of the results.

To address these limitations and examine the effects of industry dynamism on the managerial use of AIS incorporating the four dimensions of information, the present study argues that both market competition and technological change have positive and significant effects on managers' use of AIS information. This is because managers in highly dynamic industries deal with more complex and ambiguous business environments. In such circumstances, managers essentially need to improve their understanding in order to perform their tasks successfully. AIS information provides such support, enlightening managers when making decisions. From the discussion above, industry dynamism is expected to be positively correlated with an increased managerial use of AIS information, as following hypothesis is formulated:

**Hypothesis 6:** There is a positive relationship between industry dynamism and the managerial use of AIS information.

### 3.6 Chapter Summary

This chapter has presented a discussion of hypothesised relationships among variables in this study. Based on the theoretical explanations, it is proposed that a higher quality of AIS incorporating four characteristics of information may improve managers' use of AIS information. In relation to family control of management, it is posited that financial, customer, internal business process, learning and growth-related, and environmental and social performance are higher for organisations with family CEOs than those of non-family CEOs. Moreover, it is expected that family CEOs may have negative effects on the managers' use of AIS information. In terms of industry dynamism, positive relationships are anticipated between the five perspectives of organisational performance and managers' use of AIS information. Table 3.3 provides a list of the hypotheses formulated. The following chapter presents the research method that is used in the present study for testing the proposed hypotheses.
<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
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<tbody>
<tr>
<td>H1a</td>
<td>The financial performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
</tr>
<tr>
<td>H1b</td>
<td>The customer performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
</tr>
<tr>
<td>H1c</td>
<td>The internal business process performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
</tr>
<tr>
<td>H1d</td>
<td>The learning and growth performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
</tr>
<tr>
<td>H1e</td>
<td>The environmental and social performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
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<tr>
<td>H2</td>
<td>Managers’ use of AIS information in an organisation with a family CEO does not differ significantly from that in an organisation with a non-family CEO.</td>
</tr>
<tr>
<td>H3</td>
<td>There is a positive relationship between the quality of AIS and managers’ use of AIS information.</td>
</tr>
<tr>
<td>H4a</td>
<td>The more managers use AIS information, the greater is the financial performance of their organisations.</td>
</tr>
<tr>
<td>H4b</td>
<td>The more managers use AIS information, the greater is the customer performance of their organisations.</td>
</tr>
<tr>
<td>H4c</td>
<td>The more managers use AIS information, the greater is the internal business process performance of their organisations.</td>
</tr>
<tr>
<td>H4d</td>
<td>The more managers use AIS information, the greater is the learning and growth performance of their organisations.</td>
</tr>
<tr>
<td>H4e</td>
<td>The more managers use AIS information, the greater is the environmental and social performance of their organisations.</td>
</tr>
<tr>
<td>H5a</td>
<td>The more dynamic an industry is, the greater is the financial performance of an organisation within the industry.</td>
</tr>
<tr>
<td>H5b</td>
<td>The more dynamic an industry is, the greater is the customer performance of an organisation within that industry.</td>
</tr>
<tr>
<td>H5c</td>
<td>The more dynamic an industry is, the greater is the internal business process performance of an organisation within the industry.</td>
</tr>
<tr>
<td>H5d</td>
<td>The more dynamic an industry is, the greater is of the learning and growth performance of an organisation within the industry.</td>
</tr>
<tr>
<td>H5e</td>
<td>The more dynamic an industry is, the greater is the environmental and social performance of an organisation within the industry.</td>
</tr>
<tr>
<td>H6</td>
<td>There is a positive relationship between industry dynamism and the managerial use of AIS information.</td>
</tr>
</tbody>
</table>

Table 3.3: A list of the developed hypotheses
CHAPTER 4

Research Methods and Measurements

4.0 Introduction

This chapter discusses the research design for testing the hypotheses proposed in the previous chapter. Section 4.1 presents the rationale for the multi-method approach applied in the current study. Section 4.2 outlines the sample selection, followed by a brief discussion of participants in Section 4.3. Then, Section 4.4 provides descriptions of the administration of the questionnaire survey. Measurements of the variables and their tests for reliability and validity are explained in Section 4.5. The administration of in-depth interviews is clarified in Section 4.6. The last section, Section 4.7, provides a summary of the chapter.

4.1 Rationale for the Research Design

Establishing a research design is a critical task in any study, as a variety of elements need to be considered. According to Creswell (2009), research can be classified into two general types: quantitative and qualitative. Quantitative research refers to the methods that seek to express data numerically. For this type of research, researchers are considered as distant from the objects of examination and more emphasis is placed on the construction of measures, analyses of relationships among variables and sampling procedures. Qualitative research on the other hand is a collection of methods that primarily depend on observations of what people do and say to generate analytical data. This type of research provides rich and deep insights into the phenomena under examination.

Creswell (2009) also discussed a third type of research, a multi-methods approach that combines both quantitative and qualitative methods. This approach allows mixing both qualitative and quantitative methods of research and data collection which increases the research validity by studying the phenomena from different viewpoints (Neuman, 2011). Using such method seeks convergence of results because multiple
sources of evidence are used in one study: for example, findings from questionnaires are varied and further interpreted by qualitative findings from interviews (Tashakkori & Teddlie, 1998). The present study adopted the multi-methods approach as being the most appropriate strategy to follow. Data were gathered, first by a questionnaire survey, and second by in-depth interviews to assist interpreting the quantitative findings. The research design, described by Yin (2003) as 'a blueprint of the research', covers decisions regarding the choices of data collection methods, measurements, samples and data analyses. The research design of the present study is summarised in Table 4.1.

<table>
<thead>
<tr>
<th>Research Strategy</th>
<th>Multi-methods approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Purpose</td>
<td>Exploratory &amp; Explanatory</td>
</tr>
<tr>
<td>Analysis Unit</td>
<td>Organisations</td>
</tr>
<tr>
<td>Data Collection Methods</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Type of Generated Data</td>
<td>Qualitative &amp; Quantitative</td>
</tr>
</tbody>
</table>

Table 4.1: Research design overview

4.2 Sample Selection
The sample frame used for this study consists of stock market listed organisations in Saudi Arabia. The Saudi stock exchange market began in a small way in the mid 1930s when the Arab Automobile company was established as the first joint-stock organisation. By 1975, there were only 14 public organisations owned jointly by the government and Saudi individuals. In the 1980s, rapid economic expansion due to booming oil prices led to the establishment of several large corporations and joint-stock banks. The market continued to be informal until 1984, when the government formed the Saudi Arabian Monetary Agency (SAMA) to regulate and develop the market (Azzam, 1997). SAMA remained the government body charged with regulating and monitoring market activities until the Capital Market Authority (CMA) was established in July 2003. Since then, CMA is the sole regulator and supervisor of the capital market, ensuring efficiency in the market and issuing the required rules and regulations to protect investors.
In March 2007, the council of ministers approved the formation of the Saudi stock exchange company called ‘Tadawul’. Appendix C shows the performance of the Saudi stock exchange during the last 10 years. Although the Saudi stock market is categorised as an emerging market due to its age and relative small size, it ranked as the 25th among the largest stock exchange markets worldwide in terms of the market capitalisation (Appendix D). On 30 November 2010, the first day of the data collection stage, the Tadawul all shares index (TASI) comprised 15 sectors containing 147 organisations available for trading as presented in Table 4.2.

<table>
<thead>
<tr>
<th>Type of industry</th>
<th>Number of listed organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks &amp; Financial Services industry</td>
<td>11</td>
</tr>
<tr>
<td>Petrochemical industry</td>
<td>14</td>
</tr>
<tr>
<td>Cement industry</td>
<td>9</td>
</tr>
<tr>
<td>Retail industry</td>
<td>9</td>
</tr>
<tr>
<td>Energy &amp; Utilities industry</td>
<td>2</td>
</tr>
<tr>
<td>Agriculture &amp; Food industry</td>
<td>15</td>
</tr>
<tr>
<td>TeleCommunication &amp; Information Technology industry</td>
<td>5</td>
</tr>
<tr>
<td>Insurance industry</td>
<td>31</td>
</tr>
<tr>
<td>Multi-Investment industry</td>
<td>7</td>
</tr>
<tr>
<td>Industrial Investment industry</td>
<td>13</td>
</tr>
<tr>
<td>Building &amp; Construction industry</td>
<td>14</td>
</tr>
<tr>
<td>Real Estate Development industry</td>
<td>8</td>
</tr>
<tr>
<td>Transport industry</td>
<td>4</td>
</tr>
<tr>
<td>Media &amp; Publishing industry</td>
<td>3</td>
</tr>
<tr>
<td>Hotel &amp; Tourism industry</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>147</strong></td>
</tr>
</tbody>
</table>

**Table 4.2: TASI organisations**
The present study focused on the listed organisations because, as the Saudi stock exchange company is only four years old, there is a lack of empirical studies investigating the performance of these organisations. This 'purposive' sampling is a type of non-probability sampling that uses the judgment of the researcher to select cases with a specific purpose in mind (Neuman, 2011). The specific purpose of the present study is to investigate the role of AIS in organisational sustainability from different points of view. Only listed organisations have publicly available information, with a view to make participants feel less conservative and more open to talk about these organisations with the researcher.

4.3 Participants

Appropriate selection of potential participants within the sample frame of listed organisations is needed to ensure the best exemplification of the findings on the objective of the study. The ultimate aim of the current study is to extend the existing understanding of the role of AIS in SOP, including the impacts of family control of management and industry dynamism. To accomplish this objective, information is required to be collected from participants who both oversee organisational performance and understand the external and internal environments of their organisations. This criterion best fits the chief financial officers (CFOs) of organisations.

CFOs were considered the most appropriate key informants to participate in the survey due to their expertise and the nature of their work. They are primarily responsible for managing, planning and reporting the performance of organisations to the stakeholders. Also, CFOs deal directly with AIS and involve increasingly in the development and execution of organisational strategies. A survey by Cocker et al. (2007) revealed great expectations of the CFOs role in organisations: “Many CFOs around the world say they received guidance and mentorship from the CEO, who generally wants the CFO to be a full partner in the leadership team and a contributor to company strategy” (p.1). The authors’ report also outlined the top management expectations of the CFOs’ roles, as presented in Figure 4.1.
4.4 Administration of Questionnaire Survey

An electronic format of the questionnaire survey was used for collecting data in the present study. The development of the survey was subject to four stages: constructing a paper-based questionnaire, pilot testing the paper-based questionnaire, building a web-based questionnaire, and pilot testing the web-based questionnaire (Figure 4.2). These stages were followed in a guideline for administrating the web-based questionnaire developed from that of Dillman (2007) and Bryman and Bell (2011).
4.4.1 Designing a Paper-based Questionnaire

For constructing a paper-based survey, the present study reviewed the relevant literature to identify appropriate instruments for measuring variables in the research model. Specific instruments used in previous studies were adapted because their conceptualisation was consistent with the variables in the present study (see section 4.5 in Chapter 4). Translation from English to Arabic language was undertaken by the researcher. This translation was then independently reviewed by a professional translator accredited as a translator and interpreter of both Arabic and English languages by the National Accreditation Authority for Translators and Interpreters in Australia. After this, the first draft of the questionnaire was set to pilot testing.

4.4.2 Pilot Testing the Paper-based Questionnaire

The first pilot study was undertaken to test the suitability of the adapted instruments in the questionnaire. Both academics and professionals (general managers) participated in the pilot study. The views of academics were important due to their familiarity with the design and the research topic of the present study. Their knowledge allowed them to evaluate the appropriateness and fitness of the instruments' items to the research model. In addition, the reflections of general managers were significant as they were able to detect weaknesses and ambiguities within the instructions and questions of the questionnaire.

The participating academics in this pilot study involved academics in the department of Accounting, Finance and Economic in Griffith Business School, Australia. The participating general managers in the pilot study involved managers from non-listed joint-stock organisations available in the database of the Ministry of Commerce in Saudi Arabia. These managers of non-listed organisations were chosen as their organisations represent the best parallel to listed organisations: both types are categorised as joint-stock organisations that submit to the same commercial regulations imposed by the government.
Both academics and general managers were approached by e-mail to participate. The aims and the research model of the present study were stated in the email. Printable soft copies of the questionnaire were also attached to each e-mail along with a coversheet explaining the purpose of the pilot study. On the English version, the Australian participants were sought to provide comments on the instruments' items while the Saudi participants were asked to assess the Arabic version of the questionnaire in general. E-mail replies by seven academics and four general managers were received within two weeks, containing feedback and suggestions for possible improvements. Based on these reviews, a revised version of the questionnaire was finally constructed (Appendix E). The next stage was to convert this paper-based questionnaire into a web-based form that allows participants to choose between viewing the questionnaire in Arabic or in English.

4.4.3 Designing a Web-based Questionnaire

The present study used a web form of the questionnaire for a number of considerations. Firstly, a web-based format allows the researcher to upload the questionnaire in Arabic and English languages in a way that provides participants a complete choice to read either the Arabic or English version of the questionnaire. Secondly, a web-based format provides the participants with more flexibility in completing questionnaires as access to the web page is available from any place at any time, especially for busy participants like CFOs who have tight work schedules. Thirdly, this availability is more likely to increase the response rate. The response rate for web surveys is found to be higher than for mailed surveys. Greenlaw and Brown-Welty (2009) explained that web-based surveys produce greater results because response rate for web-based surveys is higher when compared to paper-based surveys (61.7% > 39.1%). This is in line with the findings of Kiernan et al. (2005) which suggested that participants prefer online surveys over other surveys' modes. Finally, the low cost of administering web surveys is another advantage, as mailed surveys are substantially more costly to administer. Cobanoglu et al. (2001) compared the costs and other features between post mail, fax and web surveys as presented in Table 4.3.
<table>
<thead>
<tr>
<th>Item</th>
<th>Mail</th>
<th>Fax</th>
<th>Email/Web based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Surveys returned</td>
<td>26</td>
<td>17</td>
<td>42</td>
</tr>
<tr>
<td>Response rate</td>
<td>26%</td>
<td>17%</td>
<td>42%</td>
</tr>
<tr>
<td>Days to response</td>
<td>16.46</td>
<td>4.0</td>
<td>5.97</td>
</tr>
<tr>
<td>Completed surveys</td>
<td>21</td>
<td>13</td>
<td>36</td>
</tr>
<tr>
<td>Labour needed</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Variable cost for each survey</td>
<td>$1.00</td>
<td>$0.50</td>
<td>No cost</td>
</tr>
<tr>
<td>Coverage</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 4.3: Comparison between mail, fax and email/web based survey
(adapted from Cobanoglu et al., 2001)

As shown in the last column in Table 4.3, some may argue that the coverage of post mail surveys is higher than for web or email surveys because participants may have access to neither the Internet nor email. This might be the reason behind the low use of web surveys in accounting literature as cited by Lowe and Locke (2005). However, the authors stressed that low access to emails is unlikely to be of concern because nowadays academic and business people rely heavily on emails, especially when the targeted participants have official and registered email that require regular checking.

The present study expected that CFOs of Saudi listed organisations use email as of their communication medium because their organisations display at least one email address in the Tadawul database as well as in their organisational websites. The coverage concern is further offset by the findings of Al-Subaihi’s (2008) study, which pointed out that “the shortage of using Web Survey in Saudi Arabia is due to some cultural factors ... rather than [to] technical infrastructure” (p.130).

The present study converted the final revised version of the paper-based questionnaire into a web-based format using the LimeSurvey application. It is an open source online application that allows researchers to construct questionnaires and host them on the web, so that participants can access the questionnaires through a web link embedded in email messages. The email content was accompanied with a personalised message, emphasising the significance of the survey, its confidentiality and its closing date.
Important information was added by the LimeSurvey application assuring the anonymity for all participants. The personalised message accompanying the survey also requested the participants to inform the researcher if they would like to join a list of people who wish to receive a summary of the survey results. In addition, as required by the guideline of the Human Research Ethics Committee at Griffith University, the message confirmed that completion and return of the questionnaire indicated consent to participate. The web-based questionnaire was then ready for pilot testing.

4.4.4 Pilot Testing the Web-based Questionnaire

Dillman (2007) suggested pilot testing as a verification stage for the web-based questionnaire in terms of its usability, clarity and integrity. In order to simulate conditions identical to CFOs’ participation, nine PhD business students in Saudi Arabia were individually invited to test the web-based questionnaire. Those participants were asked to point out any problems or difficulties in accessing, browsing and completing the questionnaire. Also, the participants were asked to provide reflections on design and presentation of the questionnaire, as well as on any confusing parts throughout the questionnaire. After the completed questionnaires were received, assessment of the recoded data was performed to evaluate the accuracy and efficiency of the LimeSurvey application. The data were transferred from LimeSurvey into Microsoft Excel and SPSS files to double check them. This procedure led to minor modifications to the design, such as adjusting font size, and paved the way to start distributing the web-based questionnaire to the CFOs.

4.4.5 Distribution and Return of the E-questionnaire Survey

After the web-based questionnaire was tested, initial email contacts with the sample organisations requesting the email addresses of the organisations’ CFOs were performed. The email addresses of all the listed organisations in the Saudi stock market are publicly available from the Tadawul database. For cases where organisations did not send their CFOs’ email addresses, organisations’ email addresses were retained as substitutes, allowing the researcher to seek help in sending the questionnaire to the CFOs. A list of 147 emails was prepared and inserted into the LimeSurvey application.
The surveyed CFOs received the questionnaire invitation and follow-up reminders through emails. For each CFO, a personalised message containing a username and password to open the questionnaire was automatically generated. This message also explained the arrangement for maintaining the confidentiality and anonymity of the respondents\(^6\), and provided the closing date for the questionnaire. The participants needed to access the questionnaire by clicking on an embedded link in the email message. When the link was clicked, the first page of the questionnaire appeared, with a 'next' button to indicate CFOs agreement to participate in the study. Once the participants began, they were able to return to complete the questionnaire when needed by pressing on a 'resume later’ button.

Two follow-up reminders were automatically programmed to be sent. The first was sent two weeks after sending the questionnaire invitation email. The second reminder was sent five days before the closing of the questionnaire. The LimeSurvey application electronically identified the non-respondents in order to remind them without attention from the researcher. Once participants had completed the questionnaire, they were not able to modify or change their answers after submission. At the end of the questionnaire availability period, the collected data were downloaded from the LimeSurvey website into Microsoft Excel and SPSS files. The following sections describe the response rate and examine the non-response bias.

4.4.6 Description of the Response Rate

As presented in Table 4.4, a total of 103 questionnaires were submitted by the participants in the present study. This number of respondents represented an initial response rate of 70%. No questionnaires were incomplete because the web-based application prevented participants from leaving questions unanswered. However, one questionnaire was dropped from the sample since it turned out to be an outlier, as will be explained later in the data analysis. Therefore, the final number of questionnaires used for data analysis, 102, represented a response rate of 69%. This response rate was favourable when compared to the reported rates in studies by Greenlaw and Brown-Welty (2009) and Cohanoglu et al. (2001) of 61% and 42%, respectively.

\(^6\) As any Griffith University research involving participation of human requires ethical clearance, this research managed to obtain ethical clearance (GU protocol number APE/11/10/HREC) from Griffith University Human Research Ethics Committee.
<table>
<thead>
<tr>
<th>Description</th>
<th>Sample</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of distributed questionnaires</td>
<td>147</td>
<td>100%</td>
</tr>
<tr>
<td>Total number of submitted (returned) questionnaires</td>
<td>103</td>
<td>70%</td>
</tr>
<tr>
<td>Number of outliers</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>Total number of questionnaires used in data analysis</td>
<td>102</td>
<td>69%</td>
</tr>
</tbody>
</table>

Table 4.4: Description of the response rate

4.4.7 Non-response Bias

Due to reliance on the survey method, the collected data for the present study is prone to non-response bias. According to Bryman and Bell (2011), higher response rates implicitly indicate lower levels of the non-response bias. However, the authors emphasised that response rate is not necessarily a sufficient indicator because it cannot assess the representativeness of respondents to the original sample: "the problem with non-response is that those who agree to participate may differ in various ways from those who do not agree to participate" (p.183). If the agreed participants differ significantly from non-participants, findings of the collected data can not be generalised to the population due to poor representation within the sample's cases.

In order to test the existence of a non-response rate bias, the present study used Oppenheim’s (1966) method, which basically involves t-test comparisons between early and late responses. However, the web-based application, LimeSurvey, provided a function for browsing only the last 50 responses ordered from most recent to least recent. Early responses among the other 52 responses could not be identified. To overcome this limitation, the researcher took the very last 25 responses and compared them with 25 responses that were randomly selected from the unidentified 52 responses. Several t-tests were conducted for each independent variable of the research model, revealing no significant differences between the two groups of responses. Hence, the non-response bias is considered negligible.
4.5 Measurements of Variables, Reliability and Validity of Instruments

All variables in the present study were measured using the questionnaire. The instruments used to measure the variables, except that of the family control of management, were adapted from those used in previous empirical studies reviewed in Chapter 3. The following sections provide details of the measurement items for each variable as well as the reliability and validity of each instrument.

On one hand, reliability revolves around the internal consistency of a measure. "A measure is reliable when different attempts at measuring something converge on the same results" (Zikmund et al., 2010, p.305). So when two or more researchers study a phenomenon with the same instrument, similar results should be generated. Also, a study with high reliability can be replicated by others. The reliability of instruments can be statistically judged by Cronbach’s (1951) alpha, starting from 0 to 1, whereby the value of 0.70 is benchmarked to be the lower limit of acceptability (Bryman & Bell, 2011).

On the other hand, validity concerns the extent to which a question or scale is measuring the concept, attribute or property as it should be. "Validity refers to the issue of whether or not an indicator (or set of indicators) that is devised to gauge a concept really measures that concept" (Bryman & Bell, 2011, p.159). Essentially, there are two main type of validity: internal and external. Internal validity comprises three subtypes: face, content, and construct validity. Face validity refers to the mere appearance that a measure is valid. When the used measure reflects the construct in a clear and understandable manner, face validity is achieved. Hence, face validity is judged by pilot testing the questionnaires. The second subtype, content validity, is basically a logical evaluation of how well the content of a scale represents the measure. Content validity refers to "the degree that a measure covers the breadth of the domain of interest" (Zikmund et al., 2010, p.307). It is a subjective view of the logical and accuracy of an instrument to measure what it supposes to measure. Similar to face validity, content validity is judged by pilot testing. In the present study, both validities were considered to be fulfilled as the questionnaire was pilot tested.
The third subtype is construct validity. This depends on whether or not the used instruments can actually measure the theoretical construct. "Construct validity exists when a measure reliably measures and truthfully represents a unique concept" (Zikmund et al., 2010, p.308). It also concerns the consistency of empirical evidence with the theoretical logic of the concepts. As suggested by Tabachnick and Fidell (2007), the present study implied a factor analysis to assess the construct validity of instruments. When the factor analysis generates only one factor with an eigenvalue greater than one, the dimensions underlying a latent variable are recognised, signalling the unidimensionality of the instrument. Also the factor analysis shows the factor loading of each item, indicating the validity (pureness) level of these items in the instrument. The higher the size of the loading, the more valid is the item. Tabachnick and Fidell (2007) considered a factor loading of 0.32 as the lower limit of acceptability.

4.5.1 Sustainable Organisational Performance (SOP)

The present study measured SOP in terms of five perspectives: financial, customer, internal business process, learning and growth, and environmental and social perspectives. The instruments for each performance item were adapted from the work of Hoque and James (2000) and Bangchokepree (2008), along with an extension from the work of Piggott et al. (2001). The majority of these instruments are well established and have shown a high degree of reliability and validity. Respondents were asked to assess their SOP as compared to that of their competitors on a five-point Likert scale. The present study argues that this subjective measure is appropriate for two reasons.

Firstly, it was anticipated that objective measures of SOP in terms of the five perspectives would be unavailable. Secondly, relevant literature affirmed that research design can reduce possible biases of subjective measures by selecting well-informed participants (Mezias & Starbuck, 2003). A study by Wall et al. (2004) asserted that the correlation between subjective and objective measures of organisational performance reveals a high level of validity. Thus, the choice of a subjective measure was considered appropriate in the present study, as explained by Richard et al. (2009) that "the synthesis between the review of dimensionality and the review of measures reveals that there is no singular measure of performance that is without limitations."
Subjective measures are easily rejected by senior managers and academics as biased, yet the empirical evidence shows that they are not inherently erroneous and that similar criticism could be raised with respect to the limitations of objective measures” (p.736).

4.5.1.1 Financial Performance

The financial performance in the present study was defined as how successful the organisations are in accomplishing their financial goals of raising profits, enhancing revenues, and utilising assets efficiently (Kaplan & Norton, 1996). Hoque and James (2000) instrument containing 3 items for measuring the financial performance of organisations has been generally accepted and used in the accounting literature (Hoque, 2012). The instrument comprised these items:

i) Operating income;

ii) Sales growth; and

iii) Return on investment.

The items above were adapted because of their ability to represent organisation success in relation to the financial goals (Hoque & James, 2000). Raising profits can be assessed by the first item ‘operating income’; enhancing revenues can be assessed by the second item ‘sales growth’; and efficient utilisation of assets can be assessed by the third item ‘return of investment’. The participants, CFOs, were asked to rate their organisational performance on these items compared to those of their leading rivals, using rating from (1) ‘much lower’ to (5) ‘much higher’. The average of the sum of these items was then considered to be the rate of the financial performance.

<table>
<thead>
<tr>
<th>Number of cases = 102; Cronbach’s ( \alpha = .860 )</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating income</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sales growth</td>
<td>.590</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Return on investment</td>
<td>.747</td>
<td>.678</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.5: Reliability analysis and Pearson correlation matrix for instrument measuring financial performance
The reliability of this instrument was assessed by Cronbach's alpha, revealing the internal consistency of the items. As shown in Table 4.5 above, the Cronbach's alpha coefficient for this instrument was 0.86, implying a highly satisfactory level of reliability. This is because this alpha coefficient was in line with Bryman and Bell's (2011) criterion and higher than Hoque and James's (2000) reported coefficient of 0.75. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were all above 0.30, emphasising the factorability assumption as it met Pallant's (2010) criterion for the measure items to have a correlation greater than 0.30.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating income</td>
<td>.883</td>
</tr>
<tr>
<td>2. Sales growth</td>
<td>.850</td>
</tr>
<tr>
<td>3. Return on investment</td>
<td>.919</td>
</tr>
</tbody>
</table>

| Eigenvalue =2.34, Variance explained = 78.18 per cent |

Table 4.6: Factor loadings for instrument measuring financial performance

The construct validity of this instrument, assessed by an orthogonal Varimax rotation of factor analysis, indicated the degree of unidimensionality between the items. As stated in Table 4.6 above, the analysis showed that one component factor was extracted with an eigenvalue greater than 1, demonstrating the unidimensionality of this instrument (Tabachnick & Fidell, 2007). This extracted factor accounted for 78.18 per cent of the total variance.
4.5.1.2 Customer Performance

The customer performance in the present study was defined as how well the organisations meet their customers’ needs. It is reflected in the observed value that customers can have, in terms of quality, services and time that will eventually result in higher market shares (Kaplan & Norton, 1996). The instrument for measuring the customer performance of organisations was adapted from that of Hoque and James (2000). Eight items were included in Hoque and James’ instrument: market share, survey of customer satisfaction, customer response time, number of customer complaints, on-time delivery, warranty repair, and cycle time from order to delivery. The present study, however, adapted only three items based on the outcomes of the pilot testing of the questionnaire. According to the participating managers, the numbers of customer complaints, on-time delivery, warranty repair, and cycle time from order to delivery regarding their rivals were difficult to assess. This, as claimed by the managers, is due to the sensitivity of such information during competition times in the Saudi market, which constricts the availability and sharing of such figures. Similar views were expressed by Thai managers in Bangchokdee’s (2008) study. As such, the present study adapted the following three items:

i) Market share;

ii) Customer satisfaction; and

iii) Customer response time.

The items above were chosen due to their ability to represent organisation achievement in relation to the customers. The participants, CFOs, were asked to rate their organisational performance on these items compared to those of their leading rivals using scoring from (1) ‘much lower’ to (5) ‘much higher’. The average of the sum of these items was then considered the score of the customer performance.
Chapter 4: Research methods and measurements

<table>
<thead>
<tr>
<th>Number of cases = 102; Cronbach’s $\alpha = .789$</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Market share</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Customer satisfaction</td>
<td>.580</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Customer response time</td>
<td>.681</td>
<td>.403</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.7: Reliability analysis and Pearson correlation matrix for instrument measuring customer performance

The reliability of this instrument, assessed by Cronbach’s alpha, revealed the internal consistency of the items. As shown in Table 4.7 above, the Cronbach’s alpha coefficient for this instrument was 0.789, implying a satisfactory level of reliability. This is because this alpha coefficient was in accordance with Bryman and Bell’s (2011) criterion as well as with Hoque and James’s (2000) reported coefficient of 0.75. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were all above 0.30, satisfying the factorability assumption as this met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Market share</td>
<td>.909</td>
</tr>
<tr>
<td>2. Customer satisfaction</td>
<td>.773</td>
</tr>
<tr>
<td>3. Customer response time</td>
<td>.833</td>
</tr>
</tbody>
</table>

Eigenvalue = 2.11, Variance explained = 70.57 per cent

Table 4.8: Factor loadings for instrument measuring customer performance
The construct validity of this instrument was assessed by an orthogonal Varimax rotation of factor analysis, which signalled the degree of unidimensionality between the items. As shown in Table 4.8, the analysis illustrated that one component factor was extracted with an eigenvalue greater than 1, showing the unidimensionality of this instrument (Tabachnick & Fidell, 2007). This extracted factor also accounted for 70.57 per cent of the total variance.

4.5.1.3 Internal Business Process Performance

The internal business process performance in the present study was defined as how successful the organisations are in developing new products/services, manufacturing and delivering products/services, and providing warranty and repair services after sales (Kaplan & Norton, 1996). The instrument for measuring the internal business process performance of organisations used in the present study contained three items:

i) Efficiency of innovation process;

ii) Effectiveness of production processes; and

iii) Quality of post-sales services.

This instrument was adapted from that of Bangchokdee (2008) because it was derived from Hoque and James’ original instrument. It is important, however, to mention that while Bangchokdee’s instrument included five items, two items were dropped, namely ‘material efficiency’ and ‘post-sales efficiency’, due to the findings of the pilot study. This is because the participating managers perceived those two items as unnecessarily duplications of ‘effectiveness of production processes’ and ‘quality of post-sales services’ items. Thus, the present study chose the three items shown above.

The selection of these three items ensured adequate indications of organisations’ success relating to internal business processes. Developing new products/services can be weighed by the first item ‘efficiency of innovation process’; manufacturing and delivering products/services can be judged by the second item ‘effectiveness of production processes’; and providing warranty and repair services after sales can be assessed by the third item ‘quality of post-sales services’. The participants, CFOs, were asked to rate their organisational performance on these items compared to that of their leading rivals, using rating from (1) ‘much lower’ to (5) ‘much higher’. The
average of the sum of these items was then treated as the rate of the internal business process performance.

<table>
<thead>
<tr>
<th>Number of cases = 102; Cronbach’s α = .736</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Efficiency of innovation process</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Effectiveness of production processes</td>
<td>.725</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Quality of post-sales services</td>
<td>.374</td>
<td>.331</td>
<td>.1</td>
</tr>
</tbody>
</table>

Table 4.9: Reliability analysis and Pearson correlation matrix for instrument measuring internal business process performance

The reliability of this instrument, assessed by Cronbach’s alpha, underlined the internal consistency of the items. As presented in Table 4.9 above, the Cronbach’s alpha coefficient for this instrument was 0.73, a highly satisfactory level of reliability. This is because this alpha coefficient was in compliance with Bryman and Bell’s (2011) criterion as well as with Bangchokdee’s (2008) reported coefficient of 0.785. In addition, the Table clarifies that coefficients for the inter-item correlation matrix for the items were all above 0.30, satisfying the factorability assumption as it met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Efficiency of innovation process</td>
<td>.895</td>
</tr>
<tr>
<td>2. Effectiveness of production processes</td>
<td>.878</td>
</tr>
<tr>
<td>3. Quality of post-sales services</td>
<td>.639</td>
</tr>
</tbody>
</table>

Eigenvalue = 1.97, Variance explained = 65.97 per cent

Table 4.10: Factor loadings for instrument measuring internal business process performance
The construct validity of this instrument was evaluated by an orthogonal Varimax rotation of factor analysis that signified the degree of unidimensionality between the items. As stated in Table 4.10 above, the analysis indicated that one component factor was extracted with an eigenvalue greater than 1, displaying the unidimensionality of this instrument (Tabachnick & Fidell, 2007). This extracted factor accounted for 65.97 per cent of the total variance.

4.5.1.4 Learning and Growth Performance

The learning and growth performance in the present study was defined as how well the organisations utilise their human and information system resources (Kaplan & Norton, 1996). The instrument for measuring the learning and growth performance of organisations was adapted from that of Bangchokdee (2008), comprising three items:

i) Employee productivity;

ii) Employee satisfaction; and

iii) Computerised system efficiency.

The items above were chosen due to their potential for illustrating organisations' success in attaining the capabilities of their resources as argued by Hoque and James (2000). Improving employees' performance can be assessed by the first item, 'employee productivity'; sustaining employees' productivity can be assessed by the second item, 'employee satisfaction'; and increasing capabilities of information systems related-assets can be appraised by the third item, 'computerised system efficiency'. The participants, CFOs, were asked to rate their organisational performance on these items compared to those of their leading rivals using a scale from (1) 'much lower' to (5) 'much higher'. The average of the sum of these items was then taken to be the score of the learning and growth performance.
Table 4.11: Reliability analysis and Pearson correlation matrix for instrument measuring learning and growth performance

The reliability of this instrument, assessed by Cronbach’s alpha, demonstrated the internal consistency of the items. As viewed in Table 4.11 above, the Cronbach’s alpha coefficient for this instrument, 0.831, refers to a highly satisfactory level of reliability, because this alpha coefficient fulfilled Bryman and Bell’s (2011) criterion and was higher than Bangchokdee’s (2008) reported coefficient of 0.785. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were all above 0.30, confirming the factorability assumption as it met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.

Table 4.12: Factor loadings for instrument measuring learning and growth performance

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee productivity</td>
<td>.881</td>
</tr>
<tr>
<td>2. Employee satisfaction</td>
<td>.845</td>
</tr>
<tr>
<td>3. Computerised system</td>
<td>.888</td>
</tr>
</tbody>
</table>

Eigenvalue = 2.27, Variance explained = 75.97 per cent
The construct validity of this instrument, assessed by an orthogonal Varimax rotation of factor analysis, indicated the degree of unidimensionality between the items. As presented in Table 4.12, the analysis showed that one component factor was extracted with an eigenvalue greater than 1, proving the unidimensionality of this instrument (Tabachnick & Fidell, 2007). This extracted factor accounted for 75.97 per cent of the total variance.

4.5.1.5 Environmental and Social Performance

The environmental and social performance in the present study was defined as how successful the organisations are in adopting and executing environmentally and socially related initiatives (Figge et al., 2001). The present study used the following items to assess the type of performance:

i) Eco-efficiency;

ii) The growth of environmentally friendly products or/and services;

iii) Community support; and

iv) Charity donations.

The items above were selected because they were able to reflect the organisations’ interactions with the natural environment and society as supported by the results of the pilot study. The participants, CFOs, were asked to rate their organisational performance on these items compared to those of their leading rivals using rating from (1) ‘much lower’ to (5) ‘much higher’. The average of the sum of these items was considered to be the score of the environmental and social performance.

<table>
<thead>
<tr>
<th>Number of cases = 102; Cronbach’s α = .811</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Eco-efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The growth of environmentally friendly products or/and services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Community support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Charity donations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.13: Reliability analysis and Pearson correlation matrix for instrument measuring environmental and social performance
The reliability of this instrument, assessed by Cronbach’s alpha, indicated the internal consistency of the items. As stated in Table 4.13, the Cronbach’s alpha coefficient for this instrument was 0.811, a satisfactory level of reliability. This is because this alpha coefficient was in accordance with Bryman and Bell’s (2011) criterion. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were above 0.30, fulfilling the factorability assumption as it met Pallant’s (2010) criterion for the measure items having a correlation greater than 0.30.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Eco-efficiency</td>
<td>.706</td>
</tr>
<tr>
<td>2. The growth of environmentally friendly products or/and services</td>
<td>.799</td>
</tr>
<tr>
<td>3. Community support</td>
<td>.855</td>
</tr>
<tr>
<td>4. Charity donations</td>
<td>.831</td>
</tr>
<tr>
<td>Eigenvalue= 2.55, Variance explained= 63.91 per cent</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.14: Factor loadings for instrument measuring environmental and social performance**

The construct validity of this instrument was assessed by an orthogonal Varimax rotation of factor analysis, indicating the degree of unidimensionality between the items. As clarified in Table 4.14 above, the analysis showed that one component factor was extracted with an eigenvalue greater than 1, establishing the unidimensionality of this instrument (Tabachnick & Fidell, 2007). This extracted factor also accounted for 63.91 per cent of the total variance.
4.5.2 The Quality of AIS

Consistent with the relevant literature, the present study conceptualised the quality of AIS as a four-dimensional construct of aggregation, integration, response time and scope. A provision of information with these characteristics indicates the higher quality of AIS. Chenhall and Morris's (1986) instrument containing 24 items was adapted as it has been generally accepted and used in the AIS and MAS literature (Chong & Chong, 1997). Throughout the literature, different items of this instrument were employed to assess two aspects of AIS information: the provision and its use. The present study considered both aspects because the availability of information is not adequate to warrant their utilisation. The 24 items of Chenhall and Morris instrument were intended be used to assess both the quality of AIS information and its managerial use.

The present study used only ten items of Chenhall and Morris's instrument. The reason is that during the pilot study, participated managers and academics expressed concerns that answering all the 24 items can be frustrating for CIOs, especially when there were noticeable similarities among the items. The participants suggested eliminating a number of items, so that the questionnaire became as short as possible in order to increase the response rate and to ensure quality responses. The elimination suggestion was further supported by previous studies, as the literature review in the present study noted that most studies utilised a limited number of the 24 items.

For instance, the study by Chang et al. (2003) used only seven of Chenhall and Morris's items. The reliability coefficients for the seven items in their study were above the commonly applied standard of 0.70, implying reasonable item convergence. For that reason, the present study also chose the seven items used by Chang et al., and added three more of Chenhall and Morris's original items to cover the four dimensions of information, giving a total of ten items as presented below:
i) Integration:

1- The information provided is diverse and impacts your decision throughout the organisation;
2- The information provided is precise for the activities of all sections within the organisation;

ii) Aggregation:

3- The information provided is related to different sections or functional areas in the organisation;
4- The information provided is formed to enable conducting ‘what-if’ analysis;
5- The information provided is separated into fixed and variable components;

iii) Response time:

6- The information requested is provided immediately upon request;
7- The information reported coincides well with event occurrences;

iv) Scope:

8- The information provided is related to possible future events
9- The information provided is related to external factors of the organisation;
10- The information provided is non-financial.

The participated CFOs were asked to indicate whether their AISs provide information that contains the four quality dimensions using a five-point Likert scale using rating from (1) ‘low provision’ to (5) ‘high provision’. The average of the sum of these items was then considered to be the score of the quality of AIS variable.
The reliability of this instrument, examined by Cronbach’s alpha, highlighted the internal consistency of the items. As presented in Table 4.15 above, the Cronbach’s alpha coefficient for this instrument was 0.892, showing a highly satisfactory level of reliability. This is because this alpha coefficient was in compliance with Bryman and Bell’s (2011) criterion and higher than that of Chang et al. (2003) reported coefficient of 0.70. In addition, the Table clarifies that coefficients for the inter-item correlation matrix for the items were all above 0.30, satisfying the factorability assumption as it met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.
Table 4.16: Factor loadings for instrument measuring the quality of AIS information

The construct validity of this instrument, evaluated by an orthogonal Varimax rotation of factor analysis, signified the degree of unidimensionality between the items. As stated in Table 4.16, the analysis indicated that one component factor that was extracted with an eigenvalue greater than 1 and accounted for 50.85 per cent of the total variance, confirming the instrument's unidimensionality for the quality of AIS (Tabachnick & Fidell, 2007).

4.5.3 Managers' Use of AIS Information

The measuring methods used in previous studies varied widely for this variable. In general, measures of the 'use' or 'utilisation' of information systems employ a self-reporting method (Burton-Jones, 2005). With such diversity of measures, however, it
was important to establish a standard way of measuring managers’ use of AIS (Szajna, 1993). AIS is utilised when its outputs (information) are used in the process of making decisions related to SOP (Moscove & Simkin, 1990). The information characteristics suggested by Chenhall and Morris (1986) were also chosen to measure the managerial use of AIS information. As for the quality of AIS information, the present study employed the 10-item instrument as a modified version of that of Chenhall and Morris. In the questionnaire, CFOs were asked to indicate the extent to which they use AIS information for decision-making on a five-point Likert scale using rating from (1) ‘low use’ to (5) ‘high use’.

<table>
<thead>
<tr>
<th>Number of cases = 102; Cronbach’s α = .885</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diverse information that impacts your decisions throughout your company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.395</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Precise information for activities of all sections within your company</td>
<td></td>
<td></td>
<td>.417</td>
<td>.391</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Information related to different sections or functional areas in your company</td>
<td></td>
<td>.392</td>
<td>.420</td>
<td>.404</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Information that enables you to conduct ‘what-if’ analysis</td>
<td></td>
<td>.329</td>
<td>.361</td>
<td>.436</td>
<td>.488</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Information separated into fixed and variable components</td>
<td></td>
<td></td>
<td>.356</td>
<td>.326</td>
<td>.370</td>
<td>.286</td>
<td>.307</td>
<td>.466</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6. Information that is provided immediately upon request</td>
<td></td>
<td>.387</td>
<td>.449</td>
<td>.358</td>
<td>.491</td>
<td>.519</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Information that coincides well with event occurrences</td>
<td></td>
<td>.450</td>
<td>.487</td>
<td>.345</td>
<td>.579</td>
<td>.530</td>
<td>.597</td>
<td>.455</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8. Information related to possible future events</td>
<td></td>
<td>.312</td>
<td>.435</td>
<td>.402</td>
<td>.518</td>
<td>.571</td>
<td>.560</td>
<td>.449</td>
<td>.594</td>
<td>1</td>
</tr>
<tr>
<td>9. Information related to external factors of your company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.445</td>
<td>.446</td>
<td>.464</td>
<td>.527</td>
<td>.517</td>
<td>.510</td>
</tr>
</tbody>
</table>

Table 4.17: Reliability analysis and Pearson correlation matrix for instrument measuring the use of AIS information
The reliability of this instrument, assessed by Cronbach’s alpha, indicated the internal consistency of the items. As stated in Table 4.17 above, the Cronbach’s alpha coefficient for this instrument was 0.885, a highly satisfactory level of reliability. This is because this alpha coefficient was in accordance with Bryman and Bell’s (2011) criterion and higher than that of Gul (1991), who reported a reliability alpha of 0.76 while using a similar 9-items instrument taken from Chenhall and Morris. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were above 0.30, affirming the factorability assumption because it met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diverse information that impacts your decisions throughout your company</td>
<td>.621</td>
</tr>
<tr>
<td>2. Precise information for activities of all sections within your company</td>
<td>.663</td>
</tr>
<tr>
<td>3. Information related to different sections or functional areas in your company</td>
<td>.638</td>
</tr>
<tr>
<td>4. Information that enables you to conduct “what-if” analysis</td>
<td>.731</td>
</tr>
<tr>
<td>5. Information separated into fixed and variable components</td>
<td>.725</td>
</tr>
<tr>
<td>6. Information that is provided immediately upon request</td>
<td>.765</td>
</tr>
<tr>
<td>7. Information that coincides well with event occurrences</td>
<td>.599</td>
</tr>
<tr>
<td>8. Information related to possible future events</td>
<td>.790</td>
</tr>
<tr>
<td>9. Information related to external factors of your company</td>
<td>.770</td>
</tr>
<tr>
<td>10. Non-financial information</td>
<td>.741</td>
</tr>
</tbody>
</table>

Eigenvalue = 5.002, Variance explained = 50.02 per cent  

Table 4.18: Factor loadings for instrument measuring the use of AIS
The construct validity of this instrument, assessed by an orthogonal Varimax rotation of factor analysis, indicated to the degree of unidimensionality between the items. As clarified in Table 4.18, the analysis showed that one component factor that was extracted with an eigenvalue greater than 1 and accounted for 50.02 per cent of the total variance, establishing the instrument's unidimensionality for the use of AIS information (Tabachnick & Fidell, 2007).

4.5.4 Industry Dynamism

According to Gordon and Narayanan (1984), industry uncertainty should be restricted to unexpected change and change that is hard to predict. These changes heighten dynamism for managers in organisations. Thus, the degree of volatility (turbulence) has usually been used in previous research to measure the dynamism of industry (Harrington & Kendall, 2005). In the present study, industry dynamism is defined as the degree of turbulence (very low/very high) that varies from one industry to another due to the differences in market competition and technological change in the respective industries' environments. Because of its consistency with this definition, the instrument of Gordon and Narayanan (1984) for measuring dynamism was seen as the most appropriate measure for industry dynamism. The items used in the current study are as follows:

i) The competition in the industry;
ii) The number of products/services in the industry;
iii) The technological change facing the industry;
iv) The market activities of the competitors within the industry;
v) The preferences of customers in the industry; and
vi) The scientific discoveries emerge in the industry.

In the questionnaire, CFOs were asked to indicate their perceptions of turbulence in their organisation's industries. The responses were measured on a Likert scale of five-point using rating from (1) 'very low' to (5) 'very high'. The instrument was developed by Khandwalla (1972) and modified by Gordon and Narayan (1984) to measure uncertainty/dynamism at industry level. This instrument showed a high degree of reliability and validity in AIS studies (Chong & Chong, 1997; Chong & Rundus, 2004). However, one item of the original instrument was excluded due to its irrelevance, as suggested by the participating academics in the pilot study. This item concerns legal and political constraints in the industry.
Table 4.19: Reliability analysis and Pearson correlation matrix for instrument measuring industry dynamism

The reliability of this instrument, assessed by Cronbach’s alpha, indicated the internal consistency of the items. As shown in Table 4.19, the Cronbach’s alpha coefficient for this instrument was 0.869, a highly satisfactory level of reliability. This is because this alpha coefficient was in line with Bryman and Bell’s (2011) criterion and that of Chong and Rundus (2004) who reported alpha score of 0.87. In addition, the Table shows that coefficients for the inter-item correlation matrix for the items were above 0.30, stressing the factorability assumption because it met Pallant’s (2010) criterion for the measure items to have a correlation greater than 0.30.
<table>
<thead>
<tr>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The level of competition in the industry</td>
<td>.763</td>
</tr>
<tr>
<td>2. The frequency of development of new products or services in the industry</td>
<td>.839</td>
</tr>
<tr>
<td>3. The level of technological change facing the industry</td>
<td>.805</td>
</tr>
<tr>
<td>4. The changes in volume of market activities of competitors within the industry</td>
<td>.769</td>
</tr>
<tr>
<td>5. The changes in customers’ preferences in the industry</td>
<td>.750</td>
</tr>
<tr>
<td>6. The rate of innovation and scientific discoveries in the industry</td>
<td>.767</td>
</tr>
<tr>
<td>Eigenvalue = 3.63, Variance explained = 60.61 per cent</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.20: Factor loadings for instrument measuring industry dynamism

The construct validity of this instrument, assessed by an orthogonal Varimax rotation factor analysis, indicated the degree of unidimensionality between the items. As clarified in Table 4.20, the analysis showed that one component factor that was extracted with an eigenvalue greater than 1 and accounted for 60.61 per cent of the total variance, confirming the instrument’s unidimensionality for industry dynamism measure (Tabachnick & Fidell, 2007).

4.5.5 Family Control of Management

In terms of family control of management, the present study classified organisations into two types: organisations run by family CEOs and organisations run by non-family CEOs. For the purpose of statistical analysis, a dummy variable measurement was applied for this variable as the following scores were assigned: family CEO = 0, non-family CEO = 1. The participating CFOs were asked whether or not the CEO is a family relative of the major shareholders of the organisations.
4.5.6 Control Variable

Organisation size is an important context variable that can affect the way in which organisations design and use AIS. Larger organisations, for example, may have better resources and capabilities for upgrading existing AIS or even to purchase advanced AIS (Williams & Seaman, 2001). The present study controlled for organisation size based on organisations' number of employees as indicated by the participating CFOs. The extant literature highlighted the influence of this variable on the relationship between AIS and organisational performance (Elbashir et al., 2008).

4.6 In-depth Interviews

As indicated in section 4.1, the second phase of the present study involved post-survey interviews with participant CFOs to supplement the results of the survey. Relevant studies such as Mirghani et al. (2003) and Patiar and Mia (2008) used in-depth interviews to gain a better understanding of issues relating to findings obtained from the field surveys. For the present study, interview data were particularly relevant for clarifying of the role of AIS in the sustainable performance of Saudi organisations.

In the survey questionnaire, CFOs were asked to indicate whether or not they were willing to participate in an interview. A total of five CFOs from five organisations indicated their acceptance to participate in the interviews. The interviews were held in the interviewees' offices and at their convenient times. Open-ended questions relating to three variables (quality of AIS, use of AIS and SOP) in the research model were used in the interviews. Also, when permitted by the interviewees, a digital audiotape was used to record the discussions in order to be transcribed and analysed. In two interviews where the CFOs asked not to digitally record the discussion, note taking was the alternative way to gather the data. The shortest interview lasted 30 minutes and the longest lasted 50 minutes, approximately.

The present study used a matrix framework to compare the interviews data, demographic details and content themes across the five participating CFOs. With the matrix format, assessment to evaluate presence or absence of consistency and consensus across participants can be performed (Subramaniam, 2000). For the present study, the matrix of the interviews data is presented in Table 4.21. Content themes are provided in point forms in the table while direct quotes from CFOs are incorporated with discussions of the results in Chapter 6.
<table>
<thead>
<tr>
<th>Demographic details:</th>
<th>Organisation A</th>
<th>Organisation B</th>
<th>Organisation C</th>
<th>Organisation D</th>
<th>Organisation E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of industry</td>
<td>Building &amp; Construction</td>
<td>Retail</td>
<td>Cement</td>
<td>Agriculture &amp; Food</td>
<td>Insurance</td>
</tr>
<tr>
<td>Average sales per year (in million SR)</td>
<td>&gt; 3,000</td>
<td>&gt; 3,500</td>
<td>&gt; 960</td>
<td>&gt; 1,440</td>
<td>&gt; 103</td>
</tr>
<tr>
<td>Total fixed assets (in million SR)</td>
<td>&gt; 780</td>
<td>&gt; 940</td>
<td>&gt; 1,170</td>
<td>&gt; 1,500</td>
<td>&gt; 12</td>
</tr>
<tr>
<td>No. of employees</td>
<td>1000</td>
<td>1100</td>
<td>850</td>
<td>3500</td>
<td>350</td>
</tr>
<tr>
<td>No. of years with the organisation</td>
<td>5</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Content theme:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of AIS</td>
<td>Thinks the success of his organisation because of quality MIS, including AIS</td>
<td>Acknowledges the importance of quality AIS information</td>
<td>Partially recognises the benefits of quality AIS</td>
<td>Considers sophisticated AIS as a luxury to his organisation</td>
<td>Refers some achievements of his organisation to advanced MIS, including AIS</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>Makes use of all available information whenever it is needed</td>
<td>Relies on financial &amp; non-financial information</td>
<td>Does not rely on non-financial information that much</td>
<td>Focuses on financial information only</td>
<td>Uses both financial &amp; non-financial information</td>
</tr>
<tr>
<td>SOP</td>
<td>Believes in SOP but thinks Saudi organisations are too far from it</td>
<td>Supports the survey findings because high SOP needs quality management</td>
<td>Sees SOP as a challenge threatening the future of his organization</td>
<td>Has no great consideration for SOP</td>
<td>Agrees with the survey findings and feels confident about the SOP &amp; future of his organisation</td>
</tr>
</tbody>
</table>

Table 4.21: Post-survey interviews data matrix
4.7 Chapter summary

This chapter firstly provides details the sample targeted for testing the hypotheses proposed in the present study. Administration of the questionnaire in its two formats and their pilot testing was then explained, including distributing the questionnaire, describing the responses, and examining the non-response rate. The measurements of each variable in the research model were conducted, followed by tests of the validity and reliability of instruments. The results of the tests revealed that the instruments for measuring relevant variables in the model of the study met the criteria for reliability and validity. The Cronbach’s alpha coefficients of the relevant instruments proved to be satisfactory, and the instruments were found to be unidimensional. In the next chapter, the results of the data analysis for testing the hypotheses are presented.
CHAPTER 5

Results of Data Analysis

5.0 Introduction

Chapter 5 presents the results of data analysis for this study in five sections. Section 5.1 discusses the statistical techniques used for data analysis while Section 5.2 provides descriptive statistics for the variables. In Section 5.3, quality assessment of the collected data is provided. Section 5.4 shows the results of hypotheses testing including the assessments of measurement and structural models. Section 5.5 summarises the whole chapter.

5.1 Statistical Techniques

The present study employed two statistical techniques, independent two-sample t-test and partial least square, to examine the eighteen hypotheses developed in Chapter 3 (see hypotheses list in p.106). Hypotheses from H1a to H2 required univariate statistical techniques that assess the significant differences among groups of an independent variable. The choice between these techniques relies mainly on the levels (groups) of the variable (Tabachnick & Fidell, 2007). In the present study, hypotheses from H1a to H2 have one independent variable, family control of management, with two levels: family and non-family CEOs. The independent two-sample t-test appeared to be the most appropriate test to apply in examining the effects of those two levels in hypotheses from H1a to H2.

The other hypotheses, from H3 to H6, concerned the latent structure underlying a set of variables that are theoretically associated. Testing such hypotheses required multivariate statistical techniques that assess the association among two or more variables. These techniques can be classified into two generations:

i) First-generation techniques (e.g. multiple regression); and

ii) Second-generation techniques (e.g. structural equation modelling)
Chapter 5: Results of data analysis

An example of difference between the two categories is that, as a first-generation technique, multiple regression analysis examines each hypothesised association separately, while second-generation techniques of structural equation modelling analysis enables a group of associations to be examined simultaneously (Tabachnick & Fidell, 2007). This postulation of a simple-model structure represents a major limitation for the first-generation techniques. Another difference is that the second-generation techniques use latent variables to account for measurement error, while the first-generation techniques presume that all variables are measured without error (Gefen et al., 2000). Such limitations prompt the popularity of structural equation modelling in social science research.

Tabachnick and Fidell (2007) defined structural equation modelling as a collection of statistical techniques that facilitate a concurrent examination of a group of associations between one or more independent variables and one or more dependent variables. This collection of techniques includes two approaches:

i) Covariance-based approach (e.g. LISREL); and

ii) Component-based approach (e.g. partial least square).

As its name suggests, a covariance-based approach implies that "the objective of the estimation model is maximizing the reproduction of the covariances among variables and explaining the covariation of all the indicators … [while] the primary goal of the component-based approach is to obtain the parameter estimates for the prediction of the variances of the latent and manifest variables in the model" (Lee et al., 2011, p.307). The covariance-based approach estimates latent variables whereby covariance among common factor indicators are theoretically identified, whilst the component-based approach estimates composites of variables which represent a linear combination of the indicators.

Another difference is that partial least square (PLS) has lower requirements for the scale of measurements, the size of samples, and the distribution of residual than for the covariance-based technique (Urbach & Ahlemann, 2010). Due to its algorithm, PLS is less sensitive towards the qualities of collected data as no multivariate normality is needed. Wakefield et al. (2008) noted that "the major benefits of this method [PLS] include robustness for small to medium sample size (Cassel et al. 2000)"
and fewer constraints on the data (e.g., normality assumptions) compared to covariance-based methods" (p.445). Because of these advantages over the covariance-based techniques, the present study employed PLS to test hypotheses from H3 to H6.

### 5.2 Descriptive Analysis of the Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>1.33</td>
<td>5.00</td>
<td>3.61</td>
<td>.82</td>
<td>-.44</td>
<td>.02</td>
</tr>
<tr>
<td>Customer performance</td>
<td>1.67</td>
<td>4.67</td>
<td>3.66</td>
<td>.68</td>
<td>-.64</td>
<td>.09</td>
</tr>
<tr>
<td>Internal business process performance</td>
<td>2.00</td>
<td>5.00</td>
<td>3.58</td>
<td>.73</td>
<td>-.12</td>
<td>-.46</td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>1.33</td>
<td>5.00</td>
<td>3.37</td>
<td>.74</td>
<td>-.04</td>
<td>-.26</td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>1.00</td>
<td>5.00</td>
<td>3.15</td>
<td>.78</td>
<td>.20</td>
<td>-.02</td>
</tr>
<tr>
<td>Use of AIS information</td>
<td>1.50</td>
<td>4.80</td>
<td>3.56</td>
<td>.60</td>
<td>-.67</td>
<td>.81</td>
</tr>
<tr>
<td>Quality of AIS information</td>
<td>1.90</td>
<td>4.90</td>
<td>3.56</td>
<td>.61</td>
<td>-.16</td>
<td>-.06</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>1.50</td>
<td>5.00</td>
<td>3.49</td>
<td>.71</td>
<td>-.13</td>
<td>-.17</td>
</tr>
</tbody>
</table>

**Table 5.1:** Descriptive statistics of the variables

Table 5.1 above presents the results of the descriptive statistics of the research variables. The figures show that the mean of the financial performance is 3.61, with an actual minimum score of 1.33 and an actual maximum score of 5. The theoretical scale from one to five was an indication of the financial performance of organisations that began from much lower to much higher than leading rivals. A frequency table performed by SPSS FREQUENCY showed that 43%, 16% and 41% of the participants respectively scored their financial performance to be lower, similar and higher than their leading rivals.
For the customer performance variable, the results in Table 5.1 indicate that the mean is 3.66, with an actual minimum score of 1.67 and an actual maximum score of 4.67. The theoretical scale from one to five was an indication of the customer performance of organisations that began from much lower to much higher than leading rivals. A frequency table performed by SPSS FREQUENCY indicated that 40%, 12% and 48% of the participants respectively scored their customer performance to be lower, similar and higher than their leading rivals.

The results in Table 5.1 reveal that the mean of the internal business process performance is 3.37, with an actual minimum score of 1.33 and an actual maximum score of 5. The theoretical scale from one to five was an indication of the internal business process performance of organisations that began from much lower to much higher than leading rivals. A frequency table performed by SPSS FREQUENCY revealed that 58%, 7% and 35% of the participants respectively scored their internal business process performance to be lower, similar and higher than their leading rivals.

The mean of the environmental and social performance is 3.15, with an actual minimum score of 1 and an actual maximum score of 5. The theoretical scale from one to five was an indication of the environmental and social performance of organisations that began from much lower to much higher than leading rivals. A frequency table performed by SPSS FREQUENCY showed that 65%, 10% and 25% of the participants respectively scored their environmental and social performance to be lower, similar and higher than their leading rivals.

For the managerial use of AIS information, the results in Table 5.1 show that the mean is 3.56, with an actual minimum score of 1.50 and an actual maximum score of 4.80. The theoretical scale from one to five referred to extent to which the information items are used in managers’ decision making, and began from very low use to very high use. A frequency table performed by SPSS FREQUENCY showed that 53%, 7% and 40% of the participants respectively scored their use of AIS information to be low, average and high.
Chapter 5: Results of data analysis

The results in Table 5.1 indicate that the mean of the quality of AIS variable is 3.56, with an actual minimum score of 1.90 and an actual maximum score of 4.90. The theoretical scale from one to five referred to the extent to which the information items are provided to managers by AIS, and began from very low provision to very high provision. A frequency table performed by SPSS FREQUENCY indicated that 51%, 3% and 47% of the participants respectively scored the provision of AIS information to be low, average and high.

The mean of the industry dynamism variable is 3.49, with an actual minimum score of 1.5 and an actual maximum score of 5. The theoretical scale from one to five referred to the level of competition in the market and the degree of change in the industry of participants’ organisations, and began from very low to very high. A frequency table performed by SPSS FREQUENCY showed that 57%, 12% and 31% of the participants respectively scored the dynamism of their industries to be low, average and high.

5.3 Quality Assessment of the Collected Data

For robustness purposes, the data set of the present study requires an assessment of its quality and compatibility for statistical analyses. According to Tabachnick and Fidell (2007), screening of the collected data is an important step prior to any analysis. Several procedures to perform this screening are available. The present study followed the guidelines as suggested by Pallant (2010) and Tabachnick and Fidell (2007) to identify any violation of the underlying assumptions that apply to the independent two-sample t-test and PLS7.

5.3.1 Adequate Sample Size

Pallant (2010) pointed out that the adequate sample size is suggested to be a minimum of 150 cases and a ratio of at least 5 cases for each item to be analysed in the study. Since the maximum number of analysed items in the present study is 10 (for use of AIS and quality of AIS variables), only 50 cases were needed to meet Pallant’s ratio requirement. Another researcher suggests that “for social science research, about 15

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7 Even though PLS does not require some of these assumptions, such as normality, Urbach and Aldenmann (2010) emphasised the need to check other assumptions such as the adequacy of sample size and common method bias in the collected data prior to PLS analysis.
Chapter 5: Results of data analysis

subjects per predictor are needed for a reliable equation” (Steven, 2002, p.88). The present study has 4 predictors (independent variables), making the minimum size to be 60 cases\(^8\). Both requirements were met, as the actual sample size of the present study is 102.

Lee et al. (2011) highlighted that “accounting researchers interested in using PLS should follow similar guidelines as multiple regression, and not believe that PLS is a panacea for small samples” (p.316). The simplest rule of thumb for adequate sample size in multiple regressions, as suggested by Tabachnick and Fidell (2007), follows this formula: number of cases ≥ 50 + 8m (where ‘m’ is the number of independent variables). Applying this in the present study requires 82 cases, while the actual number of cases is 102. Thus, the criterion for adequate sample size was achieved.

5.3.2 Absence of Outliers

The present study inspected the absence of both univariate and multivariate outliers among variables. Univariate outliers are those cases with “an extreme value on one variable” (Tabachnick & Fidell, 2007, p.73). According to these authors, the extreme values are identified when their standardised (Z) scores exceed the value of 3.29 in both tails (-3.29 > Z score > +3.29). A table of Z scores performed by SPSS DESCRIPTIVESTS showed that only case number 84 was found to be a univariate outlier since it has a Z score on the use of AIS information at -3.44.

Multivariate outliers are those cases with “an unusual combination of scores on two or more variables” (Tabachnick & Fidell, 2007, p.73). According to the authors, unusual combinations of scores are identified when the Mahalanobis distance value exceeds the critical Chi-square value while using the number of independent variables as a degree of freedom. Tables performed by SPSS REGRESSION showed that when regressing the use of AIS and industry dynamism on financial, customer, internal business process, learning and growth, and environmental and social performance (2 independent variables as the degree of freedom), the critical Chi-square value should be 13.81 (p < 0.001). Interestingly, in the five regression scenarios, only case number 84 was found to be an outlier; Mahalanobis distance value exceeds 13.81. This case was then deleted from the data set for the analysis.

\(^8\) 15 (Steven's ratio requirement) x 4 (Number of predictors) = 60

120
5.3.3 Absence of Multicollinearity and Singularity

The present study investigated the absence of multicollinearity and singularity among variables. Multicollinearity exists when two independent variables are highly correlated (i.e. correlation of 0.7 and more), while singularity happens when an independent variable is perfectly correlated (i.e. correlation of 1) with one or more independent variables (Tabachnick & Fidell, 2007). Running a bivariate correlation test would reveal any evidence of multicollinearity and singularity. Having no sign of redundant variables is critical, as these may inflate the size of error terms, which would in turn weaken the analysis. In addition, the authors suggested performing a collinearity diagnostic test as a supplementary criterion for the bivariate correlation test.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer performance</td>
<td>.731**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal business process performance</td>
<td>.687**</td>
<td>.687**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>.553**</td>
<td>.630**</td>
<td>.639**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>.509**</td>
<td>.457**</td>
<td>.494**</td>
<td>.523**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of AIS information</td>
<td>.384**</td>
<td>.337**</td>
<td>.208*</td>
<td>.221*</td>
<td>.360**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of AIS information</td>
<td>.314**</td>
<td>.415**</td>
<td>.394**</td>
<td>.380**</td>
<td>.258**</td>
<td>.434**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>.427**</td>
<td>.445**</td>
<td>.531**</td>
<td>.418**</td>
<td>.387**</td>
<td>.407**</td>
<td>.599**</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.2: Correlation among the variables
Table 5.2 shows that there is no bivariate correlation of 0.7 or more between the independent variables (use of AIS information, quality of AIS information and industry dynamism). For the collinearity diagnostic test, Tabachnick and Fidell (2007) referred to Belsey et al.’s (1980) criteria that violation cases of multicollinearity and singularity occur when either the condition indices or the variance proportions are respectively greater than 30 and 0.50 for any dimension. Unfortunately, several violation cases were found in the data set of the present study in which the variance proportions were greater than 0.50 (Appendix F). Nevertheless, Tabachnick and Fidell stressed that both bivariate correlation and collinearity diagnostic tests have to be violated together to provide evidence of multicollinearity and singularity among variables. Thus, additional tests were required.

Pallant (2010) suggested the use of additional tests such as tolerance value, variance inflation factor (VIF) and squared multiple correlation (SMC) to further inspect the absence of multicollinearity and singularity because these tests “can pick up on problems with multicollinearity that may not be evident in a correlation matrix” (p.158). When tolerance value is greater than 0.1, VIF is less than 10, and SMC is less than 0.1, then there is no sign of multicollinearity and singularity among variables (Tabachnick & Fidell, 2007). Tables of tolerance-related values preformed by SPSS LINEAR REGRESSION on the data set showed that, for all independent variables, tolerance values were greater than 0.1, VIFs were less than 10, and SMCs were less than 0.1 (Appendix G). Accordingly, no violation cases were confirmed, resulting in retention of all independent variables in the research model of the present study.

5.3.4 Existence of Normality

Normally distributed data refers to “a symmetrical, bell-shaped distribution that describes the expected probability distribution of many chance occurrences” (Zikmund, 2010, p.421). The existence of normality can be checked by statistical and graphical methods. In the statistical method, skewness and kurtosis values are used. Skewness concerns “the symmetry of the distribution; a skewed variable is a variable whose mean is not in the center of the distribution”, while kurtosis is about “the peakedness of a distribution: a distribution is either too peaked (with short, thick tails) or too flat (with long, thin tails)” (Tabachnick & Fidell, 2007, p.79). According to Huck (2008), most researchers consider data to be reasonably close to normal in shape
Chapter 5: Results of data analysis

if its skewness and kurtosis values range between -1 and +1. Table 5.3 below indicates that the variables in the present study were normally distributed because their skewness and kurtosis values turned out to be anywhere from -1 to +1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>3.61</td>
<td>.82</td>
<td>-.44</td>
<td>.02</td>
</tr>
<tr>
<td>Customer performance</td>
<td>3.66</td>
<td>.68</td>
<td>-.64</td>
<td>.09</td>
</tr>
<tr>
<td>Internal business process</td>
<td>3.58</td>
<td>.73</td>
<td>-.12</td>
<td>-.46</td>
</tr>
<tr>
<td>process performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>3.37</td>
<td>.74</td>
<td>-.04</td>
<td>-.26</td>
</tr>
<tr>
<td>Environmental and social</td>
<td>3.15</td>
<td>.78</td>
<td>.20</td>
<td>-.02</td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of AIS information</td>
<td>3.56</td>
<td>.60</td>
<td>-.67</td>
<td>.81</td>
</tr>
<tr>
<td>Quality of AIS information</td>
<td>3.56</td>
<td>.61</td>
<td>-.16</td>
<td>-.06</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>3.49</td>
<td>.71</td>
<td>-.13</td>
<td>-.17</td>
</tr>
</tbody>
</table>

Table 5.3: Skewness and Kurtosis results for the variables

In the graphical method, the notion of normally distributed data revolves around the differences between obtained and predicted scores of dependent variables (residuals) that should be normally distributed about the predicted scores of dependent variables (Tabachnick & Fidell, 2007). This assumption is fulfilled when the normal probability plots of residuals produce points that “lie in a reasonably straight diagonal line from bottom to top right” (Pallant, 2010, p.158). As can be observed from Figures 5.2 to 5.6, all the plot lines of residuals for the present study data lay close to the diagonal line, signalling a normal distribution of residuals around the predicted scores of dependent variables.
Figure 5.1: Normality test for regression of financial performance, use of AIS information and industry dynamism

Figure 5.2: Normality test for regression of customer performance, use of AIS information and industry dynamism
Figure 5.3: Normality test for regression of internal business process performance, use of AIS information and industry dynamism.

Figure 5.4: Normality test for regression of learning and growth performance, use of AIS information and industry dynamism.
Chapter 5: Results of data analysis

Figure 5.5: Normality test for regression of environmental and social performance, use of AIS information and industry dynamism

Figure 5.6: Normality test for regression of the use of AIS information, quality of AIS and industry dynamism
5.3.5 Existence of linearity, homoscedasticity and independence of errors

The existence of linearity implies that residuals (the differences between the obtained and predicted scores of dependent variables) have a straight-line association with the predicted scores of the dependent variables (Tabachnick & Fidell, 2007). This relationship can be examined by the visual appearance of residual scatterplots. If the shape of the residual scatterplot is rectangular (spreading plots rather than curving), then no sign of linearity is evident in the data set (Tabachnick & Fidell, 2007). As can be seen from Figures 5.7 to 5.12, all residual scatterplots for the present study data were roughly rectangular in shape, and therefore the existence of linearity was assumed.

The homoscedasticity assumption refers to a situation where residuals have the same variance as the predicted scores of dependent variables, whereby “the standard deviations of errors of prediction are approximately equal for all predicted dependent variable scores” (Tabachnick & Fidell, 2007, p.127). The existence of homoscedasticity can be observed from the visual appearance of the residual scatterplots. If the shape of the residual scatterplots does not represent spearheads, then no evidence of homoscedasticity is found. As can seen in Figures 5.7 to 5.12, all residual scatterplots for the present study data do not represent spearheads shapes, hence, relationships between the variables were homoscedastic.

Independence of errors happens when the residuals of variables are independent (Tabachnick & Fidell, 2007). This independence can be inspected graphically by the appearance of residual scatterplots. If the shapes of the scatterplots appear to be in random patterns rather than in systemic patterns, then no violation of the independence of errors is noted. As can be perceived in Figures 5.7 to 5.12, all residual scatterplots for the present study data were randomly shaped, indicating a compliance with the assumption of independence of errors.
Chapter 5: Results of data analysis

**Figure 5.7:** Linearity, homoscedasticity and independence of error of the variable test for the regression of financial performance, use of AIS and industry dynamism

**Figure 5.8:** Linearity, homoscedasticity and independence of error of the variable test for the regression of customer performance, use of AIS and industry dynamism
Figure 5.9: Linearity, homoscedasticity and independence of error of the variable test for the regression of internal business process performance, use of AIS and industry dynamism

Figure 5.10: Linearity, homoscedasticity and independence of error of the variable test for the regression of learning and growth performance, use of AIS and industry dynamism
Figure 5.11: Linearity, homoscedasticity and independence of error of the variable test for the regression of the environmental and social performance, use of AIS and industry dynamism

Figure 5.12: Linearity, homoscedasticity and independence of error of the variable test for the regression of the use of AIS, quality of AIS and industry dynamism
5.3.6 Assumption 6: Absence of common method bias

Podsakoff et al. (2003) defined the common method bias as occurring when a significant amount of variance shared among the variables is attributed to the common method used for data collection. Four main sources for common method variance are identified: having a common rater, having a common measurement context, having a common item context or having common item characteristics. The authors concluded that the best way to avoid such problems is to design the study in a way that minimises the risk of gathering data with common method variance. However, this is not always possible. Therefore, a number of statistical techniques have been suggested to assess common method bias. The present study used two of them.

The first technique, Harmon’s single-factor test, involved entering all items of the variables into a single factor analysis to determine the number of factors that account for the variance in the variables (Podsakoff et al., 2003). By using Varimax rotation in a principal component analysis on the data set, ten factors were extracted with eigenvalues greater than one and explained 72.6% of the variance. The first factor accounted for 30% of the variance; the remaining nine factors accounted for 42.6%. These results provided evidence that the variables do not load significantly on a single factor, implying a minimal risk of common method bias in the present study. However, Urbach and Ahlemann (2010) acknowledged some limitation of Harmon’s single-factor test and suggested carrying out an additional test to assess common method bias.

The second test conducted for common method bias was partialling out a ‘marker variable’. Lindell and Whitney (2001) considered this test to be one of the partial correlation methods that involve assessment of significant differences between the estimated paths in the structural model, with and without a marker variable. “If a variable can be identified on theoretical grounds that should not be related to at least one other variable included in the study, then it can be used as a marker in that any observed relationships between it and any of the other variables can be assumed to be due to common method variance” (Podsakoff et al., 2003, p.893). The present study used one theoretically unrelated variable, respondents’ years of experience, as a marker to examine the structural model both with and without this marker variable. The results of this test clarified that all the paths maintained their levels of statistical
significance in both models, showing no evidence of common method bias that would threaten the quality of the data set in the present study.

5.4 Results of Hypotheses Testing

5.4.1 Independent two-sample t-test

The independent variable in hypotheses from H1a to H2, family control of management, has two levels (categories): family and non-family CEOs. While the hypotheses from H1a to H1e have financial, customer, internal business process, learning and growth, and environmental and social performance as their dependent variables, respectively, managerial use of AIS is the dependent variable for H2. Independent two-sample t-test was the most appropriate statistical technique for examining the effects of those dependent variables.

Independent two-sample t-test allows the investigation of whether the values of a dependent variable differ significantly across two categories of an independent variable. The p-values produced by this test have to be compared with the significant level (alpha level) to determine the differences between means (Pallant, 2010). If a significant difference is detected, the null hypothesis can be rejected and the alternative hypothesis is therefore accepted, indicating that the theory or argument put forward in developing the research hypothesis is valid.

The assumptions for this test were checked in assessing the quality of the collected data (see section 5.3). Also, the equality of variances between the two groups was assumed because the significant of Levene's test, performed by SPSS INDEPENDENT-SAMPLES T TEST, was found to be greater than 0.05 (the alpha level for the present study) for all the dependent variables, therefore meeting the equality of variances assumption as pointed out by Pallant (2010).
5.4.1.1 Testing of H1a, H1b, H1c, H1d, and H1e

H1a: The financial performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO;

H1b: The customer performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO;

H1c: The internal business process performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO;

H1d: The learning and growth performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO; and

H1e: The environmental and social performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

The results in Table 5.4 show that there are no significant differences between organisations with family CEOs and those with non-family CEOs in terms of both financial performance and customer performance. This is because the p-values (0.942 and 0.087), shown under ‘sig. (2-tailed)’ column in the first two rows, were greater than 0.05, indicating a failure to observe significant differences in the financial and customer performance between organisations with family CEOs and organisations with non-family CEOs. Thus, the null hypotheses, H1a and H1b, were accepted.

On the other hand, internal business process, learning and growth, and environmental and social performance in organisations with family CEOs were all found to differ significantly from those with non-family CEOs. The p-values in the last three rows (0.027, 0.040, and 0.013) were less than 0.05, implying a success to observe significant differences between the family and non-family CEOs groups of organisations. Therefore, the null hypotheses, H1c, H1d and H1e, were rejected.
Chapter 5: Results of data analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene’s Test for Equality of Variances</th>
<th>T-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Financial performance</td>
<td>0.258</td>
<td>0.61</td>
</tr>
<tr>
<td>Customer performance</td>
<td>0.90</td>
<td>0.006</td>
</tr>
<tr>
<td>Internal business process</td>
<td>2.07</td>
<td>0.153</td>
</tr>
<tr>
<td>performance</td>
<td>0.47</td>
<td>0.492</td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>0.06</td>
<td>0.807</td>
</tr>
</tbody>
</table>

Table 5.4: Independent two-sample t-test for H1a to H1e

The group statistics presented in Table 5.5 below clarify the directions of the significant differences between the family and non-family CEOs groups. For organisations with family CEOs, the means of internal business process (3.73 > 3.35), learning and growth (3.50 > 3.19), and environmental and social performance (3.31 > 2.93) were all found to be higher than for organisations with non-family CEOs.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Family CEO</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal business process</td>
<td>Yes</td>
<td>3.73</td>
<td>.766</td>
<td>.115</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3.35</td>
<td>.904</td>
<td>.118</td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>Yes</td>
<td>3.50</td>
<td>.804</td>
<td>.121</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3.19</td>
<td>.661</td>
<td>.086</td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>Yes</td>
<td>3.31</td>
<td>.783</td>
<td>.118</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2.93</td>
<td>.738</td>
<td>.096</td>
</tr>
</tbody>
</table>

Table 5.5: Group statistics for H1c, H1d and H1e
5.4.1.2 Testing of H2

H2: Managers' use of AIS information in an organisation with a family CEO does not differ significantly from that in an organisation with a non-family CEO.

The results presented in Table 5.6 below demonstrate that there is no significant difference between the managers' use of AIS in organisations with family CEOs and that in organisations with non-family CEOs. The p-value for this test (0.673) was greater than 0.05, signalling a non-significant difference between the managerial use of AIS in organisations with family CEOs and that in organisations with non-family CEOs. Accordingly, the null form of the research hypothesis, H2, is accepted.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene's Test for Equality of Variances</th>
<th>T-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Managers' use of AIS information</td>
<td>.052</td>
<td>.821</td>
</tr>
</tbody>
</table>

Table 5.6: Independent two-sample t-test for H2

5.1 Partial Least Square

Partial least square (PLS) was originally developed by Wold (1980; 1985) to expand the theory of 'fixed point estimation' and to build an alternative for first generation multivariate linear regression models. Essentially, PLS is a methodological approach aimed at examining statistical models that include a number of constructs and various indicators (Chin, 1998a; 1998b). In conformity with Cassel et al. (1999), PLS uses general and soft distribution assumptions that best suit non-experimental data: PLS proves to be robust against statistical problems related to the qualities of collected data when for instance inspecting for multicolinearity or normality.

According to Chin and Newsted (1999), the PLS algorithm consists of an iterative three-step procedure. In the first step, estimations of the latent variable scores are made depending on outside and inside approximation methods. The outside method provides a weighted aggregate of the latent variable based on its indicators, while the inside method provides a weighted aggregate of the latent variable based on its neighbouring variables scores. Those estimations of the latent variable scores are used in the second step to calculate coefficients for the paths between latent variables and...
Chapter 5: Results of data analysis

their indicators (measurement model) as well as for the paths between the latent variables themselves (structural model) using ordinary least square regressions. In the third step, the actual means and regression constants for the latent variables and their indicators are calculated. Thus, as these steps reveal, PLS is essentially a series of ordinary least square regressions that simultaneously separate the calculations of parameters for latent variables in the research models (Hair et al., 2006).

PLS is found to fit well with complex cause-and-effect association models in different disciplines. For example, studies in hospitality (Johnson et al., 2009; Ekinci et al., 2008), in information technology (Choudhury & Karahanna, 2008; Hsieh et al., 2008), in enterprise systems (Elbashir et al., 2011; Diaz & Loraas, 2010), in management accounting (Ekholm & Wallin, 2011; Cleary, 2009), and in auditing (Dowling, 2009) have all utilised PLS analysis. The interest in the use of PLS has also arisen within the accounting literature but in a slower way. Lee et al. (2011) conducted a review of articles that have used PLS as the method of analysis in 20 accounting journals, covering the period between 1997 and 2010. Their review showed that while there was relatively limited usage of PLS in accounting studies, these studies applied a consistent guideline as suggested by the PLS literature. Table 5.7 provides a summary of their guidelines for PLS usage.

<table>
<thead>
<tr>
<th>Initial specification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Providing justification for the specification of constructs as either formative or reflective</td>
</tr>
<tr>
<td>ii) Following the appropriate process for measure development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model testing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>iii) Documenting the version of the PLS software used in the analysis</td>
</tr>
<tr>
<td>iv) Having a sample size that is sufficiently large enough for statistical analysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>v) Testing the convergent and discriminant validity of constructs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structural model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>vi) Providing the estimates for the path coefficients between constructs.</td>
</tr>
<tr>
<td>vii) Providing the $R^2$ for the dependent variables and ensuring it is above 0.10.</td>
</tr>
<tr>
<td>viii) Using either bootstrapping or jackknifing to estimate the significance of the parameters.</td>
</tr>
<tr>
<td>ix) Providing a visual depiction of the model with the associated path estimates and significance.</td>
</tr>
</tbody>
</table>

**Table 5.7: Guidelines for PLS usage**
Chapter 5: Results of data analysis

The initial specification of constructs to be either formative or reflective depends on the research objectives, the nature of the latent variables and the empirical conditions (Chin, 1998b). Formative constructs comprise a number of manifesting items (indicators) that directly define and cause the latent variable, while reflective constructs consist of underlying indicators that contribute to the observation of the variable. In other words, constructs are considered to be formative when their indicators are conceptually independent and are viewed as a combination of explanatory items, whereas reflective constructs have conceptually similar (interchangeable) indicators that help to explore the observed phenomenon.

For illustration, organisational performance can be a formative construct if it is to be measured by a number of indicators representing disparate elements such as return on investment and return on equity. Also, organisational performance can be a reflective construct if it is to be measured through observation of managers’ views (reflections) of how well the organisation is performing. In the present study, all the constructs were considered to be reflective because they were measured by a number of indicators that were assumed to reflect the variation in the constructs. This specification was built on the conceptualisation and findings of previous empirical studies (see section 4.5, p.120).

For PLS modelling software, Tenme et al. (2006; 2010) conducted a comprehensive review of different PLS software tools and found that while there are several available software programs, researchers have to choose the one that best fits their preferences. One of the most established softwares is SmartPLS 2.0 (Ringle et al., 2005), a software application for graphical path modelling that has more than 25,000 registered users and that is freely available on the Internet (SmartPLS, 2012). Also, SmartPLS 2.0 has been recently used in accounting studies such as Hartmann and Slapnicar (2009), Homburg and Stebel (2009), and Elbashir et al. (2011). As such, the present study chose to utilise SmartPLS 2.0 due to its affordable system requirements (Java Runtime Environment) and its easiness of use.

The assumption for having an adequate sample size for statistical analysis has been met (see section 5.3.1). Lee et al. (2011) suggested that PLS research should apply the criteria of multiple regressions for sufficient sample size. Tabachnick and Fidell
Chapter 5: Results of data analysis

(2007) provided a rule of thumb\(^9\) that determined a sample of 82 cases to be the minimum for the present study. As its data set contains 102 cases, the sample size of the present study is assumed to be large enough for statistical analysis. In addition, Lee et al. stressed the need to calculate the effect size of the sample to detect the strength of the structural relationships. The current study presents this calculation later, as a part of the structural model assessment, because it relied on other values that will be produced in subsequent sections.

Other assumptions such as common method bias have been checked in the section for quality assessment of the collected data. The next step after evaluating the data quality is model validation. This encompasses the process of systematically assessing whether or not the hypotheses presented by the structural model are supported by the collected data. According to Urbach and Ahlemann (2010), model validation is generally “an attempt to determine whether the measurement models as well as the structural model fulfill the quality criteria for empirical work” (p.18). The present study has followed the procedure of Urbach and Ahlemann in assessing the measurement and structural models, as it was more extensive from Lee et al. (2011) guidelines, with its descriptions for further criteria based on comprehensive review of PLS research.

5.4.2.1 Assessment of Measurement Model

In assessing the measurement model, Urbach and Ahlemann (2010) suggested testing four main types of construct validity: unidimensionality; internal consistency reliability; convergent validity; discriminant validity.

Validity Type 1: Unidimensionality

Unidimensionality assesses whether measurement items converge in their corresponding factor, where each of these items loads with a high coefficient on only one factor which they suppose to measure. The degree of unidimensionality between the items of variables in the present study has already been tested by exploratory factor analysis in section 4.5 in Chapter 4. Factor loadings of items for each variable ranged between 0.59 and 0.92, with one component factor being extracted, confirmed

---

\(^9\) Sample size \(\geq 50 + 4m\), where \(m\) is the number of independent variables
the unidimensionality of the latent variables for the present study, as no loadings were found to be lower than 0.40, as recommended by Urbach and Ahlemann (2010).

Validity Type 2: Internal consistency reliability

According to Urbach and Ahlemann (2010), there are two main criteria for internal consistency of items for each variable. The first is that Cronbach's alpha for a variable instrument has to be at least 0.70. As shown in section 4.5 in Chapter 4, reliability of variable instruments had been already tested, and the Cronbach's alpha for all variables were above 0.70. Consequently, this type of validity was fulfilled\textsuperscript{10}. The second criterion for the internal consistency reliability is that composite reliability of a variable has to be at least 0.60. Table 5.8 below shows that the coefficients of composite reliability for all variables were above 0.82, thus demonstrating internal consistency reliability.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach's alpha</th>
<th>Composite reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>0.860</td>
<td>0.914</td>
</tr>
<tr>
<td>Customer performance</td>
<td>0.789</td>
<td>0.876</td>
</tr>
<tr>
<td>Internal business process</td>
<td>0.736</td>
<td>0.925</td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning-growth performance</td>
<td>0.831</td>
<td>0.904</td>
</tr>
<tr>
<td>Environmental and social</td>
<td>0.811</td>
<td>0.874</td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of AIS</td>
<td>0.885</td>
<td>0.908</td>
</tr>
<tr>
<td>Quality of AIS</td>
<td>0.892</td>
<td>0.911</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>0.869</td>
<td>0.901</td>
</tr>
</tbody>
</table>

Table 5.8: Results for internal consistency reliability

\textsuperscript{10} Values of Cronbach’s Alpha obtained from SPSS differed slightly from those given by SmartPLS. After inquiring about this with the founders of SmartPLS, they agreed that Cronbach's Alpha tends to be underestimated in a PLS model, and advised the inquirers to rely more on the values of composite reliability.
Validity Type 3: Convergent validity

Convergent validity refers to the degree in which the latent variable is able to explain the average variance of its measuring items. It assesses whether the measuring items intentionally measure their construct. A common method for convergent validity is the average variance extracted (AVE), in which the value of AVE has to be at least 0.50 to indicate sufficient convergent validity (Urbach & Ahlemann, 2010). Table 5.9 reveals that, when applied to the data set of the present study, all AVE values were equal or greater than 0.50, thus establishing convergent validity.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average variance extracted (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>0.781</td>
</tr>
<tr>
<td>Customer performance</td>
<td>0.703</td>
</tr>
<tr>
<td>Internal business process</td>
<td>0.860</td>
</tr>
<tr>
<td>performance</td>
<td></td>
</tr>
<tr>
<td>Learning-growth performance</td>
<td>0.758</td>
</tr>
<tr>
<td>Environmental and social</td>
<td>0.637</td>
</tr>
<tr>
<td>performance</td>
<td></td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>0.604</td>
</tr>
<tr>
<td>Quality of AIS</td>
<td>0.506</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>0.499</td>
</tr>
</tbody>
</table>

Table 5.9: Results for convergent validity

Validity Type 4: Discriminant validity

Discriminant validity assesses whether the measuring items do not accidentally measure beyond their own construct. There are two main criteria for discriminant validity. The first one is a cross-factor-loading test that verifies whether each item is loading more highly on its proposed construct than on other constructs (Urbach & Ahlemann, 2010). Table 5.10 presents a cross-loading of all items in the research model of the present study, which demonstrates that the constructs in the model differ sufficiently from each other.
Table 5.10: A cross-loading of all items in the research model

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S2.1</td>
<td>0.878</td>
<td>0.672</td>
<td>0.539</td>
<td>0.509</td>
<td>0.549</td>
<td>0.358</td>
<td>0.225</td>
<td>0.408</td>
</tr>
<tr>
<td>S2.2</td>
<td>0.905</td>
<td>0.607</td>
<td>0.606</td>
<td>0.470</td>
<td>0.410</td>
<td>0.365</td>
<td>0.250</td>
<td>0.315</td>
</tr>
<tr>
<td>S2.3</td>
<td>0.868</td>
<td>0.659</td>
<td>0.685</td>
<td>0.488</td>
<td>0.386</td>
<td>0.450</td>
<td>0.371</td>
<td>0.358</td>
</tr>
<tr>
<td>S2.4</td>
<td>0.754</td>
<td>0.934</td>
<td>0.687</td>
<td>0.450</td>
<td>0.451</td>
<td>0.493</td>
<td>0.428</td>
<td>0.399</td>
</tr>
<tr>
<td>S2.5</td>
<td>0.518</td>
<td>0.773</td>
<td>0.519</td>
<td>0.774</td>
<td>0.406</td>
<td>0.360</td>
<td>0.290</td>
<td>0.177</td>
</tr>
<tr>
<td>S2.6</td>
<td>0.519</td>
<td>0.798</td>
<td>0.485</td>
<td>0.271</td>
<td>0.291</td>
<td>0.255</td>
<td>0.288</td>
<td>0.279</td>
</tr>
<tr>
<td>S2.7</td>
<td>0.718</td>
<td>0.721</td>
<td>0.949</td>
<td>0.570</td>
<td>0.457</td>
<td>0.580</td>
<td>0.376</td>
<td>0.227</td>
</tr>
<tr>
<td>S2.8</td>
<td>0.558</td>
<td>0.541</td>
<td>0.901</td>
<td>0.617</td>
<td>0.467</td>
<td>0.422</td>
<td>0.340</td>
<td>0.186</td>
</tr>
<tr>
<td>S2.9</td>
<td>0.215</td>
<td>0.221</td>
<td>0.440</td>
<td>0.246</td>
<td>0.032</td>
<td>0.067</td>
<td>0.073</td>
<td>0.074</td>
</tr>
<tr>
<td>S2.10</td>
<td>0.581</td>
<td>0.307</td>
<td>0.392</td>
<td>0.903</td>
<td>0.436</td>
<td>0.436</td>
<td>0.356</td>
<td>0.226</td>
</tr>
<tr>
<td>S3.1</td>
<td>0.498</td>
<td>0.441</td>
<td>0.486</td>
<td>0.306</td>
<td>0.299</td>
<td>0.766</td>
<td>0.521</td>
<td>0.350</td>
</tr>
<tr>
<td>S3.2</td>
<td>0.429</td>
<td>0.388</td>
<td>0.530</td>
<td>0.383</td>
<td>0.452</td>
<td>0.855</td>
<td>0.453</td>
<td>0.303</td>
</tr>
<tr>
<td>S3.3</td>
<td>0.237</td>
<td>0.319</td>
<td>0.369</td>
<td>0.313</td>
<td>0.334</td>
<td>0.791</td>
<td>0.449</td>
<td>0.304</td>
</tr>
<tr>
<td>S3.4</td>
<td>0.259</td>
<td>0.334</td>
<td>0.284</td>
<td>0.306</td>
<td>0.174</td>
<td>0.748</td>
<td>0.527</td>
<td>0.346</td>
</tr>
<tr>
<td>S3.5</td>
<td>0.241</td>
<td>0.363</td>
<td>0.361</td>
<td>0.281</td>
<td>0.245</td>
<td>0.735</td>
<td>0.483</td>
<td>0.331</td>
</tr>
<tr>
<td>S3.6</td>
<td>0.344</td>
<td>0.292</td>
<td>0.433</td>
<td>0.405</td>
<td>0.351</td>
<td>0.765</td>
<td>0.362</td>
<td>0.260</td>
</tr>
<tr>
<td>S4.1A</td>
<td>0.215</td>
<td>0.289</td>
<td>0.295</td>
<td>0.266</td>
<td>0.162</td>
<td>0.467</td>
<td>0.704</td>
<td>0.437</td>
</tr>
<tr>
<td>S4.2A</td>
<td>0.126</td>
<td>0.259</td>
<td>0.323</td>
<td>0.155</td>
<td>0.159</td>
<td>0.486</td>
<td>0.730</td>
<td>0.245</td>
</tr>
<tr>
<td>S4.3A</td>
<td>0.140</td>
<td>0.297</td>
<td>0.311</td>
<td>0.240</td>
<td>0.132</td>
<td>0.526</td>
<td>0.831</td>
<td>0.332</td>
</tr>
<tr>
<td>S4.4A</td>
<td>0.315</td>
<td>0.260</td>
<td>0.377</td>
<td>0.353</td>
<td>0.285</td>
<td>0.375</td>
<td>0.674</td>
<td>0.271</td>
</tr>
<tr>
<td>S4.5A</td>
<td>0.314</td>
<td>0.403</td>
<td>0.379</td>
<td>0.353</td>
<td>0.254</td>
<td>0.381</td>
<td>0.677</td>
<td>0.269</td>
</tr>
<tr>
<td>S4.6A</td>
<td>0.177</td>
<td>0.193</td>
<td>0.120</td>
<td>0.269</td>
<td>0.218</td>
<td>0.416</td>
<td>0.709</td>
<td>0.367</td>
</tr>
<tr>
<td>S4.7A</td>
<td>0.280</td>
<td>0.266</td>
<td>0.185</td>
<td>0.351</td>
<td>0.088</td>
<td>0.416</td>
<td>0.738</td>
<td>0.349</td>
</tr>
<tr>
<td>S4.8A</td>
<td>0.203</td>
<td>0.354</td>
<td>0.216</td>
<td>0.284</td>
<td>0.261</td>
<td>0.404</td>
<td>0.690</td>
<td>0.262</td>
</tr>
<tr>
<td>S4.9A</td>
<td>0.191</td>
<td>0.234</td>
<td>0.240</td>
<td>0.172</td>
<td>0.099</td>
<td>0.373</td>
<td>0.703</td>
<td>0.234</td>
</tr>
<tr>
<td>S4.10A</td>
<td>0.347</td>
<td>0.411</td>
<td>0.322</td>
<td>0.229</td>
<td>0.177</td>
<td>0.358</td>
<td>0.642</td>
<td>0.300</td>
</tr>
<tr>
<td>S4.11B</td>
<td>0.302</td>
<td>0.244</td>
<td>0.127</td>
<td>0.171</td>
<td>0.196</td>
<td>0.213</td>
<td>0.162</td>
<td>0.621</td>
</tr>
<tr>
<td>S4.21B</td>
<td>0.272</td>
<td>0.275</td>
<td>0.223</td>
<td>0.237</td>
<td>0.350</td>
<td>0.365</td>
<td>0.266</td>
<td>0.682</td>
</tr>
<tr>
<td>S4.31B</td>
<td>0.244</td>
<td>0.201</td>
<td>0.141</td>
<td>0.173</td>
<td>0.159</td>
<td>0.323</td>
<td>0.345</td>
<td>0.632</td>
</tr>
<tr>
<td>S4.41B</td>
<td>0.291</td>
<td>0.186</td>
<td>0.139</td>
<td>0.137</td>
<td>0.381</td>
<td>0.167</td>
<td>0.256</td>
<td>0.728</td>
</tr>
<tr>
<td>S4.51B</td>
<td>0.337</td>
<td>0.300</td>
<td>0.208</td>
<td>0.143</td>
<td>0.239</td>
<td>0.309</td>
<td>0.278</td>
<td>0.725</td>
</tr>
<tr>
<td>S4.61B</td>
<td>0.415</td>
<td>0.279</td>
<td>0.233</td>
<td>0.154</td>
<td>0.312</td>
<td>0.352</td>
<td>0.413</td>
<td>0.776</td>
</tr>
<tr>
<td>S4.71B</td>
<td>0.073</td>
<td>0.082</td>
<td>0.019</td>
<td>0.155</td>
<td>0.123</td>
<td>0.340</td>
<td>0.386</td>
<td>0.580</td>
</tr>
<tr>
<td>S4.81B</td>
<td>0.357</td>
<td>0.379</td>
<td>0.199</td>
<td>0.288</td>
<td>0.357</td>
<td>0.296</td>
<td>0.365</td>
<td>0.801</td>
</tr>
<tr>
<td>S4.91B</td>
<td>0.195</td>
<td>0.214</td>
<td>0.097</td>
<td>0.038</td>
<td>0.210</td>
<td>0.211</td>
<td>0.322</td>
<td>0.750</td>
</tr>
<tr>
<td>S4.10B</td>
<td>0.279</td>
<td>0.243</td>
<td>0.088</td>
<td>0.060</td>
<td>0.249</td>
<td>0.258</td>
<td>0.371</td>
<td>0.734</td>
</tr>
</tbody>
</table>
Chapter 5: Results of data analysis

The second criterion for discriminant validity, that of Ponnell-Larcker (1981), requires the square root of AVE for each construct to be higher than the correlation between that construct and any other constructs (Urbach & Ahlemann, 2010). The results in Table 5.11 illustrate that all constructs in the research model met this criterion, as none of the correlation values exceeded its respective square root of AVE (diagonal values). Thus, discriminant validity of measures was emphasised. Overall, the results of measurement model assessment established support for the unidimensionality, reliability, convergent and discriminant validities of the measures used in the research model of the present study. The measures are therefore considered to be satisfactory.

The next step of the PLS analysis is to assess the structural model and test the hypotheses.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Financial performance</td>
<td>0.884</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Customer performance</td>
<td>0.734</td>
<td>0.838</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Internal business process performance</td>
<td>0.694</td>
<td>0.689</td>
<td>0.927</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Learning and growth performance</td>
<td>0.555</td>
<td>0.586</td>
<td>0.633</td>
<td>0.871</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Environment and social performance</td>
<td>0.507</td>
<td>0.466</td>
<td>0.502</td>
<td>0.505</td>
<td>0.798</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Use of AIS information</td>
<td>0.410</td>
<td>0.356</td>
<td>0.224</td>
<td>0.230</td>
<td>0.380</td>
<td>0.706</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Quality of AIS information</td>
<td>0.324</td>
<td>0.413</td>
<td>0.382</td>
<td>0.380</td>
<td>0.254</td>
<td>0.447</td>
<td>0.711</td>
<td></td>
</tr>
<tr>
<td>8. Industry dynamism</td>
<td>0.446</td>
<td>0.462</td>
<td>0.541</td>
<td>0.430</td>
<td>0.409</td>
<td>0.404</td>
<td>0.596</td>
<td>0.777</td>
</tr>
</tbody>
</table>

Table 5.11: Correlation among construct scores (square root of AVE in diagonal)

5.4.2.2 Assessment of Structural Model

As PLS analysis requires no distributional assumption in its parameter estimation, four main criteria were used to assess the structural model and examine the hypotheses (Urbach & Ahlemann, 2010):
Chapter 5: Results of data analysis

i) Coefficient of determination for the dependent variable;
ii) The effect size test;
iii) The Stone-Geisser test for predictive relevance; and
iv) The size, t-statistic and significant level for the path coefficients.

(i) **Coefficient of determination for the dependent variables**

The coefficient of determination ($R^2$) for the dependent variables measures the explained variance of a latent variable relative to its total variance. Falk and Miller (1992) recommended 0.10 to be the minimum level of acceptance. As shown in Table 5.12 below, all $R^2$'s for each dependent variable were greater than 0.10. More specifically, 26% of variance in the financial performance is explained by the use of AIS and industry dynamism, 25% of variance in the customer performance is explained by the use of AIS and industry dynamism, 29% of variance in the internal business process performance is explained by the use of AIS and industry dynamism, 21% of variance in the learning and growth performance is explained by the use of AIS and industry dynamism, 25% of variance in the environmental and social performance is explained by the use of AIS and industry dynamism, and 23% of variance in the managers' use of AIS is explained by the quality of AIS and industry dynamism. The overall predicative power of the model was assessed by the Average Variance Accounted for (AVA), as suggested by Chin (1998b). The average of the sum all $R^2$'s produced an AVA of 0.249, giving evidence of the existence of the associations and affirming that the later examination of the significance of the paths is appropriate.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial performance</td>
<td>0.229</td>
</tr>
<tr>
<td>Customer performance</td>
<td>0.263</td>
</tr>
<tr>
<td>Internal business process performance</td>
<td>0.255</td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>0.292</td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>0.208</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>0.251</td>
</tr>
<tr>
<td><strong>AVA</strong></td>
<td><strong>0.249</strong></td>
</tr>
</tbody>
</table>

**Table 5.12:** The coefficient of determination ($R^2$) for the dependent variables
(ii) The effect size test
It is important to calculate the effect size ($f^2$) for detecting the strength of the structural associations in research models (Lee et al., 2011). The value of $f^2$ measures the size of an independent variable’s effects on a dependent variable. According to Chin (2010), the value of $f^2$ depends on a dependent variable’s $R^2$ when a predictor variable is used and omitted (included $R^2$ and excluded $R^2$)\(^{11}\). Cohen (1988) suggested that an effect size is trivial when $f^2$ is lower than 0.02, small when it is lower than 0.15, medium when it is lower than 0.35, and large when it exceeds 0.35. Table 5.13 below presents $f^2$ for the structural relationships, showing the effect size of each relationship in the present study. Having the majority of the relationships with a small effect size may imply an empirically limited confirmation of any significant findings in the present study. Nevertheless, comparing these figures with relative studies was not achievable because many did not report such results.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>$R^2$</th>
<th>$f^2$</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of AIS</td>
<td>Financial performance</td>
<td>0.263</td>
<td>0.203</td>
<td>0.081</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.263</td>
<td>0.176</td>
<td>0.118</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>Customer performance</td>
<td>0.255</td>
<td>0.224</td>
<td>0.042</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.255</td>
<td>0.151</td>
<td>0.140</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>Internal business process performance</td>
<td>0.293</td>
<td>0.294</td>
<td>-0.001</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.293</td>
<td>0.057</td>
<td>0.334</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>Learning-growth performance</td>
<td>0.208</td>
<td>0.205</td>
<td>0.004</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.208</td>
<td>0.091</td>
<td>0.148</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>Environmental and social performance</td>
<td>0.251</td>
<td>0.202</td>
<td>0.065</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.251</td>
<td>0.190</td>
<td>0.081</td>
</tr>
<tr>
<td>Quality of AIS</td>
<td>Use of AIS</td>
<td>0.229</td>
<td>0.163</td>
<td>0.086</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td></td>
<td>0.229</td>
<td>0.201</td>
<td>0.036</td>
</tr>
</tbody>
</table>

Table 5.13: Effect size for the structural relationships

\(^{11}\) $f^2 = (R^2\text{ included} - R^2\text{ excluded}) / (1 - R^2\text{ included})$
While a small effect size may not essentially represent an insignificant interaction effect (Chin et al., 2003), researchers in different fields stressed that small effect sizes may have substantial practical value. For instance, Mordock (2000) stated that “findings from an investigation reporting a small ES [effect size] but employing a meaningful outcome measure would be preferred over the findings of one reporting a large ES but using a less meaningful outcome measure” (p.697). The meaningfulness of variables’ measures concerns whether change in the scale points of the measures follows a logical pattern in the real world. In the present study, all measures of the variables were well established in the relevant literature as the hypothesised relationships were developed based on theoretical rationale extracted from the findings of previous empirical studies. Therefore, any statistical significance of the findings with small effect size still holds practical implications, especially when the sample size of the present study was sufficient enough, as implied by Chin (2010).

(iii) The Stine-Geisser test for predictive relevance

The Stone-Geisser test for predictive relevance ($Q^2$) was performed to assess how well observed values were reproduced by the model and its parameter estimates (Chin, 2010). Stone-Geisser’s $Q^2$ is considered an alternative measure for goodness of fit in PLS path modelling (Tenenhaus et al., 2005). In general, a positive value of $Q^2$ indicates a good predictive ability of the model while a negative value signals a lack of predictive relevance. Chin (2010) clarified that there are two types of $Q^2$: communality and redundancy. A cross-validated communality $Q^2$ is obtained when prediction of the omitted data points is produced by the scores of the blindfolded latent variable, while a cross-validated redundancy $Q^2$ is obtained when the prediction of omitted data points is produced by the scores of other variables affecting the blindfolded variable. According to Chin (2010), any omission distance between 5 and 10 is feasible as long as the sample size is sufficient.

Since “the cross-validation test of Stone and Geisser fits soft modeling like hand in glove” (Tenenhaus et al., 2005, p.174), the present study used the blindfolding procedure to examine the predictive relevance of the structural model based on the results of cross-validated communalities and redundancies. As presented in Table 5.14 below, using an omission distance of 5 and 10 yielded similar results, illustrating that the parameter estimates of the model were stable. Also, the results show that the value
of \( Q^2 \) for all dependent variables was greater than 0, indicating that the model has satisfactory predictive relevance. Therefore, the following step is to test the hypothesised relationships (H3, H4a to H4e, H5a to H5e, and H6) by examining the size, t-statistic and significant level for the paths' coefficients.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Omission Distance = 5</th>
<th>Omission Distance = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cross-validated</td>
<td>cross-validated</td>
</tr>
<tr>
<td></td>
<td>communality ( Q^2 )</td>
<td>redundancy ( Q^2 )</td>
</tr>
<tr>
<td>Use of AIS</td>
<td>0.475</td>
<td>0.111</td>
</tr>
<tr>
<td>Financial performance</td>
<td>0.783</td>
<td>0.194</td>
</tr>
<tr>
<td>Customer performance</td>
<td>0.734</td>
<td>0.165</td>
</tr>
<tr>
<td>Internal business process performance</td>
<td>0.581</td>
<td>0.137</td>
</tr>
<tr>
<td>Learning-growth performance</td>
<td>0.751</td>
<td>0.154</td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>0.396</td>
<td>0.161</td>
</tr>
</tbody>
</table>

*Table 5.14: The blindfolding results*
5.4.2.3 Testing for H3, H4a to H4e, H5a to H5e, and H6

H3: There is a positive relationship between the quality of AIS and managers’ use of AIS information.
H4a: The more managers use AIS information, the greater is the financial performance of their organisations.
H4b: The more managers use AIS information, the greater is the customer performance of their organisations.
H4c: The more managers use AIS information, the greater is the internal business process performance of their organisations.
H4d: The more managers use AIS information, the greater is the learning and growth performance of their organisations.
H4e: The more managers use AIS information, the greater is the environmental and social performance of their organisations.
H5a: The more dynamic an industry is, the greater is the financial performance of an organisation within the industry.
H5b: The more dynamic an industry is, the greater is the customer performance of an organisation within that industry.
H5c: The more dynamic an industry is, the greater is the internal business process performance of an organisation within the industry.
H5d: The more dynamic an industry is, the greater is the learning and growth performance of an organisation within the industry.
H5e: The more dynamic an industry is, the greater is the environmental and social performance of an organisation within the industry.
H6: There is a positive relationship between industry dynamism and the managerial use of AIS information.

In order to test the proposed hypotheses, the bootstrapping resampling technique was employed to estimate the size, t-value and significance levels for the structural path coefficients. By using SmartPLS 2.0, the bootstrapping procedure involved generating 1000 random samples from the data set of the present study. While the path coefficients show the size of the structural relationships, observed t-values determine the significance levels of those coefficients. Basically an observed t-value has to be compared to a critical z-value; t-values are treated as z-values when the sample size is over 30 cases (Huck, 2008). The results of the structural model testing by PLS analysis are summarised in Table 5.15 and followed by an interpretation of the critical z-value in Table 5.16.

---

12 Based on the suggestion of Hesterberg et al. (2005) and following several accounting studies such as Dowling (2009), Hall and Smith (2009), Hartmann and Stepnica (2009), Abernathy et al. (2010), and Elbashir et al. (2011), 1000 random samples were set in bootstrapping.
13 Additional to PLS analysis, the present study performed path analysis using ordinary least squares (OLS) regression to test the same hypotheses (see Appendix H).
Chapter 5: Results of data analysis

<table>
<thead>
<tr>
<th>Dependent (predicted) variable</th>
<th>Independent (predictor) Variables</th>
<th>Hypothesis</th>
<th>Path coefficient ($\beta$)</th>
<th>Observed t-value</th>
<th>Sig. level ($p$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of AIS</td>
<td>Quality of AIS</td>
<td>H3</td>
<td>.321</td>
<td>2.87</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H6</td>
<td>.213</td>
<td>1.75</td>
<td>**</td>
</tr>
<tr>
<td>Financial performance</td>
<td>Use of AIS</td>
<td>H4a</td>
<td>.275</td>
<td>2.41</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H5a</td>
<td>.328</td>
<td>3.15</td>
<td>****</td>
</tr>
<tr>
<td>Customer performance</td>
<td>Use of AIS</td>
<td>H4b</td>
<td>.202</td>
<td>1.68</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H5b</td>
<td>.365</td>
<td>3.87</td>
<td>****</td>
</tr>
<tr>
<td>Internal business process performance</td>
<td>Use of AIS</td>
<td>H4c</td>
<td>.007</td>
<td>0.06</td>
<td>n.s</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H5c</td>
<td>.535</td>
<td>5.39</td>
<td>****</td>
</tr>
<tr>
<td>Learning and growth performance</td>
<td>Use of AIS</td>
<td>H4d</td>
<td>.067</td>
<td>.067</td>
<td>n.s</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H5d</td>
<td>.378</td>
<td>3.76</td>
<td>****</td>
</tr>
<tr>
<td>Environmental and social performance</td>
<td>Use of AIS</td>
<td>H4e</td>
<td>.256</td>
<td>2.22</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Industry dynamism</td>
<td>H5e</td>
<td>.275</td>
<td>2.29</td>
<td>**</td>
</tr>
</tbody>
</table>

Table 5.15: PLS results for hypotheses testing

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Sig. level ($p$)</th>
<th>Critical z-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>****</td>
<td>.001</td>
<td>3.090</td>
</tr>
<tr>
<td>***</td>
<td>.010</td>
<td>2.326</td>
</tr>
<tr>
<td>**</td>
<td>.050</td>
<td>1.645</td>
</tr>
<tr>
<td>*</td>
<td>.100</td>
<td>1.282</td>
</tr>
<tr>
<td>n.s</td>
<td>Not significant</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5.16: Critical z-values

14 Please refer to Table 5.16 for the meaning of symbols.
The results of PLS analysis, as presented in Table 5.14 above, indicated that both the quality of AIS ($\beta = 0.321$, $t =2.87$, $p < 0.01$) and industry dynamism ($\beta = 0.213$, $t =1.75$, $p < 0.05$) had significant positive effects on the use of AIS. These results suggested that managers' utilisation of AIS information depended positively on their perceptions of quality of AIS and industry dynamism. Accordingly, H3 and H6 were found to be supported.

Moreover, the results showed that both the use of AIS ($\beta = 0.275$, $t =2.41$, $p < 0.01$) and industry dynamism ($\beta = 0.328$, $t =3.15$, $p < 0.001$) had significant positive impacts on the financial performance of organisations, implying that managerial use of AIS information and industry dynamism helped to improve financial performance of organisations, thus providing support for H4a and H5a. For the customer performance, similar results were also found where both the use of AIS ($\beta = 0.202$, $t =1.68$, $p < 0.05$) and industry dynamism ($\beta = 0.365$, $t =3.87$, $p < 0.001$) had significant positive influence on the customer performance of organisations. These results suggested that more use of AIS information by managers and high dynamism in industries contributed positively toward the customer performance of organisations, hence supporting H4b and H5b.

The results of PLS analysis also revealed that, on one hand, the use of AIS ($\beta = 0.007$, $t =-0.6$) had a non-significant effect on the internal business process performance of organisations, advocating that the incremental use of AIS information by managers did not enhance the internal business process performance. Therefore H4c was not supported. On the other hand, the results showed that industry dynamism ($\beta = 0.535$, $t =5.39$, $p < 0.001$) had a significant positive effect on the internal business process performance of organisations, indicating that highly dynamic industries played a positive role in improving the internal business process performance of organisations. Thus H5c was supported.

The results of PLS analysis clarified that while the use of AIS ($\beta = 0.067$, $t =0.067$) had a non-significant impact on the learning and growth performance of organisations, industry dynamism ($\beta = 0.378$, $t =3.76$, $p < 0.001$) had a significant positive influence on that same performance. These findings suggested that
managerial use of AIS was not significantly associated with the learning and growth performance of organisations as the state of industry dynamism did. Therefore, the results failed to support H4e while succeeding in supporting H5e.

Finally, the results of PLS analysis demonstrated that both the use of AIS ($\beta = 0.256$, $t = 2.22$, $p < 0.05$) and industry dynamism ($\beta = 0.275$, $t = 2.29$, $p < 0.05$) had significant positive impacts on the environmental and social performance of organisations. These findings provided evidence that more managerial utilisation of AIS information, as well as a higher dynamic characteristic of industries, positively influence the environmental and social performance of organisations. As a result, both H4e and H5e were found to be supported. Figure 5.13 provides a visual depiction of the model with the associated path estimates and their significance.
Figure 5.13: PLS results for the structural model testing
## 5.5 Summary of results of testing hypotheses

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>The financial performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b</td>
<td>The customer performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1c</td>
<td>The internal business process performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1d</td>
<td>The learning and growth performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1e</td>
<td>The environmental and social performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H2</td>
<td>Managers' use of AIS information in an organisation with a family CEO does not differ significantly from that in an organisation with a non-family CEO.</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>There is a positive relationship between the quality of AIS and managers' use of AIS information.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4a</td>
<td>The more managers use AIS information, the greater is the financial performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b</td>
<td>The more managers use AIS information, the greater is the customer performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4c</td>
<td>The more managers use AIS information, the greater is the internal business process performance of their organisations.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H4d</td>
<td>The more managers use AIS information, the greater is the learning and growth performance of their organisations.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H4e</td>
<td>The more managers use AIS information, the greater is the environmental and social performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5a</td>
<td>The more dynamic an industry is, the greater is the financial performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5b</td>
<td>The more dynamic an industry is, the greater is the customer performance of an organisation within that industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5c</td>
<td>The more dynamic an industry is, the greater is the internal business process performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5d</td>
<td>The more dynamic an industry is, the greater is of the learning and growth performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5e</td>
<td>The more dynamic an industry is, the greater is the environmental and social performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>There is a positive relationship between industry dynamism and the managerial use of AIS information.</td>
<td>Supported</td>
</tr>
</tbody>
</table>
CHAPTER 6

Discussion of results, contributions, limitations and conclusions

6.0 Introduction
This final chapter of the study comprises four sections. Section 6.1 discusses the research findings for each hypothesis. The qualitative results from the interviews are incorporated in some of these discussions to help interpret and making informative the findings of the hypotheses testing. Section 6.2 clarifies the contributions of the present study; a presentation of the research limitations follows in section 6.3. Finally, section 6.4 provides a summary and concludes the study.

6.1 Discussion of Results
This section presents discussions of the research findings for each hypothesis in turn.

6.1.1 Hypothesis H1a
The financial performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.
The results in Table 5.4 in chapter 5 show that there are no significant difference between organisations with family CEOs and those with non-family CEOs in terms of financial performance. As a consequence, hypothesis H1a was supported. An explanation of the non-significant result is that organisations run by non-family CEOs perform financially as well as those run by family CEOs, proving that family control of management of an organisation does not necessarily increase profitability of the organisations. Other factors may significantly influence the relationship between the type of CEO and the financial performance of organisations. This explanation is in line with the findings of previous studies reporting that different organisational and environmental factors significantly affect the association between the type of CEO and the financial performance of organisation.
Chapter 6: Discussion of results, contribution, limitations and conclusions

For example, Lin and Hu (2007) found no significant difference in financial performance between family and non-family CEOs. These authors concluded that both family and non-family CEOs can assist an organisation's performance as long as there were appropriate governance mechanisms in the organisation. Another factor, as investigated by Banalieva and Eddleston (2011), is the geographic scope of the organisational strategy. The authors showed that when local regions were targeted, organisations with family CEOs perform better than those with non-family CEOs, whereas organisations with non-family CEOs perform better when an international-scale strategy was pursued. Thus, it appeared that such organisational factors can mediate the relationship between the type of CEO and the financial performance of organisations.

In addition, the findings of Anderson and Reeb's (2003) study highlighted the view that the effects of family and non-family CEOs on organisational performance vary according to the legal environment. The authors argued that family control of management in listed organisations can reduce the costs of the agency problem only in well-regulated and transparent business environments. Taking the transparency international index (TI, 2011) as a measure, it appears that previous studies reporting positive impacts of family CEOs on financial performance were all conducted in relatively more regulated and transparent economies. For instance, while the sample of Maury's (2006) study included organisations from Austria, Belgium, Finland, France, Germany, Ireland, Norway, Spain, Sweden, Switzerland, and the United Kingdom, the study of Martinez et al. (2007) was conducted in Chile. In relatively less regulated and transparent economies such as Taiwan\(^{15}\), Lin and Hu (2007) found no significant differences in financial performance between family and non-family CEOs. However, those possible effects were not investigated because it was beyond the scope of the current study to investigate the extent of regulations and level of transparency in Saudi Arabian economy.

\(^{15}\) The status of transparency and regulation according to the international transparency index (IT, 2011) is as follow: Taiwan (32\(^{th}\)), Saudi Arabia (57\(^{th}\)), Austria (16\(^{th}\)), Belgium (19\(^{th}\)), Finland (20\(^{th}\)), France (23\(^{th}\)), Germany (14\(^{th}\)), Ireland (19\(^{th}\)), Norway (6\(^{th}\)), Spain (31\(^{st}\)), Sweden (4\(^{th}\)), Switzerland (8\(^{th}\)), the United Kingdom (16\(^{th}\)), and Chile (22\(^{th}\)).
6.1.2 Hypothesis H1b

The customer performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

Table 5.4 in chapter 5 shows that there are no significant differences between organisations with family CEOs and those with non-family CEOs in terms of customer performance. As a result, hypothesis H1b was supported. The findings suggest that having family COEs makes no difference to the customer performance of organisations. One possible reason for the insignificant finding is that, regardless of the type of leadership, the concept of having quality relationships with customers has become a fairly common practice in the business community globally. Whether a CEO is a family member or an outsider, a local or a foreigner, male or female, the importance of customer relationship management has been evident to the CEOs worldwide. This interpretation is consistent with the findings of Cooper *et al.* (2005) that both family and non-family organisations reported similar attitudes toward the importance of customer relationship management programs. This explanation is further supported by Orth and Green's (2009) study where no significant differences were found in customer loyalty between family managed and non-family managed businesses.

Another possible reason for this result is that financial performance and customer performance are closely related. The logic implies that customer performance relates well to the financial performance because the outcome of having more customers results in the generation of more revenues. Thus, what offsets significant differences in the financial performance may also eliminate the differences in customer performance between organisations with family CEOs and those with non-family CEOs.

Banalieva and Eddleston (2011) argued that performance differences between organisations with family CEOs and those with non-family CEOs depended on the focus of the business strategy. When the focus is on regional markets, organisations with family CEOs outperform those with non-family CEOs. “A family leader personifies the business, persuading customers to purchase its products based on positive family attributes ... by creating a positive image of the family in consumers’ minds and creating a regional reputation for integrity” (p.1063). But when the focus is
on global markets, organisations with family CEOs were found to perform worse than those with non-family CEOs, because family business leaders have less expertise than their non-family parallels in dealing with the new challenges of the global markets (Banalieva & Eddleston, 2011). It is therefore plausible that different organisational factors intervene in the relationship between the type of CEO and customer performance of organisations.

Compliance with corporate governance is an organisational factor that can eliminate family effects on organisational performance. As explained by Lin and Hu (2007), both family and non-family CEOs can assist organisational performance as long as there are appropriate governance mechanisms in the organisation. Recent studies on corporate governance in Saudi Arabia showed that publicly listed organisations employ corporate governance for adherence to the guidance of corporate governance issued by the Saudi Capital Market Authority in 2006 (Robertson et al., 2012; Hussainey & Al-Nodel, 2008; Al-Abbas, 2009). The extent of the current compliance with the guidance of corporate governance may constrict the hypothesised differences in customer performance between organisations with family CEOs and those with non-family CEOs.

Another possible reason for the non-significant differences in the present study is the nature of the interaction between customers and top management in the examined organisations. While family ties are evident in Saudi culture (Weir, 2009; Karam, 2010), those ties appear to be uninfluential in strengthening the relationship between family control of management and customer performance because publicly listed organisations are relatively large organisations16 in which direct contact between top management and customers is uncommon. The majority of research that found significant differences focused on small and medium organisations (Sorenson et al., 2009) where customers interact directly with the top management of organisations. However, both the compliance with corporate governance and the interaction between customers and top management were not investigated because they were beyond the scope of the current study.

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16 According to the Saudi Arabian Capital Market Authority, private organisations wishing to transform into publicly listed organisations must have a minimum capital of 10 million Saudi Riyals (equivalent to 2.66 million American Dollars).
6.1.3 Hypothesis H1c

The internal business process performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO. Table 5.4 in chapter 5 reveals that the internal business process performance of organisations with family CEOs differs significantly from that of organisations with non-family CEOs. Therefore, H1c was not supported. Also, the group statistics in Table 5.5 clarify that the mean of the internal business process performance for organisations with family CEOs is higher than that of organisations with non-family CEOs. An interpretation of the results is that family CEOs are likely to concentrate on improving the internal business process in order to overcome the legitimacy concerns about their organisations’ identity. A CEO who feels a greater accountability to shelter their family assets has more motivation for increasing the rate of innovations, work efficiency and services after sales to satisfy customers in a way that eliminates any legitimacy issues over the family name.

Moore and Craig (2006) presented a cases study of an Australian business, O’Reilly’s Rainforest Guesthouse, showing how a family management perceive the scorecards of its internal business process performance. “The family business [the O’Reilly’s] decided to plan to build further the culture of the organization that was founded on ecotourism leadership and ensure that this feature is communicated both inside and outside the business, thereby enhancing its reputation as a good corporate citizen” (p.204). In other words, reputation concerns over the family organisation in the minds of executive management escalated the importance of improving the internal business process. In order to enhance the overall organisational performance of the internal business process, managers need to supervise and evaluate the innovation processes, operations processes and post-sales related processes (Kaplan & Norton, 1996).

The results of the present study are also consistent with the observation of Zahra (2005) that family managements have been found to be a major facilitator of technological innovation. Because of their ownership, family managers have supremacy to bring forth ideas for innovation and strategic change as well as to conduct formal examinations and implementations ahead before rivals. In addition,
Craig et al. (2008) argued that a brand identity associated with family management can facilitate performance advantages for the organisation. According to Rajagopal (2010), a differentiation of brand by post-sales services increases customers' satisfaction and creates higher trust for the brand performance. Levenburg (2005) provided supporting results that post-sales services are found to be significant in enhancing the image of family business. It therefore appears that when the identity of organisations and the owning family are perfectly correlated, family CEOs may feel a greater accountability to shelter this identity by emphasising innovative progression, operational efficiency and post-sales services. This focus, in turn, advances the internal business process performance of those organisations.

6.1.4 Hypothesis H1d

The learning and growth performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO. Table 5.4 in chapter 5 shows that the learning and growth performance of organisations with family CEOs differs significantly from that of organisations with non-family CEOs. Therefore, H1d was not supported. Also, the group statistics in Table 5.5 clarify that the mean of the learning and growth performance for organisation with family CEOs is higher than that of organisations with non-family CEOs.

An explanation of the results is that the capabilities of employees and information systems, the drivers of learning and growth performance, are of great importance to family CEOs because of their role in satisfying customers. Greater reliance on these capabilities leads to higher stability of employees and to better accuracy of information, enabling family organisations to adapt faster and cope better with customers’ needs. In turn, satisfied customers can assist in restoring the image of the family and the business. Tagiuri and Davis (1992) found that executive management of family organisations was more concerned to accomplish excellence in the markets by creating and maintaining quality reputations. Thus family CEOs seemed to recognise the way to better reputations for their organisations, that is, by improving employees and information systems’ capabilities.
It is important to note that while the current results indicate that family CEOs try relatively harder to improve employees’ and information systems’ capabilities, the results do not suggest total negligence by non-family CEOs toward those capabilities. The results only show that family CEOs are associated with higher learning and growth performance of organisations because those CEOs are emotionally bound to the organisations more than non-family CEOs (Chua et al., 2003; Lutz & Schraml, 2011). This type of bonding has been illustrated by Astrachan and Allen (2003) who found that management of family organisations tended to stabilise employment levels and resist downsizing. Also, Lee (2006) found that employment stability in organisations with family CEOs is higher than in organisations with non-family CEOs.

It appears that family CEOs who usually followed their family founders, or want to hand over their organisations to the next generation, are likely to have a longer term view compared with non-family CEOs. The professional career and personal life of a family CEO depends intimately on the continuity and longevity of the organisation; whereas non-family CEOs would be less affected even if the organisation were liquidated. One of the participating CFOs, who worked with a family CEO for 5 years and now is working with non-family CEOs in the retail industry, commented that:

Well... yes he [Family CEO] had different attitude towards us [employees] as we know his father and some of us might work with him. In fact one of the head departments became his brother in law after working. Maybe some family CEOs feel more close to employees and can develop personal relationships with them, but business is business. I myself and other professional executives would not rely on such emotional attachments. We have to care about achieving the targets, fulfilling the contracts and advancing our skills. I managed to add CIA certificate beside my CPA that helped me to get a better offer and I did not hesitate to leave the company and sing for it.
6.1.5 Hypothesis H1c

The environmental and social performance of an organisation with a family CEO does not differ significantly from that of an organisation with a non-family CEO.

Table 5.4 in chapter 5 shows that the environmental and social performance of organisations with family CEOs differs significantly from that of organisations with non-family CEOs. Therefore, H1c was not supported. Also, the group statistics in Table 5.5 clarify that the mean of the environmental and social performance for organisations with family CEOs is higher than that for organisations with non-family CEOs. This indicates that there are incomparable incentives toward environmental and social performance between organisations with family involvement and those without family involvement in Saudi Arabia. The sensitivity toward family image and renown is a genuine deriver of environmental and social performance, as family CEOs are found to be associated with a higher environmental and social performance in organisations.

This interpretation is in line with the findings of several studies. For instance, Gallo (2004) reported that family control of management guided organisations to sufficiently fulfil their social and environmental responsibilities. Dyer and Whetten (2006) found that family control of management positively influences the organisational trend toward socially responsible performance when compared to organisations without family involvement. In addition, McGuire et al. (2012) showed that the family-controlled organisations were less likely to be involved in socially negative activities than their non-family counterparts. Supporting findings are also provided by Block and Wagner (2010), who reported a positive relationship between having family CEOs and higher levels of corporate social responsibility in organisations. The management concern over the legitimacy of organisations’ operation has been the core of the social performance improvement (Gray et al., 1995).

Moreover, prior studies found that the sensitivity of stakeholders about the natural environment plays an important role in enhancing the environmental performance of organisations. Jacobs et al. (2010) reported a statistically significant reaction in stock markets for certain environmental initiatives announced by the organisations. Also,
Craig and Dibrell (2006) showed that family CEOs had incentives to act with more environmental responsibly than non-family CEOs. Supporting evidence found by Berrone et al. (2010) revealed that family-controlled organisations protect their 'socio-emotional wealth' by having better environmental performance than their non-family parallels. Consistent with Deegan (2002) and Block and Wagner (2010) explanations, the findings of the present study support the view that associates higher levels of corporate social responsibility with the family control of organisations because of the legitimacy consideration perceived by executive management.

6.1.6 Hypothesis H2

Managers' use of AIS information in an organisation with a family CEO does not differ significantly from that in an organisation with a non-family CEO.

Table 5.6 in chapter 5 shows that there are no significant differences between managers' use of AIS information in organisations with family CEOs and such use in organisations with non-family CEOs. As a result, hypothesis H2 was supported. The findings suggest that having a family CEO makes no difference to the managerial use of AIS information. Two alternative explanations are possible for these results. The first one relates to the cultural effects on senior managers. Previous research showed that the Saudi national culture is considered to be a high power distance culture, whereby differences among its people are clearly acknowledged as the people make decisions autonomously (Hofstede, 2001; Idris, 2007). Saudi managers were found to make decisions autocratically and paternalistically (Bjerke & Al-Meer, 1993). This cultural environment may reduce the adverse effect of centralised leadership in Saudi organisations. In other words, senior managers may not be shocked or surprised by the over-control or domination of their CEOs. Rather, those managers will keep doing their job as usual even if their family CEOs exercise autocratic decision-making. Their usual job as senior managers requires a thorough utilisation of information provided by MIS including AIS.

This explanation presupposes that while the managerial decision-making process is negatively affected by the directive leadership of executive management, as reported by Western based studies such as Poza et al. (1997), Barth et al. (2005) and Cruz et al. (2011), Saudi managers may not experience such negative effects due to cultural differences. This may justify the insignificant differences between the managerial use
Chapter 6: Discussion of results, contribution, limitations and conclusions

of AIS in organisations with family CEOs and its use in organisations with non-family CEOs. However, the role of cultural differences was not explored in the present study as it was beyond the scope of the research.

On the other hand, the second possible explanation is that family CEOs in Saudi organisations may tend to decentralise their decision-making and integrate new participatory methods that lead to an increase in the use of AIS information by senior managers. Research showed that the level of education is a significant driver for decentralisation preferences of decision makers (Papadakis & Barwise, 2002) and highly educated executives are more likely to carry out power-influence sharing and joint decision making (Classen et al., 2012). When one of the interviewed CFOs was asked about these results, his response was as follows:

Of course they [family CEOs] adopt joint decision-making and also all advanced ideas in business. I work with a family CEO who has done his business studies at MIT [Massachusetts Institute of Technology] and equipped with business skills for the future and gained not only a qualification, but responsible leadership skills as well as practical experience.

This explanation implies that, because family CEOs have the ability to enrol in top institutes and are able to study aboard while relying on their family sponsorships, they become comparatively well educated. This may raise the importance of participative decision-making and delegation of authority in the minds of family CEOs which, in turn, enhances senior managers’ involvement in decision-making and ultimately leads to improving their use of AIS information.

The group statistics output convey some support for this view because the mean of the managerial use of AIS information organisation with family CEOs was 3.58, and 3.53 for those in organisations with non-family CEOs. The theoretical scale from 1 to 5 refers to the extent to which the information items are used in managers’ decision making, ranging from very low use to very high use. Also a frequency table performed by SPSS FREQUENCY showed that 40% of the participants scored their use of AIS information to be high. These indications of decentralised decision-making by family CEOs appeared to be consistent with the results of Al-Yahya’s (2009) study.
in which 60% of the participating Saudi managers showed their preferences for joint decision making. "This may indicate a change in attitudes toward new, more participative leadership and management styles over the years, and it most likely indicates changes in training content and strategies and an increased tendency to converge with international management values" (Al-Yahya, 2009, p.397). Yet, these trends of decision-making cannot be confirmed by the present study as they were beyond the scope of the research.

6.1.7 Hypothesis H3

There is a positive relationship between the quality of AIS and managers’ use of AIS information.

Table 5.14 in chapter 5 shows that the quality of AIS has significant positive effects on the managerial use of AIS information. H3 was therefore supported. An interpretation of the results is that managers’ utilisation of AIS information depended positively on their perceptions of the quality of AIS (Considine et al., 2010). This is in line with the findings of relevant research that the quality of information systems is significantly associated with the usage of these systems (DeLone & McLean, 1992). While excellent decisions require good inputs and good processing of data into information (Turban et al., 2001), managers are required to make such decisions on a daily basis. According to the results of the interviews, this increases managers’ reliance on quality information systems to perform their tasks successfully. The following comment made by the CFO of organisation B (see Table 4.21) emphasises this view:

"We use it [AIS information] everyday for every task. And of course we need it as perfect as possible. Because if we are [for example] preparing the sales budget based on poor information, many inaccurate figures will be provided. This would have numerous negative consequences on the performance of different departments and ultimately on my performance. I do not want to be caught because of unreliable AIS information."

This explanation is essentially consistent with the view that only a quality AIS has a good input and processing capacity. Wall and Greiling (2011) explained that AIS information can influence decision making by providing input into the decision-making process and by influencing the behaviour of managers themselves. Managers
can for example develop and extend their knowledge of the work environment (Hall, 2008). Quality AIS can also be considered by managers to be facilitator that helps monitor different features of their organisations, as well as empowering them to make economically, socially and environmentally informed decisions (Lamberton, 2005).

By using broad-scope, timely, aggregated and integrative AIS information, managers are able to gain a better understanding of the internal and external environments of their organisations. For example, broad-scope AIS information, the first quality dimension, can assist managers in responding more effectively to any emerging requirements of environmental and social initiatives (Allenby et al., 2001). Boullanne (2007) emphasised that managers increase their use of broad-scope AIS information because it provides them with broader views of business when it includes external, non-financial, and future-oriented information.

In addition, having aggregate information varying from unprocessed data to information that covers different responsibility centres or functional units is imperative for managers to gain a deeper understanding of their organisations (Chang et al., 2003). The results of the present study accord with the argument of Brown et al. (2005) that integrating different data from different sources enriches AIS information and improves managers' decision making. The fourth quality dimension of AIS, having response time, is a significant driver of the managerial use of AIS because being able to respond quickly to provide necessary and diverse information satisfies the managers and motivates them to use it more often (Au et al., 2002). From these elements, it appears that quality AIS effectively support the management of organisations, leading to more usage of the AIS information.

6.1.8 Hypothesis H4a

The more a manager uses AIS information, the greater is the financial performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that the managerial use of AIS information was positively and significantly associated with the financial performance of organisations. Therefore, H4a was supported. An explanation of these findings is that an increased usage of AIS information enables managers to better manage the financial
performance of organisations. These results are consistent with the findings of several studies. For example, Mia and Clarke (1999) reported that through the use of MAS information, managers can understand current and future needs of customers in order to effectively fulfil those needs by designing new products based on market expectations. An improved recognition of the current and future needs of markets can help managers in creating the right products and providing the most suitable services (Ge & Ding, 2005). This way, customers’ needs are likely to be fulfilled, encouraging them to keep buying from the organisation (Pelham, 1997); this, in turn, increases sales volume and organisational profits (Hult & Ketchen, 2001; Dawes, 2000).

The results of the present study are also consistent with argument that an improved use of AIS information can enhance managers’ awareness of internal business factors, enabling them to make adequate decisions (Considine et al., 2010). Some managers, for example, may need to supervise the production process. Through the use of AIS information, those managers can proactively detect production areas where improvements can be made, avoiding faulty products and decreasing their wastage (Bangchokdee et al., 2011). According to the interview with the CFO of organisation A (see Table 4.21), these improvements can further cut down the overall cost of sales, as long with increasing sales, the end consequence for the organisations is higher profits:

At least once each day, we [the financial division of the company] receive requests from the acting directors on the sites asking for special reports or analyses. Some about new changes in the designs, new procurements steps, or an entire financial plan for new projects. These analyses are needed urgently... Because we have a powerful system, we [are able to] do all these jobs efficiently and make our company ahead of its competitors. Numbers do not lie; look at the financial ratios of our company and see how profitable our work is.

Lukka and Granlund (1996) found that information on manufacturing defects draws the attention of managers to the problem immediately, resulted in elimination of the production of faulty items. From a different perspective, Mia (2000) found that organisations utilising more MAS information and working under just-in-time environments are more likely to have higher profitability. Baines and Langfield-
Smith’s (2003) findings support the premise that more reliance on accounting information is positively associated with the financial performance of organisations.

6.1.9 Hypothesis H4b

The more a manager uses AIS information, the greater is the customer performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate a positive and significant relationship between the managerial use of AIS information and the customer performance of organisations. Therefore, H4b was supported. An interpretation of these results is that an increased use of AIS information can assist managers in making effective decisions with regard to creating the right products and to providing suitable services that satisfy customers, strengthen their loyalty, and enlarge the market share of the organisation. This explanation is consistent with the conclusions of Ge and Ding (2005), that organisational ability to generate intelligence about consumers led to a significant and positive impact on market performance of organisations. Similarly, Snoj et al. (2007) found that organisations’ capability to offer better value and to achieve customer loyalty is positively associated with market share and sales volume.

In addition, the results of the present study are line with Inglis’s (2008) argument that the use of AIS information by managers is essential for understanding the expectations and requirements of markets. AIS can provide externally oriented information, such as figures of market surveys, to better manage the customers’ relationships through identifying the current trends in the markets and their future directions (Banghokdee et al., 2011). Lin and Germain (2003) found that customer performance of organisations is positively associated with their customer orientation, including the extent to which the organisations design products from consumers’ feedback, attend to consumers’ signals on products’ quality requirements, research product aspects desired by customers, and execute knowledge on how consumers may use those products.
These results are also supported by the information collected through the interviews with the managers. The findings of the interviews suggest that their use of AIS information is vital in improving the customer performance of their organisations. For instance, the CFO of organisation E (see Table 4.21) in the insurance industry noted as follows:

My company has the largest number of customers [in Saudi Arabia]. The main reason is the ability to collect and process vast and complicated information about them [customers]. After all our business is about providing services based on the needs of customers and this what made the company invest a huge fortune on a computerised management information system [included AIS] ... that advanced us ahead of others. We can tailor the services according to a customer's needs in a clear [transparent] and fast way. And [for the existing customers] we have no waiting lists for claims.

6.1.10 Hypothesis H4c

The more a manager uses AIS information, the greater is the internal business process performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate a positive but insignificant relationship between the managerial use of AIS information and the internal business process performance of organisations. Therefore, H4c was not supported. The results indicate that the managerial use of AIS information may not assist organisations to improve their internal business process performance. Surprisingly, this result contradicts the present study's expectation and the findings of previous studies such as Chenhall (1997), Mia (2000), Hoque (2003) and Bangchokdeoo et al., (2011).

A possible reason for the result might be due to negative effects of information overload on decision-making. Managing the internal business process requires information about different divisions in the organisations. Taking Kaplan and Norton's (1996) categories of business processes (the innovation, operations and post-sales processes) as core divisions, it appears that managers need massive details to recognise the efficiency of each aspect of the internal business processes. Dealing with a large amount of information may negatively influence managers’ efforts to improve their organisational performance. Several accounting studies such as Schick
et al. (1990), Iselin (1993), Stocks and Harrell (1995), and Gadenne and Iselin (2000) have reported negative effects of information overload on the quality of managers’ decision-making.

A recent study by Iselin et al. (2010) found partial support to argument that multi-perspective performance systems (e.g. BSC) may provide managers with a heavy information load, disabling their ability to make quality decisions and therefore reducing the organisational performance. Information, data and redundant cue overload in the Iselin et al.’s study was found be negatively associated with one item of the internal business process perspective. In line with this, the present study suspects that because of the complexity and diversity of internal business processes, managers are potentially prone to excessive supply of information, leading to poor managerial decision making. This may weaken or even terminate the hypothesised contribution of managers’ use of AIS information on the internal business process of organisations.

6.1.11 Hypothesis H4d
The more a manager uses AIS information, the greater is the learning and growth performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate a positive but insignificant relationship between the managerial use of AIS information and the learning and growth performance of organisations. Therefore, H4d was not supported. The results indicate that the managerial use of AIS information may not help organisations to improve their learning and growth performance, possibly because the genuine drivers of this type of organisational performance, employee satisfaction and information systems efficiency, were largely affected by other factors.

In terms of employee satisfaction, a number of psychological, physiological and environmental elements are found to shape employees’ perceptions of the relationship between what they want from their job and what they get out of it (Malouff, 2011). For example, Morris and Venkatesh (2010) showed that job characteristics such as task identity and task significance had direct and positive effects on employee satisfaction. In Saudi Arabia, Elamin and Alomaim (2011) found that job satisfaction
for local employees was significantly affected by the employees’ perception of the
fairness of treatment received from their organisation.

In addition, several studies reported significant impacts of different factors on
information systems efficiency. These studies can be categorised as those concerning
information systems attributes (DeLone & McLean, 1992) and those concerning the
personal attributes such as technology acceptance (Szajna, 1994; Venkatesh & Davis,
2000) and task technology fit (Goodhue, 1995). DeLone and McLean (2003) offered
an updated model for information system efficiency, suggesting that the success of
any given system depends on a number of elements such as intention to use, user
satisfaction and service quality. Therefore, it is plausible that factors other than
information systems efficiency and employee satisfaction may intervene in the
relationship between the managerial use of AIS information and the learning and
growth performance of organisations.

6.1.12 Hypothesis H4e

The more a manager uses AIS information, the greater is the environmental and
social performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13,
chapter 5. These results indicate a positive and significant relationship between the
managerial use of AIS information and the environmental and social performance of
organisations. Therefore, H4e was supported. An explanation of these results is that
an increased use of AIS assists managers in adopting and executing environmental
and social initiatives, and enables them to conquer the legitimacy concerns over the
organisations’ operations. This explanation is in line with the findings of Al-khater
and Naser (2003) that most users of corporate information would like to view
corporate social responsibility information disclosure. These results also support the
argument of Adams and Zutshi (2004) that, as a reporting initiative, “a good social and
environmental report should be transparent, demonstrate a genuine attempt to be
accountable to all key stakeholders, cover negative as well as positive impacts on
society and the environment, and demonstrate corporate acceptance of its social,
ethical and environmental responsibilities” (p.31).
On one hand, managers need AIS information to identify the costs of environmental initiatives. An increased use of AIS information helps to trace all environmental and material efficiency loss expenditure, improving managers’ control over waste disposal fees for environmental protection and treatment facilities (Jasch, 2003). On the other hand, managing social initiatives requires more information of the direct and indirect costs and benefits of those initiatives. In order to be effectively socially responsible, organisations have to identify the significant effects of social donation on customers’ minds (Dean, 2004). An increased use of AIS provides the managers with the necessary information for such social cost-benefit analysis (Milne, 1996), allowing better relationships to be built with the customers and community.

In the Saudi business environment, the CFO of organisation C (see Table 4.21) in the cement industry noted that mounting awareness of environmental and social issues starts to lay more pressure on the broad of directors. This is illustrated by the following comments:

... talking about the environmental impacts of the company’s activities is no longer secret. The media is full of questions about possible damages [that] the company is causing such as the release of dust while the process of grinding. In fact we are now in the middle of a major analysis requested by the chairman to prepare for possible relocation of the main factory. Such a step [initiative] needs a lot of financial and technical information to process. [Therefore], the reliance on AIS may become critical to us.

6.1.13 Hypothesis H5a
The more dynamic the industry is, the greater is the financial performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the financial performance of organisations. Therefore, H5a was supported. An interpretation of these results is that both intensive competition and rapid technological change have led to improvements in the operations process of organisations, and resulted in better financial performance. As
noted with the Saudi Telecom and Apple examples, competition and technological change yielded superior profits to these organisations.

The financial performance of Saudi organisations was found to have a positive association with industry dynamism, resulting from an improvement in production, an increase of sales and a reduction in cost of sales. Castrogiovanni (2002) reported that dynamism of newly developed industries is greater than in well-established industries. Saudi economy is also considered as a newly developed economy, implying high turbulence in its industries. This is in accord with the findings of Bangehokdee et al. (2011) that in Thailand, a newly industrialised economy, organisations react effectively to industry uncertainty by applying appropriate strategies to improve their customer satisfaction and market shares.

Furthermore, the results of the present study conformed that the more dynamic the industry is, the greater is the financial performance of organisations. These results are supported by the argument of Carmeli and Tishler (2005) that within dynamic industries, satisfied customers are likely not only to continue to purchase but also to spread a reputation about the excellence of competitive organisations, tempting new customers to buy. Those organisations are competitive because they focus on the delivered value of products and services. Seeking higher satisfaction of customers influences organisations' profitability, growth and financial strength.

The explanation above is also consistent with the findings of Wallace et al. (2010) that in dynamic industries, the relationship between top management focus on attaining positive outcomes and the financial performance of organisations is strengthened. This is because dynamic industries are motivational in a way that inspires organisations with new methods of running the business. When management strives for desired goal by focusing on attaining positive outcomes without regard for possible negative consequences, more profits for the organisations are gained. This is in line with the explanation of Ketkar and Sett (2010) and Sirmon et al. (2007) that in an dynamic industry, financial advantage of organisations is further attainable through renewing, reallocating, rejuvenating and redefining organisational resources in accordance with changes in the industry.
6.1.14 Hypothesis H5b

The more dynamic the industry is, the greater is the customer performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the customer performance of organisations. Therefore, H5b was supported. An explanation of these results is that both market competition and technological change created more emphasis on the quality and competitiveness of products and services provided by organisations. When market competition is intense, then quality production and servicing lead to higher customer satisfaction, ultimately improving customer performance of organisations. Also, when technological change in the industry is rapid, keeping up with and obtaining new technologies allows organisations to enjoy a higher competitive position and, hence, to receive better customer performance.

As with the previous results on financial performance, the positive and significant relationship between customer performance and industry dynamism is in line with the findings of several studies. For instance, Yeung and Ramasamy (2007) found that perceived quality of organisational brands is positively correlated with multiple profitability ratios: “products or services with higher levels of brand equity will result in greater customer loyalty and higher resilience to endure crisis situations, higher profit margins, more favourable customer response to price change ... resulting in improved profits” (p.325). High profits basically mean that more customers are buying products and services from the organisation. Furthermore, Hoque (2005) reported that under conditions of a high level of industry uncertainty/dynamism, the interaction between dynamism and the customer perspective of organisational performance is positive and significant. These findings emphasise the results of the present study that the more dynamic the industry is, the greater is the customer performance of organisations.
6.1.15 Hypothesis H5c

The more dynamic the industry is, the greater is the internal business process performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the internal business process performance of organisations. Therefore, H5c was supported. An interpretation of these results is that both intensive competition and rapid technological led organisations to focus on their productivity and efficiency by increasing the rate of innovations, work efficiency and post-sales services.

As a central part of their internal business activities, innovation progression has been critical factor in the performance of organisations. Industry dynamism plays a significant role in this relationship, as consistent with evidence from many previous studies such as Jansen et al. (2006) and Jansen et al. (2009). The results of the present study asserted that the internal business process performance of organisations is positively correlated with the number of new products and services provided by the organisations. This is in line with the findings of Garg et al. (2003) that, in highly dynamic industries, more CEO attention to innovation-related internal functions was associated with high performance. In other words, the overall level of dynamism in industries significantly determines top managements' judgment and choices regarding the innovation processes.

The results of the present study are also consistent with the argument of Sirmon et al. (2007) that, under conditions of high industry dynamism, operational efficiency paves the way for organisations to a greater variety of opportunities whereby providing value to customers, gaining a competitive advantage and ultimately creating wealth for organisations are achievable. In addition, the results are in accordance with the findings of Lichtenhaller (2009) that technological turbulence positively moderates the relationship between organisational ability in utilising external knowledge and performance. This supports the view that advanced technologies can secure customers' perceptions of organisational excellence by enhancing the operational efficiency. It can, for example, lead to fewer defective items or less waiting time,
which can improve the performance of internal business processes (Kaplan & Norton, 1996).

6.1.16 Hypothesis H5d

The more dynamic the industry is, the greater is the learning and growth performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the learning and growth performance of organisations. Therefore, H5d was supported. An explanation of these results is that both market competition and technological change have led organisations to improve their employees’ satisfaction and productivity as well as their provision of accurate and timely information. This is because, in dynamic industries, organisations face rapid changes in customers’ needs and preferences. To lead with these challenges, organisations need to support their employees in doing their jobs by enhancing the capabilities of employees and information systems (Barrows & Neely, 2011).

This rationalisation is supported by the views of Datta et al. (2005) that in order to improve employees’ performance, dynamics in industries should be considered when conducting any human resource practices. Wright and Snell (1999) explained that matching human resource policies with the conditions of industries is a vital step to improve employees’ satisfaction and productivity. Also, the results of the present study appear consistent with the argument of Macdade (2009) that industry dynamism has significant effects on the stability and movement of employees. In an dynamic industry, employees need to become more comfortable and to feel job security in order to perform better. One way to achieve this is to increase employees’ involvement in the process of making decisions regarding their jobs (Jackson & Schuler, 1995). This improves employees’ satisfaction and their productivity, which eventually enhances the learning and growth performance of organisations (Kaplan & Norton, 1996).

Furthermore, organisations operating in dynamic industries face high dynamic situations that require more information to deal with the complexity of these circumstances. Such situations increase the demand for information systems that are
Chapter 6: Discussion of results, contribution, limitations and conclusions

capable of producing accurate and timely data. "An environment in which managers are uncertain about changes in their industry's products, services, and technologies (i.e., a dynamic environment); about diversity in products, customers, and the nature of competition ... can produce changes in IS objectives and priorities" (Newkirk & Lederer, 2004, p.3670). This is in accordance with Lawrence's (1999) argument that industry dynamism is a significant determinant of information value to users. Managers are genuine users of information system, in which improving its capabilities enhances the learning and growth performance of organisations (Kaplan & Norton, 1996).

6.1.17 Hypothesis H5e

The more dynamic the industry is, the greater is the environmental and social performance of an organisation.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the environmental and social performance of organisations. Therefore, H5e was supported. An interpretation of these results is that both market competition and technological change played significant roles in supporting organisations’ endeavours to espouse particular practices that are friendly to the natural environment and society. The adoption of such practices helps organisations to gain a legitimacy that provides them with some protection from volatilities in the industries. The results of the present study appear consistent with arguments of Gonzalez (2005) and Benito and Benito (2006) that because commitment to the natural environment became a critical factor in the business world, many organisations began to voluntarily transfer themselves to ecological principles, giving a rise in environmental strategies whereby those organisations apply the minimal obligatory changes to meet regulations and take measures to decrease their effects on the natural environment.

In addition, Nadkarni and Narayanan (2007a; 2007b) argued that dynamic industries are categorised by rapid changes in process technologies, making it difficult to create sustainable advantage. To survive in those industries, organisations must "precipitate intentional changes and adapt to environmental changes through continuous changes in current strategic actions, asset deployment, and investment strategies" (2007b,
The authors provided an example: in a semiconductor industry a large investment in a wafer fabrication plant is expected to be outdated in less than 4 years, while in automobile industry a large investment in an engine assembly plant can last for 14 years. Such instability or dynamism in the replacement of process technologies is found to have significantly positive impacts on the environmental and social performance of organisations (Pimenova & Vorst, 2004; Hoque, 2005).

The interpreted positive effect of industry dynamism on the environmental and social performance of organisations is consistent with empirical evidence from prior studies. For instance, Rothenberg and Zyglidopoulos (2007) explained that making major technological changes to organisational processes is more attainable in highly dynamic industries than in less dynamic industries. The authors found the likelihood of organisations implementing advanced technologies to reduce harmful emissions to the environment in dynamic industries was higher than in less dynamic industries. Another study by Prakash (2002) provided evidence that organisations can be capable of managing environmental turbulences by leveraging advanced technological programs. Furthermore, Goll and Rasheed (2004) reported that organisations in dynamic industries improved their socially responsible practices in order to establish their compliance with the implicit and explicit expectations of the society.

6.1.18 Hypothesis H6

There is a positive relationship between industry dynamism and the managerial use of AIS information.

Results of PLS analysis used to test this hypothesis are presented in Table 5.13, chapter 5. These results indicate that industry dynamism was positively and significantly associated with the managerial use of AIS information. Therefore, H6 was supported. An explanation of these results is that managers seek and utilise more information to reduce their job complexity. AIS provided the managers with necessary information to improve their decision-making and enhance their performance.

As explained by Spink and Cole (2006), "the concept of uncertainty may prove to be an inclusive marker for information seeking behaviour" (p.27). This is because intensive market competition and rapid technological change increase the dynamism
of industries and, therefore, limit managers’ understanding of the business environment. To overcome this challenge, managers demand more information to clarify the volatilities around them and to make informed decisions. This is in line with the arguments of Chowdhury et al. (2011) and Guo (2011) that higher levels of job unpredictability tend to be positively associated with higher levels of information usage.

The results of the present study appear consistent with findings from many empirical studies. For example, Chong and Chong (1997) reported a positive and significant correlation between managers’ use of broad scope MAS information and their views of turbulence in competitors’ actions in the market and technological changes. Also, Lal and Hassel (1998) found that managers perceive non-conventional MAS information to be most useful when the industry is dynamic. Similarly, Mia and Clarke (1999) reported that the use of MAS is positively associated with managers’ perceived levels of competition.

More recently, Tillem (2005) discovered that since their industries are dynamic, organisations utilised more broad scope accounting information because they need financial analyses of future activities that are also subject to potential future circumstances in the markets. Furthermore, Patiar and Mia (2008) reported that an increased use of broad-scope MAS information can provide managers with information to successfully face intense competition and produce better performance. Finally, Chiou (2011) showed that the predictability and stability of organisation’s technological, competitive, and customer environments had a significant impact on the usefulness of aggregated MAS information, confirming the positive role of MAS information in assisting managers in dealing with dynamics in the environment.
6.2 Contributions

As implied by Berthon et al. (2002), since “research is a methodic search for knowledge” (p.416), the issue of contribution to knowledge is straightforward enough to be classified into two main generic categories: theoretical and practical contributions. The authors concluded that all research, from pure replication to pure generation, can significantly contribute to our knowledge. Having presented the results and their discussions in the present study earlier, the implications of this research is explained next.

6.2.1 Theoretical Implications

The present study makes a number of theoretical contributions. Firstly, prior investigations of the effects of AIS quality on managers’ use of AIS have been scarce. This is because past research focuses mainly on information-related dimensions of AIS quality such as scope and relevance (Brecht & Martin, 1996). Little attention was paid to the system-related dimensions of AIS quality, such as integration and aggregation of information. The capability of coordinating different divisions within the organisation is an important requirement for quality AIS, in order to aggregate and integrate information varying from unprocessed data to information that covers different responsibility centres or functional units enriches AIS information and improves users’ decision making which in turn enhances their understanding of their organisations (Brown et al., 2005; Chang et al., 2003).

Secondly, previous research has not clearly clarified the effects of managers’ use of AIS information on specific dimensions of organisational performance such as customer, internal business process, learning and growth, and environmental and social performances (Firgo et al., 2002). While the studies of James and Elmezughi (2010) and Bangchokdee et al. (2011) sought to investigate the effects of MAS usage on both financial and non-financial performance, environmental and social performance of organisations was absent in both studies. The present study recognised this shortcoming of performance assessments and incorporated all perspectives of the SBSC system (financial, customer, internal business process, learning and growth, and environmental and social perspectives) in assessing the organisational performance.
Thirdly, prior examination in family business research focuses only on the effects of family control on the financial performance of organisations. Other aspects of performance such as customer, internal business process, learning and growth, and environmental and social performance have not been covered. The present study filled this gap by examining the differences between organisations with family CEOs and those with non-family CEOs in terms of five perspectives of organisational performance: financial, customer, internal business process, learning and growth, and environmental and social perspectives.

Fourthly, the current understanding of the impacts of industry dynamism on organisational performance is inconclusive due to the mixed results noted by Hoque (2005). For instance, some studies (e.g. Chong & Chong, 1997) reported a significant positive correlation between market competition (one factor of industry dynamism) and financial performance, while other studies (e.g. Patiar & Mia, 2008) reported a negative influence of market competition on financial performance. Because it is imperative to enhance the existing knowledge, the present study included in its investigations the impacts of industry dynamism on organisational performance and managers’ use of AIS information.

The final theoretical contribution is that the current study improves the presently limited understanding of the Saudi business environment, especially in relation to the role of AIS on organisational sustainability as well as the role of family control of management and industry dynamism on organisational performance. This is because the majority of prior research has largely been conducted in advanced economies such as Australia, the United Kingdom and the United States. Considering the lack of our knowledge regarding Saudi organisations since the 1990s (Al-Yahya, 2009), this present study provides the existing body of literature with more insights about the Saudi business environment.

6.2.2 Practical Implications

The results of the present study provide a number of managerial implications for practising managers. Firstly, the present study reveals that the quality of AIS was significantly associated with the use of AIS information. This implies that the four
quality dimensions of AIS used in the survey (aggregation, integration, timeliness and scope) have a vital role in improving the usage of AIS. The decision to implement or invest in AIS should therefore include requests for those specific qualities. Managers are also advised to ensure that their current AIS is effective enough to provide aggregated, integrated, timely and broad-scope information.

Secondly, the results of the present study show that while the managerial use of AIS information significantly improves financial, customer and environmental and social performances of organisations, it had non-significant impacts on the internal business process and the learning and growth performances of organisations. This indicates that practising managers should focus more on how to make use of AIS in improving the internal business process and the learning and growth performances of their organisations. While utilising more AIS information seemed to be a non-significant driver, the managers should start to critically identify the roots of those weak effects. An important reason raised here is the problem of overload of information that was reported by Stocks and Harrell (1995), Gadenne and Iselin (2000), and Iselin et al. (2010) to negatively influence the managerial decision-making and performance. Other reasons including employment conditions were found by Morris and Venkatesh (2010) and Elamin and Alomaim (2011) to significantly affect employee satisfaction. Managers should therefore take those plausible reasons to concentrate more on improving the internal business process and the learning and growth performances in order to secure the sustainability of their organisations.

Thirdly, the findings of the present study reveal that the internal business process, the learning and growth, and the environmental and social performances of organisations with family CEOs are significantly higher than those found in organisations with non-family CEOs. This means that family CEOs focus more on improving the non-financial performance of organisations than do non-family CEOs. It is therefore advised that professional/non-family managers should place more emphasis on the non-financial aspects of performance to positively contribute to the future of the organisations. Also, family CEOs are reminded by the importance of financial-related measures of performance and not to be overwhelmed by the non-financial measures. There should be a balance between these two generic perspectives of organisational
performance to warrant meeting the current stakeholders' needs without compromising the ability of future stakeholders to meet their own needs.

Finally, the results of the present study clarify that industry dynamism is a significant contextual factor of organisational performance. The more dynamic the industry is, the greater the financial related and non-financial related perspectives of organisational performance. Managers should therefore consider this variable in all of their decision making. Whether the decision is to provide new products or to enter new markets, the level of dynamism in the targeted industry has a significant influence on the outcome of that decision. One proven way for managers to enhance their decisions and organisational performance in dynamic industries is to increase their use of AIS information.

6.3 Limitations and Directions for Future Research

As all applied research has inherent limitations, the present study acknowledges several limitations within its theoretical and methodological frameworks that are necessary to note. Such limitations may pave the way for future research to provide a deeper understanding of the examined relationships.

The first one is that the present study limited its research scope to the effects of quality dimensions of AIS on the managerial use of AIS information. Other non-examined factors such as managerial styles and behavioural intention have been shown to have a significant influence on the use of information systems (DeLone, & McLean, 2003). However, the present study concentrated on the central theme of the study, that is, to examine the argument that poor quality AIS reduces the manager's use of AIS information, leading to decreased SOP. Including other variables would have extended the scope of the analysis beyond a single doctoral thesis. Future examinations of those factors could lead to further understanding of the issue in this study.

The second limitation is that the present study has not fully covered several elements of SOP. This is because the SBSC framework that formed the basis in measuring SOP
comprises a large number of indicators that were excluded from the questionnaire. Those items were eliminated according to the participant views in the pilot study that having all the SBSC measuring items would be onerous for the participating CFOs. Future studies with participants in different official positions could consider those items to enhance the measurement of SOP.

The third is that in-depth interviews in the present study included only five CFOs. As expressed by an interviewed CFO, all department managers should be surveyed because they are regular users of AIS information. This would give future study greater breadth and improve the accuracy of the results. Therefore, the present study suggests testing its developed model by collecting data from department managers to further benefit our knowledge of the issue in this research area.

The fourth limitation is that the present study is a 'cross-sectional' study that surveys participant perceptions at a point in time. Yet these perceptions may differ significantly at different times or in different economic conditions. For future studies, conducting action and longitudinal case studies would pave the way for researchers to provide a better understanding of the examined associations.

The fifth limitation is that the survey method in the present study may lack some internal validity. This is because the researcher had no control over the time, place or even the person who actually completed the questionnaire. Nonetheless, considering these elements not to be critical factors in the research model, there might be only trivial impacts on the collected data of the present study. This influence is further mitigated by the procedure of distributing questionnaires and emphasising the voluntarily nature of the participation.

The sixth limitation is related to the strength of the structural associations in the research model of the present study. As explained in section 5.4.2.2, Chapter 5, the values of $f^2$ (effect size) were mostly small. This may indicate an insignificant interaction effect of the examined associations, where the independent variables had

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17 For example, items such as the number of customer complaints, on-time delivery, warranty repair, and cycle time from order to delivery were all excluded in the present study even though Hoque and James' instrument in measuring customer performance included them.
small effects on the dependent variables. However, according to Chin et al. (2003), Mordock (2000) and Chin (2010), any statistical significance of the findings with a small effect size still holds practical implications, especially when the sample size is sufficient. As the sample size of the present study proved to be sufficient enough and most of the examined associations were found to be statistically significant, the findings of the present study have substantial practical value.

The final limitation is that, while the present study gathered data from Saudi listed organisations operating in different industries, organisations in the public sector and non-profits organisations were not included. Therefore, the generalisability of the results is limited to the Saudi business environment, and more specifically, to the Saudi listed organisations.

6.4 Conclusions
The present study had six objectives, presented in section 1.2. The first objective, examining the relationship between the quality of AIS and the managers' use of AIS, showed significant and positive results. This shows that quality AIS can effectively support the management of organisations, leading to more usage of the AIS information. This is because managers' utilisation of AIS information was found to be positively associated with their perceptions of the quality of AIS.

The second objective was to examine the relationships between the managers' use of AIS information and SOP, incorporating each of the five perspectives of SBSC. The results revealed that the managerial use of AIS information was significantly associated with only the financial, customer and environmental and social performances of organisations. These results indicate that as managers utilise more AIS information, their organisations are likely to achieve greater financial, customer and environmental and social performances.

The third objective was to examine the associations between the family control of management and SOP, incorporating each of the five perspectives of SBSC. This examination discovered that family control of management had positive and significant impacts on only these performances of organisation: the internal business process, learning and growth, and environmental and social. These results imply that
as family members become executive managers, their organisations are likely to achieve greater non-financial performance.

The fourth objective was to examine the relationships between the family control of management and managers’ use of AIS information. The results demonstrate that family control of management had non-significant impacts on the managerial use of AIS information. This suggests that having a family CEO makes no significant difference to the managerial use of AIS information.

The fifth objective was to examine the associations between industry dynamism and SOP, incorporating each of the five perspectives of SBSC. The results show that industry dynamism had significant and positive impacts on all five perspectives of organisational performance. These results assert that industry dynamism is a significant contextual factor in organisational performance: the more dynamic the industry is, the more likely organisations are to achieve greater financial, customer, internal business process, learning and growth, and environmental and social performances.

The sixth objective was to examine the relationships between industry dynamism and the managerial use of AIS information. The results reveal that industry dynamism had significant and positive impacts on managers’ utilisation of AIS information. This indicates that managers seek and use more information to reduce the effects of dynamics in their business environments.

Finally, it is hoped that the results of these six objectives have theoretical and practical implications, which provide the motivation for further work in the role of AIS in organisations and add to the body of research and practice on the management of sustainability performance and family business. Not only will such works enhance our knowledge of AIS but also they represent important endeavours in identification of appropriate AIS in a range of contexts.
**INDEX OF APPENDICES**

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A:</td>
<td>Family control in publicly traded organisations in Saudi Arabia</td>
<td>p.186</td>
</tr>
<tr>
<td>Appendix B:</td>
<td>DeLone &amp; McLean model of information system success</td>
<td>p.187</td>
</tr>
<tr>
<td>Appendix C:</td>
<td>Performance of the Saudi stock exchange during the last 10 years</td>
<td>p.188</td>
</tr>
<tr>
<td>Appendix D:</td>
<td>The largest stock exchange markets worldwide in terms of the market capitalisation</td>
<td>p.189</td>
</tr>
<tr>
<td>Appendix E:</td>
<td>The questionnaire</td>
<td>p.190</td>
</tr>
<tr>
<td>Appendix F:</td>
<td>Collinearity diagnostic tests for the dependent variables</td>
<td>p.198</td>
</tr>
<tr>
<td>Appendix G:</td>
<td>Multicollinearity and singularity additional tests for the dependent variables</td>
<td>p.200</td>
</tr>
<tr>
<td>Appendix H:</td>
<td>Path analysis for testing H3, H4a to H4e, H5a to H5c, and H6</td>
<td>p.202</td>
</tr>
</tbody>
</table>
### Appendix A: Family control in publicly traded organisations in Saudi Arabia

<table>
<thead>
<tr>
<th>Type of industry (no. of organisations)</th>
<th>Number of available seats on the boards of directors</th>
<th>Number of family members on the boards of directors (no. of families)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks &amp; Financial Services industry (11)</td>
<td>108</td>
<td>72 (12)</td>
</tr>
<tr>
<td>Petrochemical industry (14)</td>
<td>121</td>
<td>72 (14)</td>
</tr>
<tr>
<td>Cement industry (9)</td>
<td>104</td>
<td>86 (14)</td>
</tr>
<tr>
<td>Retail industry (9)</td>
<td>81</td>
<td>66 (14)</td>
</tr>
<tr>
<td>Energy &amp; Utilities industry (2)</td>
<td>16</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Agriculture &amp; Food industry (15)</td>
<td>122</td>
<td>86 (18)</td>
</tr>
<tr>
<td>TeleCommunication &amp; Information Technology industry (5)</td>
<td>46</td>
<td>28 (1)</td>
</tr>
<tr>
<td>Insurance industry (31)</td>
<td>275</td>
<td>158 (31)</td>
</tr>
<tr>
<td>Multi-Investment industry (7)</td>
<td>52</td>
<td>22 (5)</td>
</tr>
<tr>
<td>Industrial Investment industry (13)</td>
<td>106</td>
<td>80 (17)</td>
</tr>
<tr>
<td>Building &amp; Construction industry (14)</td>
<td>119</td>
<td>106 (20)</td>
</tr>
<tr>
<td>Real Estate Development industry (8)</td>
<td>78</td>
<td>64 (14)</td>
</tr>
<tr>
<td>Transport industry (4)</td>
<td>33</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Media &amp; Publishing industry (3)</td>
<td>28</td>
<td>14 (3)</td>
</tr>
<tr>
<td>Hotel &amp; Tourism industry (2)</td>
<td>21</td>
<td>4 (1)</td>
</tr>
<tr>
<td><strong>Total (147)</strong></td>
<td><strong>1310</strong></td>
<td><strong>874</strong></td>
</tr>
</tbody>
</table>

* According to a recent report published by Alqissadiah Newspaper (2013), the number of family members on the boards of directors increased to 900 seats which represent 69 per cent of the available seats on the boards of directors in the Saudi stock market.
Appendix B: DeLone & McLean model of information system success

(Source: DeLone & McLean, 1992)

(i) **System quality**: reflecting more engineering-oriented performance aspects of a system by examining, for example, reliability, response time and error rates of the information processing system itself.

(ii) **Information quality**: concerning the outcomes of a system by measuring aspects of the information such as accuracy, relevance and comparability.
Appendix C: Performance of the Saudi stock market during the last 10 years

<table>
<thead>
<tr>
<th>Year</th>
<th>TASI†</th>
<th>TASI growth per year</th>
<th>Market value (USD billions)</th>
<th>Number of shares traded in millions</th>
<th>Number of transactions in thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>2,518.08</td>
<td>-</td>
<td>74.86</td>
<td>11,254</td>
<td>1,033,669</td>
</tr>
<tr>
<td>2003</td>
<td>4,437.58</td>
<td>110.14%</td>
<td>157.31</td>
<td>34,204</td>
<td>3,763,403</td>
</tr>
<tr>
<td>2004</td>
<td>8,206.23</td>
<td>94.70%</td>
<td>306.29</td>
<td>62,431</td>
<td>13,319,523</td>
</tr>
<tr>
<td>2005</td>
<td>16,712.64</td>
<td>112.28%</td>
<td>650.19</td>
<td>73,348</td>
<td>46,607,951</td>
</tr>
<tr>
<td>2006</td>
<td>7,933.29</td>
<td>-49.72%</td>
<td>326.90</td>
<td>75,733</td>
<td>96,095,920</td>
</tr>
<tr>
<td>2007</td>
<td>11,038.66</td>
<td>58.77%</td>
<td>519.03</td>
<td>64,247</td>
<td>65,665,500</td>
</tr>
<tr>
<td>2008</td>
<td>4,802.99</td>
<td>-52.50%</td>
<td>246.54</td>
<td>61,411</td>
<td>52,135,929</td>
</tr>
<tr>
<td>2009</td>
<td>6,121.76</td>
<td>29.31%</td>
<td>318.80</td>
<td>57,143</td>
<td>36,458,326</td>
</tr>
<tr>
<td>2010</td>
<td>6,620.75</td>
<td>10.86%</td>
<td>353.44</td>
<td>33,334</td>
<td>19,536,143</td>
</tr>
<tr>
<td>2011</td>
<td>6,417.73</td>
<td>-4.12%</td>
<td>338.89</td>
<td>48,536</td>
<td>25,546,933</td>
</tr>
</tbody>
</table>


† TASI: Tadawul All-Share Index
Appendix D: The largest stock exchange markets worldwide in terms of the market capitalisation

<table>
<thead>
<tr>
<th>Ranking</th>
<th>The name of stock market</th>
<th>The value (USD millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NYSE Euronext (US)</td>
<td>140,238,01.90</td>
</tr>
<tr>
<td>2</td>
<td>NASDAQ OMX</td>
<td>395,207,7.90</td>
</tr>
<tr>
<td>3</td>
<td>Tokyo SE Group</td>
<td>384,155,3.90</td>
</tr>
<tr>
<td>4</td>
<td>London SE Group</td>
<td>370,109,2.30</td>
</tr>
<tr>
<td>5</td>
<td>NYSE Euronext (Europe)</td>
<td>309,102,0.00</td>
</tr>
<tr>
<td>6</td>
<td>Shanghai SE</td>
<td>272,403,7.10</td>
</tr>
<tr>
<td>7</td>
<td>Hong Kong Exchanges</td>
<td>272,375,1.90</td>
</tr>
<tr>
<td>8</td>
<td>TMX Group</td>
<td>218,313,5.70</td>
</tr>
<tr>
<td>9</td>
<td>BM &amp; FBOVESPA</td>
<td>147,695,0.70</td>
</tr>
<tr>
<td>10</td>
<td>Deutsche Borse</td>
<td>147,460,8.40</td>
</tr>
<tr>
<td>11</td>
<td>Bombay SE</td>
<td>143,656,7.00</td>
</tr>
<tr>
<td>12</td>
<td>Australian SE</td>
<td>142,084,5.50</td>
</tr>
<tr>
<td>13</td>
<td>National Stock Exchange India</td>
<td>140,306,9.20</td>
</tr>
<tr>
<td>14</td>
<td>BME Spanish Exchanges</td>
<td>124,243,6.10</td>
</tr>
<tr>
<td>15</td>
<td>Shenzhen SE</td>
<td>123,310,1.40</td>
</tr>
<tr>
<td>16</td>
<td>SIX Swiss Exchange</td>
<td>122,516,2.50</td>
</tr>
<tr>
<td>17</td>
<td>Korea Exchange</td>
<td>112,217,0.80</td>
</tr>
<tr>
<td>18</td>
<td>NASDAQ OMX Nordic Exchange</td>
<td>107,181,3.80</td>
</tr>
<tr>
<td>19</td>
<td>MICEX</td>
<td>998,625.10</td>
</tr>
<tr>
<td>20</td>
<td>Johannesburg SE</td>
<td>841,143.20</td>
</tr>
<tr>
<td>21</td>
<td>Taiwan SE Corp</td>
<td>836,530.80</td>
</tr>
<tr>
<td>22</td>
<td>Singapore Exchange</td>
<td>646,726.20</td>
</tr>
<tr>
<td>23</td>
<td>Mexican Exchange</td>
<td>448,635.00</td>
</tr>
<tr>
<td>24</td>
<td>Bursa Malaysia</td>
<td>412,912.90</td>
</tr>
<tr>
<td>25</td>
<td>Saudi Stock Market-Tadawul</td>
<td>340,273.90</td>
</tr>
<tr>
<td>26</td>
<td>Indonesia SE</td>
<td>333,084.10</td>
</tr>
<tr>
<td>27</td>
<td>Santiago SE</td>
<td>319,724.70</td>
</tr>
<tr>
<td>28</td>
<td>Oslo Bors</td>
<td>295,193.40</td>
</tr>
<tr>
<td>29</td>
<td>Istanbul SE</td>
<td>282,521.90</td>
</tr>
<tr>
<td>30</td>
<td>Osaka SE</td>
<td>271,408.40</td>
</tr>
</tbody>
</table>

Appendix E: The questionnaire

The Role of AIS in Organisational Sustainability: An Empirical Study of Saudi Organisations

This research is being conducted as part of the requirement for the degree of Doctor of Philosophy at Griffith University, Queensland, Australia. The study will focus on examining the role of accounting information system (AIS) in performance management. More specifically, the study will investigate whether both the quality of accounting information system (AIS) and managers' use of AIS information are associated with sustainable organisational performance in Saudi Arabia.

Your input will make valuable contribution to the output of my research. I would be grateful if you could devote 20-30 minutes to participate in a structured anonymous questionnaire survey. However, there is no time limit on the completion time needed for access this e-survey 24 hours 7 days a week through either your work or home computer.

- Please print and retain this information sheet as hard copy reference/instruction. It is important to note that the return of a completed questionnaire will be accepted as an expression of consent.

- It is essential that you answer the question as accurately as you can. The success of the study depends upon the frankness and care with which you answer the questions. There is no right or wrong answer; it is your opinion that is important.

- Please read each question carefully and select the answer that bests your case. If you do not find an exact answer that fits your case, select one that comes closest to it.

- Where it is not possible to answer the entire survey at one time, please note that you can save your answer and reopen the survey at a later time and continue to the next unanswered question.
• As per the requirement of the National Statement on Ethical Conduct in Human Research (2007) an independent contact person has been listed below. If you have a complaint about the ethical conduct of this research, you should consult in the first instance:

_Imam Mohammed bin Saud University_  
_Economics and Administrative Sciences College_  
_Accounting Department_  
_Phone: +966-1-2582004_  
_accounting@imamu.edu.sa_

• All issues pertaining to the ethical conduct of this research will also be forwarded immediately to:

_The manager for research ethics_  
_Office for research_  
_Bray Centre, Nathan campus_  
_Griffith University_  
_Phone: +61-7-37355585_  
_research-ethics@griffith.edu.au_

• The sample of this study is the listed organisations in the Saudi stock market. The survey questionnaires of the study will be distributed via the organisations’ email addresses. The invitation email for the survey specifies that the survey to be passed to the appropriate respondent, that is the person responsible for the organisations’ AIS.

• This study endeavours to produce a number of practical and theoretical contributions to the existing body of literature. For instance, the results may provide new insight into the role of AIS in helping organisations to manage their sustainable organisational performance. The results may also provide an empirical evidence of the effects of family ownership and industry uncertainty on the use of AIS and sustainable organisational performance.

• This survey will be treated as STRICTLY PRIVATE AND CONFIDENTIAL, no individual or organisation’s name will be divulged in the final report; and no information, which may result in the identification of any individual or organisation, will be released. In fact, only aggregated data from the respondents will be used in reporting the results of the study. The survey is set to be anonymous and not to save the IP-address for all responses. This means that there is actually no any way to connect answer and participants.

• Participation is voluntary and you are free to withdraw from the study at any time.
• If you would like a copy of the executive summary of the findings, please send a separate email requesting the copy to halbarrak@griffith.edu.au.

• Should you have any question, please contact my supervisors or me. Our contact details are as follows:

Professor Lokman Mia  
Griffith Business School  
Business 1 (N50), Room 0.53  
Nathan campus, Griffith University,  
170 Kessels Road, Nathan, QLD 4111, Australia  
Phone: +61 7 373 57112  
Fax: +61 7 373 53719  
Email: l mia@griffith.edu.au

Dr. Lanita Winata  
Griffith Business School  
Business 3 (G06), Room 2.09  
Gold Coast campus, Griffith University,  
Parklands Drive, Southport, QLD 4215, Australia  
Phone: +61 7 555 29083  
Fax: +61 7 555 28068  
Email: i winata@griffith.edu.au

OR

Hesham Albarrak  
PhD candidate  
Griffith Business School  
Business 3 (G06), Room 3.21  
Gold Coast campus, Griffith University,  
Parklands Drive, Southport, QLD 4215, Australia  
Phone: 04 05903601  
Email: h albarrak@griffith.edu.au

• Please note that all research at Griffith University must be designed and conducted in accordance with the Australian Code for the Responsible Conduct of Research 2007 and ethically reviewed and monitored in accordance with the National Statement on Ethical Conduct in Human Research. If you have any concerns or complaints about the ethical conduct of the research project, you should contact the Manager, Research Ethics on 3735 5585 or research-ethics@griffith.edu.au. The ethical clearance number for this research is AFE/11/10/HREC.
SECTION 1: Organisational Information

- Please tick (✓) your response, where appropriate or fill an appropriate answer on the blank space:

1. The industry type of your company is:

| Banks & Financial Services industry |
| Petrochemical industry |
| Cement industry |
| Retail industry |
| Energy & Utilities industry |
| Agriculture & Food industry |
| TeleCommunication & Information Technology industry |
| Insurance industry |
| Multi-Investment industry |
| Industrial Investment industry |
| Building & Construction industry |
| Real Estate Development industry |
| Transport industry |
| Media & Publishing industry |
| Hotel & Tourism industry |

2. Are there major shareholders who own 50% or more of your company’s capital?
   □ Yes (please answer question 3).
   □ No (please go to question 4).

3. Is your company’s chief executive officer a family relative of the major shareholders mentioned above?
   □ Yes, he/she is.
   □ No, he/she is not.

4. Total number of full-time equivalent employees within your company is approximately: __________.

5. The length of your years of experience is: __________.
SECTION 2: This section deals with organisational performance using a set of financial and nonfinancial measures that comprise five perspectives of performance, namely (a) financial, (b) customer, (c) internal business process (d) learning and growth, and (e) environmental and social.

-Please indicate under each of the following items your company's average performance over the last five years compared to that of your leading competitor. Please respond by circling the appropriate number for each item.

<table>
<thead>
<tr>
<th></th>
<th>Much Lower</th>
<th>Lower</th>
<th>Average</th>
<th>Higher</th>
<th>Much Higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating income</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Return on investment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Sales growth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Market share</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Effectiveness of the process of producing products or/and providing services</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Efficiency of using materials for producing products or/and providing services</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Employee productivity</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Employee satisfaction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Eco-efficiency (e.g. using less energy and water resources and creating less waste and pollution)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. The growth of environmentally friendly products or/and services</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Community support (e.g. sport sponsorships, endowment of chair in education)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. Charity donations</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
SECTION 3: This section deals with the level of dynamism in the industry of your organisation.

- Please indicate under each of the following items the **degree of turbulence** (very low/very high) in the industry of your organisation. Please respond by circling the appropriate number for each item.

<table>
<thead>
<tr>
<th></th>
<th>Very low</th>
<th>Low</th>
<th>Average</th>
<th>High</th>
<th>Very high</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The level of competition in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. The frequency of development of new products or services in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. The level of technological change facing in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. The changes in volume of market activities of competitors within the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. The changes in customers’ preferences in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. The rate of innovation and scientific discoveries in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
SECTION 4: This section deals with the quality of your organisation's accounting information system (AIS) as well as the use of AIS information in your decision making.

-Please indicate under each of the following items:
(i) The extent to which the information is provided to you (column A), and
(ii) The extent to which the information is used for your decision making (column B).
Please respond by circling the appropriate number for each item.

<table>
<thead>
<tr>
<th>Information items</th>
<th>column A</th>
<th>column B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low</td>
<td>Low</td>
</tr>
<tr>
<td>1. Diverse information that impacts your decisions throughout your company</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. Precise information for activities of all sections within your company</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. Information related to different sections or functional areas in your company</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4. Information that enables you to conduct 'what-if' analysis</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5. Separated information into fixed and variable components</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. Information that is provided immediately upon request</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. Information that coincides well with event occurrences</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. Information related to possible future events</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9. Information related to external factors of your company</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10. Non-financial information</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
SECTION 5:

As mentioned in the information sheet, this study will collect data through interviews. I would greatly appreciate if you could participate in an interview. The interview will be conducted one time, and it will take only 30-40 minutes. Your participation will be highly appreciated and treated with complete confidentiality.

1) Would you like to participate in the interview?

   Yes          No

2) Would you like to receive a summary of the results of this study?

   Yes          No

If you answer “yes” in either question 1 or 2 (or both), please provide your email address or postal address.


THANK YOU FOR YOUR ASSISTANCE IN COMPLETING THIS QUESTIONNAIRE
Appendix F: Collinearity diagnostic tests for the dependent variables

### i) Financial performance

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>Variance Proportions</th>
<th>Industry Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td></td>
<td>(Constant)</td>
<td>Use of AIS Information</td>
<td>Quality of AIS Information</td>
</tr>
<tr>
<td>1</td>
<td>1.000</td>
<td>3.951</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>2</td>
<td>.023</td>
<td>13.250</td>
<td>.17</td>
<td>.22</td>
</tr>
<tr>
<td>3</td>
<td>.014</td>
<td>16.756</td>
<td>.44</td>
<td>.75</td>
</tr>
<tr>
<td>4</td>
<td>.012</td>
<td>18.181</td>
<td>.39</td>
<td>.81</td>
</tr>
</tbody>
</table>

### ii) Customer performance

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>Variance Proportions</th>
<th>Industry Uncertainty</th>
</tr>
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<td>Quality of AIS Information</td>
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<td>.75</td>
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<td>.012</td>
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</table>

### iii) Internal business process performance

<table>
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<th>Dimension</th>
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<td>Quality of AIS Information</td>
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<td>3.951</td>
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<td>.00</td>
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<td>13.250</td>
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<td>.22</td>
</tr>
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<td>3</td>
<td>.014</td>
<td>16.756</td>
<td>.44</td>
<td>.75</td>
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</table>
iv) Learning and growth performance

<table>
<thead>
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<th>Variance Proportions</th>
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v) Environmental and social performance

<table>
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</tbody>
</table>
Appendix G: Multicollinearity and singularity additional tests for the dependent variables

i) Financial performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>S Ig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
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<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
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<tr>
<td>1  (Constant)</td>
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<td>.246</td>
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<tr>
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<td>.154</td>
<td>.017</td>
<td>.145</td>
<td>.885</td>
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<td>.130</td>
<td>.316</td>
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</table>

* SMC values for this variable range between 0.223 and 0.402.

ii) Customer performance

<table>
<thead>
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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>S Ig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
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<td>B</td>
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<td>.264</td>
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<td>.273</td>
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</table>

† SMC values for this variable range between 0.223 and 0.402.

iii) Internal business process performance

<table>
<thead>
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<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>S Ig.</th>
<th>Collinearity Statistics</th>
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<td>-.040</td>
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<td>.156</td>
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<td>.573</td>
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<td>.469</td>
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§ SMC values for this variable range between 0.223 and 0.402.
iv) Learning and growth performance

<table>
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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<th>Sig.</th>
<th>Collinearity Statistics</th>
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<td>.197</td>
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** SMC values for this variable range between 0.223 and 0.402.

v) Environmental and social performance

<table>
<thead>
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<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<th>Sig.</th>
<th>Collinearity Statistics</th>
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<td>Beta</td>
<td></td>
<td>Tolerance</td>
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<td>.335</td>
<td>.127</td>
<td>.306</td>
<td>2.650</td>
<td>.009</td>
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</tbody>
</table>

†† SMC values for this variable range between 0.223 and 0.402.
Appendix H: Path analysis for testing H3, H4a to H4c, H5a to H5e, and H6

i) The relationships among the variables

- Equations:

\[
X_3 = P_{31}X_1 + P_{32}X_2 + P_{33}R_f 
\]

(1)

\[
X_{4a} = P_{4a1}X_2 + P_{4a2}X_3 + P_{4a3}R_g 
\]

(2)

\[
X_{4b} = P_{4b1}X_2 + P_{4b2}X_3 + P_{4b3}R_h 
\]

(3)

\[
X_{4c} = P_{4c1}X_2 + P_{4c2}X_3 + P_{4c3}R_j 
\]

(4)

\[
X_{4d} = P_{4d1}X_2 + P_{4d2}X_3 + P_{4d3}R_k 
\]

(5)

\[
X_{4e} = P_{4e1}X_2 + P_{4e2}X_3 + P_{4e3}R_l 
\]

(6)

<table>
<thead>
<tr>
<th>Combination of variables</th>
<th>Direct effects</th>
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<tbody>
<tr>
<td>X₁ with X₃</td>
<td>P₃₁</td>
</tr>
<tr>
<td>X₂ with X₃</td>
<td>P₃₂</td>
</tr>
<tr>
<td>X₂ with X₄a</td>
<td>P₄a₁</td>
</tr>
<tr>
<td>X₂ with X₄b</td>
<td>P₄b₁</td>
</tr>
<tr>
<td>X₃ with X₄c</td>
<td>P₄c₁</td>
</tr>
<tr>
<td>X₂ with X₄d</td>
<td>P₄d₁</td>
</tr>
<tr>
<td>X₂ with X₄e</td>
<td>P₄e₁</td>
</tr>
<tr>
<td>X₃ with X₄a</td>
<td>P₄a₂</td>
</tr>
<tr>
<td>X₃ with X₄b</td>
<td>P₄b₂</td>
</tr>
<tr>
<td>X₃ with X₄c</td>
<td>P₄c₂</td>
</tr>
<tr>
<td>X₃ with X₄d</td>
<td>P₄d₂</td>
</tr>
<tr>
<td>X₃ with X₄e</td>
<td>P₄e₂</td>
</tr>
</tbody>
</table>
ii) The results of ordinary least squares (OLS) multiple regressions

\[ X_3 = P_{31}X_1 + P_{32}X_2 + P_{33}R_t \] (1)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
<th>Path Coefficient</th>
<th>( \beta ) (Beta)</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of AIS</td>
<td>H3</td>
<td>( P_{31} )</td>
<td>.297</td>
<td>2.68</td>
<td>.009</td>
</tr>
<tr>
<td>Industry dynamism</td>
<td>H6</td>
<td>( P_{32} )</td>
<td>.230</td>
<td>2.07</td>
<td>.041</td>
</tr>
</tbody>
</table>

R square = .223  
Adjusted R square = .207  
Dependent variable: Use of AIS

\[ X_{4a} = P_{4a1}X_2 + P_{4a2}X_3 + P_{4a3}R_R \] (2)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
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<th>( \beta ) (Beta)</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of AIS</td>
<td>H4a</td>
<td>( P_{4a2} )</td>
<td>.252</td>
<td>2.61</td>
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</tr>
<tr>
<td>Industry dynamism</td>
<td>H5a</td>
<td>( P_{4a1} )</td>
<td>.325</td>
<td>3.37</td>
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</table>

R square = .236  
Adjusted R square = .220  
Dependent variable: Financial performance

\[ X_{4b} = P_{4b1}X_2 + P_{4b2}X_3 + P_{4b3}R_Rh \] (3)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
<th>Path Coefficient</th>
<th>( \beta ) (Beta)</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of AIS</td>
<td>H4b</td>
<td>( P_{4b2} )</td>
<td>.186</td>
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<tr>
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<td>H5b</td>
<td>( P_{4b1} )</td>
<td>.369</td>
<td>3.81</td>
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</tbody>
</table>

R square = .227  
Adjusted R square = .211  
Dependent variable: Customer performance
\[ X_{4c} = P_{4c1}X_2 + P_{4c2}X_3 + P_{4c3}R_j \]  \hspace{1cm} (4)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
<th>Path Coefficient</th>
<th>( \beta ) (Beta)</th>
<th>( t )</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
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<td>Use of AIS</td>
<td>H4c</td>
<td>( P_{4c2} )</td>
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<td>-.11</td>
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<td>Industry dynamism</td>
<td>H5c</td>
<td>( P_{4c1} )</td>
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R square = .282  
Adjusted R square = .267  
Dependent variable: Internal business process

\[ X_{4d} = P_{4d1}X_2 + P_{4d2}X_3 + P_{4d3}R_k \]  \hspace{1cm} (5)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
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<th>( \beta ) (Beta)</th>
<th>( t )</th>
<th>Sig</th>
</tr>
</thead>
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<td>( P_{4d2} )</td>
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<tr>
<td>Industry dynamism</td>
<td>H5d</td>
<td>( P_{4d1} )</td>
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<td>3.94</td>
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R square = .178  
Adjusted R square = .161  
Dependent variable: Learning and growth performance

\[ X_{4e} = P_{4e1}X_2 + P_{4e2}X_3 + P_{4e3}R_l \]  \hspace{1cm} (6)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypothesis</th>
<th>Path Coefficient</th>
<th>( \beta ) (Beta)</th>
<th>( t )</th>
<th>Sig</th>
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<td>( P_{4e2} )</td>
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<td>( P_{4e1} )</td>
<td>.289</td>
<td>2.93</td>
<td>.004</td>
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</table>

R square = .199  
Adjusted R square = .183  
Dependent variable: Environmental and social performance

204
iii) Summary of the path analysis results

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
<th>Results</th>
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<tbody>
<tr>
<td>H3</td>
<td>There is a positive relationship between the quality of AIS and managers' use of AIS information.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4a</td>
<td>The more managers use AIS information, the greater is the financial performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b</td>
<td>The more managers use AIS information, the greater is the customer performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H4c</td>
<td>The more managers use AIS information, the greater is the internal business process performance of their organisations.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H4d</td>
<td>The more managers use AIS information, the greater is the learning and growth performance of their organisations.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H4e</td>
<td>The more managers use AIS information, the greater is the environmental and social performance of their organisations.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5a</td>
<td>The more dynamic an industry is, the greater is the financial performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5b</td>
<td>The more dynamic an industry is, the greater is the customer performance of an organisation within that industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5c</td>
<td>The more dynamic an industry is, the greater is the internal business process performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5d</td>
<td>The more dynamic an industry is, the greater is of the learning and growth performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H5e</td>
<td>The more dynamic an industry is, the greater is the environmental and social performance of an organisation within the industry.</td>
<td>Supported</td>
</tr>
<tr>
<td>H6</td>
<td>There is a positive relationship between industry dynamism and the managerial use of AIS information.</td>
<td>Supported</td>
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</table>
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222


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235
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237


