THE RELATIONSHIP BETWEEN CONTINGENCY FACTORS AND ACCOUNTING INFORMATION SYSTEM, AND ITS SUBSEQUENT IMPACT ON INFORMATION TECHNOLOGY BENEFITS: A SURVEY ON JORDANIAN LISTED COMPANIES

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By

MAHMOUD MOHMAD AHMAD AL-EQAB

Thesis Submitted to the College of Business in Fulfillment of the Requirement for the Degree of Doctor of Philosophy Universiti Utara Malaysia

DEDICATION

I dedicate this effort to the soul of my father Mohmad, who is my wise teacher in this life, my kindhearted mother Mohsenah, my eldest brother Marwan, my beloved wife Elham Alta'ani, my dear brothers Yousef, Motafa, Ala, Sakor, and my dear sisters Nawal, Suad, Na'elah, and Amani.

أهداء ألى :

روح والدي الغالي رحمه الله واسكنه فسيح جناته

و أمي الحبيبه: أنعم بها من حنونه والحديث عن فضلها يطول

وأخي الاكبر مروان: من ضحى براحته ووقته من أجل أسعد العيش لمن حوله

و زوجتي الحبيبه الهام: شريكة حياتي ومن تحملت الصعاب من أجلي

و أخواني ألاعزاء: يوسف ومصطفى وعلاء وصخر

وأخواتي الغاليات: نوال و سعاد و نائله و أماني

اليكم جميعا اهدي هذا الجهد المتواضع

ADMISSION

“I, Mahmoud Mohmad Ahmad Al-Eqab, declare that this thesis, submitted in fulfillment of requirements for award of Doctor of Philosophy, in College of Business (the discipline of Accounting Information Systems), Universiti Utara Malaysia, is wholly my own work unless otherwise referenced of acknowledged. The document has not been submitted for qualifications at any other academic institution.

Mahmoud Mohmad Ahmad Al-Eqab

July, 2009

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ABSTRACT

The relationships between contingency factors and information technology (IT) or between contingency factors and accounting information systems (AIS) have been discussed in the literature, both in accounting and information systems disciplines. However, very little is known about the relationship between IT sophistication and AIS design, and the impact of AIS design on IT benefits. Most prior studies also treated IT as a unidimensional variable and focuses on the technological sophistication only. Researchers also measured IT differently. To fill this gap, this study first examines the relationships between three dominant contingency factors found in the literature (IT sophistication, environmental conditions, and business strategy) and the sophistication of AIS design. Second, it examines the impact of AIS design on IT benefits. Importantly, this study focuses on four dimensions of IT sophistication, i.e. technological, informational, functional, and managerial to measure the impact of IT on AIS design. This study also focuses on two dimensions of business strategy, i.e. cost leadership strategy and innovation differentiation strategy. To achieve the objectives of this study, data were collected from 182 companies listed in Jordanian Stock Exchange, which represents about 83% response rate. Initial tests show that the assumptions of reliability, multicollinearity, normality, linearity, and homoscedasticity were met. Multiple regression analysis was then conducted to examine the relationship between contingency factors and AIS design. The results reveal significant and positive relationships between four dimensions of

IT sophistication and AIS design, and between two business strategies and AIS design. While most organizations focus on the technical aspect in information systems project, findings from this study suggest managerial, informational, and functional IT sophistication are more important than the technological aspect in influencing AIS design. Furthermore, cost leadership strategy was found to be more important than innovation differentiation strategy in influencing AIS design. Overall, cost leadership strategy is the most important factor that influence the sophistication of AIS design, followed by, in descending order of importance, managerial IT sophistication, informational IT sophistication, functional IT sophistication, innovative differentiation strategy, and technological IT sophistication. Furthermore, no significant relationship was found between environmental conditions and sophistication of AIS design. Finally, results from linear regression indicate a significant and positive relationship between AIS design and IT benefits. Findings of this study imply that organizations need to have a sophisticated AIS design in order to achieve greater IT benefits. On the other hand, the sophistication of AIS design can be achieved by investing not only in the technological IT sophistication but more importantly the managerial, informational, functional sophistication. Furthermore, business strategies especially cost leadership strategy adopted by organizations would also determined the sophistication of AIS design. In summary, this study has deepened current understanding of AIS design and its influence factors, and has provided useful insights into the sophistication of IT development in Jordan. More importantly, it opens up possibilities for further studies of AIS in Jordan and other Middle East countries, and on a global basis.

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LIST OF ABBREVIATION

IT	=	Information Technology
AIS	=	Accounting Information System
IS	=	Information System
MIS	=	Management Information System
MAS	=	Management Accounting System
FAS	=	Financial Accounting System

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

This chapter introduces the chapter agenda of this study. It outlines the background of the research problem, research questions, research objectives, the context of the study, the significance of the study, and the organization of the remaining chapters.

1.2 BACKGROUND OF RESEARCH PROBLEM

Accounting information system (AIS) is an important component of modern information system (IS) (Mitchell, Reid, & Smith, 2000). Developments in the areas of accounting, information technology (IT) and IS over the last three decades have widened the scope and roles of AIS. For example, the introduction of new accounting model such as Resources-Events-Agents (REA) and the emergence of new technology such as relational and object-oriented database have transformed the way business people view AIS (Ismail & King, 2005). The REA accounting model which is based on economic changes rather than debits and credits as in traditional accounting model (McCarthy, 1982) has made it possible for modern AIS to capture not only historical and financial-related data but also non-financial and future-oriented data (Mauldin & Ruchala, 1999). Furthermore, the evolution of client-server architecture has introduced new and sophisticated Information System (IS) like Enterprise Resource Planning (ERP) (Hall, 2000). Business people including accountants now view accounting in a much broader perspective (Abernethy & Guthrie, 1994) with added emphasis on the economies of business operations and strategic management (Brecht & Martin, 1996). Therefore, several researchers have argued that there is now very small room to separate between management information systems (MIS) and AIS disciplines (Arnold & Sutton, 2002; Murthy & Wiggins, 1999).

Traditionally, AIS tended to mirror historically developed manual accounting processes (Mauldin & Ruchala, 1999). Therefore, traditional AIS was unable to adapt to change, to support critical business processes and models, and to satisfy users' information requirements, which are constantly changing over time (Paul, 1994). Modern AIS, however, can generate various types of information including accounting and non-accounting information to assist management manages short-term problems and integrates operational considerations within long-term strategic plans (Mitchell et al., 2000).

Reviews of both accounting and IS literature indicate that IT-related issues have long received the attention of both accounting and IS researchers. IT-related researches have evolved over the last three decades from the IT adoption and IT sophistication issues to the IT alignment and IT value delivery issues. One of the main issues with respect to IT is the impact of IT on organization (Shin, 2001) especially in terms of the extent of benefits IT can offer the organization. For example, many scholars have begun to speculate that employees' underutilization of such modern implemented systems may result in the failure to gain the expected success of such implementations and hence threatens the long-term viability of such systems (Jasperson, Carter, & Zmud, 2005; Mabert, Soni, & Venkataramanan, 2001).

Following this, many IT researchers have attempted to explain the benefits IT will bring to the organization. Several studies that have adopted the contingency approach have suggested that IT needs to be aligned with other contingent factors to have a real impact on organization (Shin, 2001). The alignments between contingency factors such as business strategy, organizational structure, and strategic IT management have been found to have significant impacts on organizational performance (Bergeron, Raymond, & Rivard, 2001; Chang, 2001; Nicolaou, 2000). Raymond and Bergeron (2008) suggested that since IT alignment with business strategy has been shown to significantly contribute to the business performance of small and medium enterprises (SMEs), the alignment of IT investments and business strategy should also be addressed for large organizations.

Another issue with respect to IT is the difficulty in comparing the results of previous studies. Firstly, different researchers seemed to define IT benefits differently, whereby organizational performance is only one of the dimensions used to measure IT benefits. Other dimensions used to represent IT benefits include user satisfaction, system use, system quality, information quality, and individual impact, (Delone and McLean, 1992). Secondly, IT researchers have used different measures of IT sophistication. Most IT-related studies also focused on the technological dimension IT sophistication (Cline & Guynes, 2001; Mahmood & Mann, 2000; Tam, 1998; Weill, 1992) while neglecting other IT dimensions such as informational, functional and managerial sophistication (Ismail & King, 2007; Raymond & Pare, 1992).

Realizing the importance of IT to business and accounting, accounting researchers have also investigated several IT-related issues. Many early AIS studies have investigated the impact of general IT on accounting and the roles of accountants themselves (Ismail, 2006). More recent AIS studies focused on the impact of more sophisticated IS such as ERP on the role of accountants (Doran & Walsh, 2004; Hyvonen, 2003; Rom & Rohde, 2006; Spraakman, 2005). However, as suggested by Hunton (2002) and Xiao, Dyson and Powell (1996), most of AIS studies are very descriptive in nature and therefore fail to reveal in a meaningful way the relationship between IT and AIS and its impact on organizational performance.

Reviews of AIS literature also indicate that most AIS studies have incorporated contingency factors such as organizational structure, business strategy, and environmental condition in their research model (Chenhall & Langfield-Smith, 1998; Chong & Chong, 1997; Mia & Clarke, 1999) but have neglected the influence of IT on AIS design. Furthermore, among the few studies that have examined the relationship between AIS design and IT have defined IT in a narrow perspective (Ismail, 2004). Similar to IT researches, these studies viewed IT from the technological perspective only but failed to incorporate other perspectives of IT sophistication such as informational, functional and managerial.

Hunton and Flowers (1997) suggested that a more comprehensive AIS study is needed to further explain the relationship between IT and accounting and its subsequent impact on organization in general and accounting/accountants in particular. Furthermore, most of previous IT/AIS studies were conducted in developed countries (Raman & Yap, 1996; Tan, 1997; Thong, 1999). Very few of such studies have been carried out in developing countries especially in the Middle East.

The above discussions relating to the evolution of IT and its subsequent impact on accounting profession have raised several interesting issues that need to be carefully addressed, particularly among developing countries like Jordan. Jordan, unlike other Middle East countries, is a small country with very limited natural resources. IT development in Jordan is also under-developed compared to developed countries and even some developing countries (Murrar, 2003). Despite this, the Jordanian government with the strong support from the King of Jordan has recently invested quite heavily in IT development with the hope to be a leader among the Arab countries (Nasereddin, 2006). Therefore, a comprehensive AIS study which incorporates both IT and accounting issues could contribute to further understanding of the IT-related issues such as the combined effect of contingency factors including IT on AIS design and the subsequent impact of AIS design on IT benefits, not only in Jordan but also other developing countries.

The findings from this study could explain not only the sophistication of IT adoption among Jordanian companies but also the influence of other contingency factors on the AIS design of adopting companies. This is important as even though AIS users could now generate and use accounting information in a more strategic way, lack of understanding of available technology and contemporary accounting information that could be generated by the technology would hamper the benefits of IT implementation. This issue is particularly important for organizations operating in a turbulent and uncertain environment (Child, 1972) as these organizations require more information to make good decisions (El Luoadi, 1998). For example, organizations need to process external information to keep up with the occurrences, trends, and evolutions in their environment, while the management of internal information enables firms to stay informed about their resources and how these resources are used. This issue is important as the misalignment between information processing capacity (represented by IT sophistication) and organizational information requirements (represented by AIS design) has the tendency to inflict unnecessary expenses on the organization (Galbraith, 1973).

In summary, the above discussions highlight several important issues relating to accounting and IS from the perspective of contingency theory. The first issue relates to the lack of a comprehensive empirical study that examines the relationship between IT sophistication and AIS especially in the Middle East countries. The second issue relates to the inconsistency in the measurement of IT sophistication and IT benefits. Therefore, further study is needed to better explain the relationship between contingency factors especially IT sophistication and AIS design, and the subsequent impact of AIS design on IT benefits. This study represents the first attempt to fill in the gap in the specific context of Jordanian companies.

In this study, AIS refers to the practices of both financial and management accounting in an organization, while AIS design refers to the four characteristics of accounting information generated by computer-based IS, which are scope, timeliness, aggregation and integration.

Also, IT sophistication refers to the sophistication of IT usage and IT management in an organization (Raymond & Pare, 1992). IT usage is represented by the technological and informational dimensions, while IT management is represented by the functional and managerial dimensions. Each dimension is discussed in further details in chapter three.

Finally, IT benefits refers to the potential benefits received by the end users from using computer-based IS, which are measured based on information quality, system quality, system use, user satisfaction, individual impact, and organizational impact.

1.3 RESEARCH QUESTIONS

From the previous section, it has become clear that despite conceptual and empirical research efforts addressed at a wide variety of accounting and IT issues, several areas require further clarity and studies especially in developing countries like Jordan. The research problem that is envisaged in this study is especially focused on the following:

What are the relationships between contingency factors, in particular IT sophistication, and AIS design and the subsequent impact of AIS design on IT benefits?

The research problem is subdivided into the following research questions:

- What is the relationship between IT technological sophistication and AIS design?
- What is the relationship between IT informational sophistication and AIS design?
- What is the relationship between IT functional sophistication and AIS design?
- What is the relationship between IT managerial sophistication and AIS design?
- What is the relationship between environmental condition and AIS design?
- What is the relationship between cost leadership strategy and AIS design?
- What is the relationship between innovative differentiation strategy and AIS design?
- What is the relationship between AIS design and IT benefits?

1.4 RESEARCH OBJECTIVES

The main objectives of this study are:

Firstly, to explore the relationship between contingency factors namely; IT sophistication, environmental condition, and business strategy and AIS design.

Secondly, to ascertain the subsequent impact of AIS design on IT benefits.

The specific objectives are follows:

- To examine the relationship between IT technological sophistication and AIS design.
- To examine the relationship between IT informational sophistication and AIS design.
- To examine the relationship between IT functional sophistication and AIS design.
- To examine the relationship between IT managerial sophistication and AIS design.
- To examine the relationship between environmental condition and AIS design.
- To examine the relationship between cost leadership strategy and AIS design.
- To examine the relationship between innovative differentiation strategy and AIS design.
- To examine the relationship between AIS design and IT benefits.

1.5 THE CONTEXT OF THE STUDY

This study explores the relationships between contingency factors such as IT sophistication, business strategy, and environmental condition and AIS design and the subsequent impact of AIS design on IT benefits in the specific context of Jordanian listed companies. Unlike many previous studies, IT sophistication domain is explored within the context of four dimensions: (1) technological, (2) informational, (3) functional, and (4) managerial. Similarly, the domain of IT benefits explored covers all items related to system quality, information quality, system use, user satisfaction, individual impact, and organizational impact. Furthermore, unlike many IT-related researches, this study seeks answers, using a questionnaire survey, from accountants as the respondents. Accounting and IT, studied together, should provide new insights into the roles of accounting in IS development, in which accounting is already the prime source of information of an organization. The importance of accountants' involvement in organisational IS development is evidenced by the statement issued by International Federation of Accountants (IFAC). Practice Statement 2.1 "Information Technology for Professional Accountants" outlined a modest set of IT requirements for professional accountants (IFAC, 2006). Included in the guideline are lists of general IT education requirements, user role requirements, and designer, manager and evaluator requirements. The argument is that, professional accountants, in addition to extensively using various types of IT, also play important managerial, advisory and evaluative roles in connection with the adoption, deployment and use of various technologies by organisations of all types and sizes. Prior to the statement, several researchers and professionals have also highlighted the importance of accountants' involvement in organisational IS development (Hunton & Flowers, 1997; Elliot, 1994; Hammer & Champy, 1993). Therefore, using accountants as the respondents would provide new understanding to the role of users in IS development. Several compelling reasons justify the selection of Jordanian listed companies for this research. Firstly, as argued by Kaplan (1994), contemporary accounting research including AIS research is best served by studying the largest and most successful subjects. The reason is that smaller businesses are less likely to possess the expertise or resources to make significant breakthroughs or innovations in contemporary accounting techniques and IT sophistication. Second, Jordan is one of the developing countries that has put significant efforts toward IT development and has the potential to be a role model like United Arab Emirates in terms of IT innovation for other countries in the Middle East region (Burkhart & Older, 2003; Murrar, 2003). Finally, IT and/or AIS related studies are very rare in this part of the world. Therefore, findings from this study would provide interesting insights not only into the status of IT sophistication but also AIS design. The results of this study can also be used to compare with those carried out in other parts of the world.

1.6 SIGNIFICANCE OF THE STUDY

One of the distinctive contributions of this study to the field of accounting and IS is the exploration of the relationship between IT sophistication and AIS design. Many previous studies have investigated the factors that determine the characteristics of AIS design and IT sophistication. However, they focused on the integration between AIS design or IT sophistication and contingency factors such as environment, strategic choice, and organizational structure. Very few attempts have been made to examine the relationship between IT sophistication and AIS design, and more importantly its impact on IT benefits. Secondly, the results from previous studies relating to the relationship between AIS design or IT sophistication and performance are inconclusive and in many instances contradictory. Therefore, this study takes a different approach by first examining the relationship between contingency factors and AIS design and then examining the impact of AIS design on IT benefits in the specific context of Jordanian listed companies. Findings from this study would extend current understanding of how effective IT investment is carried out in these organizations. Such findings are a necessary foundation for the eventual development of effective IT strategies. Third, there are few studies of accounting practices and IT adoption in the Middle East particularly in Jordan. Most of previous IT and/or AIS studies were conducted in developed western countries such as Australia, United Kingdom, United States and Canada. Tan (1997) suggested that the pursuit of IT in various regional countries is diverse and the use of IT also varies tremendously within these countries. Developing countries like Jordan are also very different in many aspects from those of developed economies and even newly industrialized economies (Thong, 1999). Developing countries rely heavily on government assistance and incentives to accelerate the use of IT (Kraemer, Gurbaxani, & King, 1992). Mc Intosh (1998) revealed that organizations in different countries adopted IT in similar ways but derived different levels of competitive benefit due to cultural differences. Further, since such studies in this part of the world are relatively rare, it would be interesting to compare the findings with those of the more developed nations. Finally, the findings of this study might be of interest to relevant agencies in Jordan. The information provided might assist policy makers in formulating strategies to encourage the effective use of IT among businesses in Jordan.

1.7 THE ORGANIZATION OF THE REMAINING CHAPTERS

This study is organized into five chapters including the introduction. The details of remaining chapters are described below.

Chapter two is divided into four sections. The first section is devoted to literature review on Jordan specifically on accounting profession, IT development and the role of government in IT development, and the obstacles facing IT development. The second section is devoted to providing an extensive overview of the literature on AIS, definition of AIS research, categories of AIS research, focus of AIS research, the relationship between accounting and IT, the AIS design perspective, and the differences between MIS and accounting information. The third section is devoted to providing an extensive overview of the literature related to IT and in more specific the IT benefits. The last section is devoted to providing an extensive overview of the literature related to contingency theory.

Chapter three describes how the theoretical framework and hence research hypotheses are developed to answer the research questions based on the extensive literature review and the problem statement. Overview of the description of the research strategies and the sampling procedures is also provided. The final part of chapter three is a description of the questionnaire development as well as data collection methods and procedures. This chapter also discusses the validity of the research instruments used. In addition, the pre-test and the pilot test results were discussed, as well as the statistical tools used to test the research hypotheses developed.

Chapter four describes data analysis and explains the procedures used to test the research hypotheses. It starts by undertaking some descriptive statistics on the respondents and companies' profile. These are then followed by assessing the goodness of the measures, testing for non-respondents bias, and running multiple regressions to carry out the hypotheses testing.

The last chapter, chapter five discusses and concludes the present study. This chapter starts with the summary and contribution of research findings. It also discusses limitations of the present study and explains how the findings have implications to future research and practice.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Scholars in IS area have highlighted the significance of IS and consistently recommended that IT research be grounded in relevant disciplines such as accounting and IS. Based on that recommendation, the focus of this study is to explore the relationship between several contingency factors including IT and AIS design, and subsequently examine the relationship between AIS design and IT benefits in the specific context of Jordanian listed companies. Toward this end, this chapter discusses literature relating to AIS and IT. It also provides an overview of accounting and IT development in Jordan. The chapter also highlights relevant issues from a variety of perspectives to demonstrate the potential for change and upgrading in existing models such as AIS design (Chenhall & Morris, 1986), IT sophistication (Raymond & Pare, 1992), IT benefits (Delone & Mclean 1992), business strategy (Paopun, 2000), and environmental condition (Khandwalla, 1977). Furthermore, the researcher provided a diagram (figure 2.1) that shows the mapping of the sections and theory discussed in this chapter.

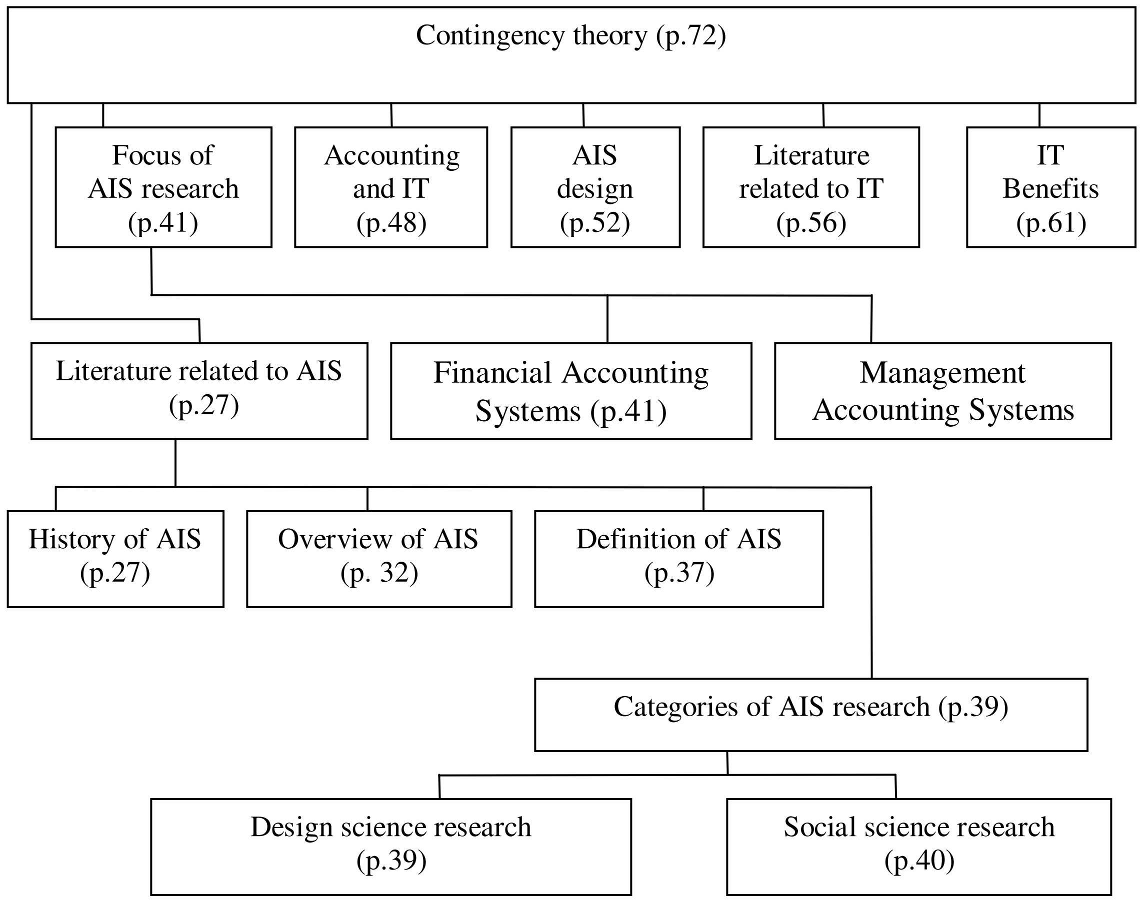


Figure 2.1: Literature mapping model.

2.2 GENERAL INFORMATION ABOUT JORDAN

Jordan is officially named the Hashemite Kingdom of Jordan. It is an Arab country and uniquely situated at the crossroads (a key trading post in the Middle East for several centuries). Jordan is bordered by Syria on the north, Iraq on the east, Saudi Arabia Kingdom on the east and south, Israel, and the West Bank on the west. Jordan has access to the Red Sea via the port city of Aqaba, which is located at the northern end of the Aqaba Gulf.

Jordan is a constitutional monarchy and hereditary, and the King of Jordan has widespread powers. The king appoints a prime minister to head the government, as well as members of the council of ministers. The king also appoints 40 members Senate to four-year terms and acts as the Jordan's legislature (Al-Jaghoub & Westrup, 2003). Jordan started practicing the democratic elections in 1989. This election includes the parliament deputies (110 members to four-year terms).

Jordan has a population of about 6.5 million with the population growth on average of 2.5%. The country has a land surface of around 91,000 square kilometers (Ciborra & Navarra, 2005). The country is governed by a constitutional monarchy headed by his Majesty King Abdullah II from 1999. Jordan is one of the developing countries in the world. It is dominated by middle-income earners, and Jordanian economy is a service economy, not an oil-based one (Al-Jaghoub & Westrup, 2003; Ein-Dor, Goodman & Wolcott, 1999; Shanikat, 2008). Jordan continues to have shortages in oil and water.

Although Jordan has some natural resources such as phosphates and potash in commercial quantities that may not be enough to cover new plans such as developing the country's IT projects. The service sector utilizes the largest number of workers in the country. Many of them are concentrated in the IT activities (Al-Jaghoub & Westrup, 2003). Due to lack of resources, the government was dependent on the help of rich countries such as the Gulf countries and US to finance government activities such as education and health care and IT programs.

2.3 ACCOUNTING PROFESSION IN JORDAN

It is widely acknowledged that the "accounting profession is an important facet of our society" (Wyatt, 2004, p 53). Worldwide, leaders of professional accountancy organizations believe that a strong accountancy profession plays a key role in economic development both globally and nationally (IFAC, 2007). Scholars in related fields have shown considerable confidence in accounting as a potentially productive field in any number of regions around the world. But in recent years accounting has come under strong criticism particularly in the literature in the USA (Wijewardena & Cooray, 1993). Consequently, there has been a great concern among governments, professional bodies and educators for changes in accounting education (Wijewardena & Cooray, 1993). As an integral facet of society, the accounting profession has a role in the state and the trading sector, and is also expected to serve the public interest. The capacity of the accounting profession in Jordan to serve the public interest is considered in the context of legislation and the accounting standard setting process. For example, in Jordan in order to practice the profession of accounting, an accountant is expected to sit for many tests and accrue all the essential capabilities that would qualify him/her as a professional accountant (Jordanian Association of Certified Public Accountants, 2003, personal communication).

Despite the fact that Jordan is indeed a small country, it is still considered one of the better developing countries in the field of accounting (Burkhart & Older, 2003; Jordanian Association of Certified Public Accountants, 2003, personal communication). It is no surprise to find that the Jordanian government has given all the necessary attention and concern to this productive and significant profession. It has delineated all the relevant rules and regulations in the practice of this profession, with meticulous detail. Accounting as an emerging profession has been given the rights and obligations it deserves in parity with other professions (Jordanian Association of Certified Public Accountants, 2003, personal communication).

In addition to the requirements of scientific and moral rehabilitation of accounting as a key profession, the government of Jordan has passed all the required legislation to organize the ranks of this profession (Jordanian Association of Certified Public Accountants, 2003, personal communication). These legislative initiatives have included a wide variety of rights and responsibilities related to the profession. These have been implemented through roughly 50 ministerial articles that evinced a marked concern for the profession of accounting and its potential and continuing contribution to the economic growth of the country (Jordanian Association of Certified Public Accountants, 2003, personal communication). The first ministerial article for an example states that accounting has critical importance and should be viewed as a mainstream profession and must be organized legally. According to these various ministerial articles of the Jordanian government, the stated objective of all this legislations is to regulate the profession of accountancy, to promote and ensure adherence to globally recognized standards, and to ensure its dynamic contribution to the growth of the national income of the country. Needless to say, such governmental scrutiny and care will naturally help to upgrade the working parameters and conditions of chartered accountants and their commitment to the code of ethics of the accounting profession and moreover rivet attention on the real quality of an accountant's knowledge and his/her professional independence.

In accordance to the provisions of paragraph "b" of the Article 30, all these legislations, whether of the public shareholding companies and private companies or of the companies which have a limited liability in appointing a licensed or legal accountant in any field of major accounting work, act in such a manner that the profession of accounting can be regulated in Jordan through a set of legal strictures to have the best possible returns vis-à-vis this profession (Jordanian Association of Certified Public Accountants, 2003, personal communication). Owning the rights to the instructions of this ministerial article, a licensing committee has been formed to conduct qualifying examinations to practice this profession. This however led to the forced adoption of a variety of specific, new topics, including direct regulation of accountancy-profession litigation, trade, corporations, banks, securities, financial, insurance, and investment institutions and even the programmatic, active promotion of financial leasing, special economic zones and free zones and stamp duties and taxes and exemptions (Jordanian Association of Certified Public Accountants, 2003, personal communication). All of this lead to the second paper of accountancy and auditing with regard to the following themes: accounting standards, adopted financial reporting standards, international scrutiny and cost accounting, management accountancy, and accountancy vis-à-vis financial accounting theory (Jordanian Association of Certified Public Accountants, 2003, personal communication).

Despite these regulations established by the Jordanian government, there is certainly a need for studies covering various aspects of accounting education. Unfortunately, in the existing literature there is a dearth of such studies particularly in the area of AIS design in Jordan. For example, to the researcher's knowledge, no study has ever been done to examine the relationship between accountants participation in IS development and its impact on AIS design in Jordan. The significance of accountant's participation in selecting the suitable strategy, and specifying the required characters of accounting information may have a significant bearing on performance. The present study is an attempt to fill this gap.

2.4 INFORMATION TECHNOLOGY IN JORDAN

The following sections provide an overview of IT development, obstacles facing the development, and the roles of Jordanian government in accelerating the IT development processes.

2.4.1 Information Technology Development in Jordan

IT adoption has become an increasingly important agenda for every country in driving its economic growth, and it is increasingly playing a vital role in improving the quality and level of people’s lives and overcoming obstacles to social and economic development (Arunthari, 2005; Bala, Venkatesh, Brown, & Maruping, 2008). Along with developed countries strategies, Jordan has now become one of the fast growing developing countries in the Middle East (Burkhart & Older, 2003). Despite this, the advancement of IT related issues in Jordan is still very much underdeveloped compared to other developed countries in the world such as Europe and North America (Checchi, Hsieh, & Straub, 2003; Navarrete & Pick, 2003; Navarrete, Pick, & Roztocki, 2004; Raman & Yap, 1996; Thong, 1999). Nevertheless, Jordan is still a vivid and shining example of a resource-poor developing country that has seized upon IT as a mean of providing highly skilled employment and high value added exports in addition to interaction with the global business markets like Irish and Singaporean experience in this field (Al-Jaghoub & Westrup, 2003; Ein-Dor, Goodman, & Wolcott, 1999).

Elliott (2006) states that Jordan has achieved excellence in many respects and professions in particular the IT sector are booming and expanding rapidly. It is evident within last decade that the government has taken many actions and made various efforts to bridge the digital divide and technological gap. Although lots of advancement and support for IT are attributed to the efforts of “Microsoft” company to support the growth and economical development of different regions worldwide (Foreign Ministry of Jordan, 2008), IT advancement is indebted to the leadership of the Majesty King Abdullah II as Jordan’s achievements thus far have been accredited by many countries around the world. Today, Jordan is one of the best models for other countries in the region, and interestingly many of these countries wish to follow the Jordanian footsteps in this field.

2.4.2 Obstacles Facing Information Technology Development in Jordan

Despite all indexes which indicate that the IT sector has grown in Jordan and the adoption of relevant activities have improved the IT sector, it is generally assumed that developing countries such as Jordan are less capable than developed countries of utilizing IT to gain its benefits (Arunthari, 2005). There are many reasons that affect the IT development plans in Jordan. One of which is that due to the Gulf War of 1991, it was estimated that the majority of some 10,000-15,000 of educated and qualified Jordanian IT expatriates who were repatriated into Jordan left the country, creating a shortage of IT professionals in Jordan (Ciborra, 2005; Kaled, 2000). Other obstacles that need to be attended to include cultural resistance to new technologies that hinder IT usage, Jordan dependency on foreign IT experts, financial constraints in terms of the relative rise in cost of buying computers and in connecting to the internet, limited funding to support IT projects, and high piracy rate and weak laws protecting intellectual property (Murrar, 2003).

Furthermore, there seem to be no strong signs or indication to suggest that information revolution will be imminent in most of Middle East countries (Burkhart & Older, 2003). Activities such as having an information management system that are based on science, experience and analysis, communication technology that depends on the economical systems of governance are still lacking. Moreover, the vitality of economic activity and the openness of political participation when on the other hand the possibility in most of the countries in the region to lose the opportunity to catch up with the information revolution still exist. This is in turn will lead to raise the development gap between Middle East countries and the organization for economic cooperation and development (Burkhart & Older, 2003).

Burkhart and Older (2003) argued that due to the advancement in new IT in line with the IT revolution and the changes in the economical environment, it is increasingly difficult for trading sector in Jordan to make decisions regarding IT adoption. They assert that there are many interrelated and complex factors underpinning information revolution that could be discussed as follows:

1. Most of the Middle East countries will miss the IT revolution altogether, whereas others experience a belated "IT evolution". This will increase the development gap between these developing countries and developed countries.
2. Generally, the shortage level of IT penetration in most of the Middle East countries, regardless of any consideration for an IT revolution will exacerbate the gap between Middle East countries and the developed countries.
3. The disparate manner of IT diffusion and use, irrespective of the magnitude of IT, favoring the wealthy and privileged will increase the standard of living and opportunity gaps between the richest and poorest sectors of Middle East societies. As a result, continued unrest – including armed rebellion and the export of terrorism – and justification for a government's strict controls will

contribute to the fundamental problem in changing initially workers and society at large.

Furthermore, all developing countries seem to face the same limitations in adopting new technologies, and access or diffusion for technology. These limitations can be attributed to lack of business infrastructure, human skills and financial resources (Wong, 2002) or to the restrictions on the access to technologies imposed by developed countries where new technologies originate (Al Jaghoub & Westrup, 2003). Evidently, there are lack of studies that examine the relationship between IT adoption and business performance in the context of Middle East. Most previous studies concentrated on specific developed countries that are located primarily in North America and Western Europe (Al Jaghoub & Westrup, 2003). Therefore, more studies need to be conducted on the subject matter in countries like Jordan to infuse a better understanding of technological adaptation in the country. The lack of research and resources offers Jordan little help in creating a competitive advantage through technological industries, especially in developing new software or AIS generations.

2.4.3 The Role of Jordanian Government in Developing Information Technology Sector

The Jordanian government has made a lot of efforts to develop the IT sector. The effort started with the establishment of the Ministry of Information and Communication Technology (ICT) in 2002. This ministry has the responsibility to develop policies for the IT sector, including telecommunications and mail. It is also responsible for providing support to all aspects of IT initiatives at the local level and for developing awareness on the use of IT by all sectors of the population according to a comprehensive plan. Moreover, the ministry sets plans that reflect its goal to create a legal and trade environment, and to provide regulatory assistance to accommodate technology as a change factor towards socio-economic development in Jordan (Foreign Ministry of Jordan, 2008).

In many of His Majesty King Abdullah visit and travel to foreign countries, the focus point of his discussions on foreign issues is always related to the development of IT sector in Jordan. Based on his encouragement and support to create technologically developed Jordan, a meeting between His Majesty and the CEO of Microsoft was held in Davos in January 2000 to discuss technological cooperation between Jordan and Microsoft Corporation (King Abdullah II Official Website, 2008). As announced by the Ministry of ICT, the Jordanian government will introduce new programs for developing networks of technological skills among Jordanian youths to provide training opportunities for them so that they can develop their skills to achieve the effective use of IT. Jordan plans through this explosive growth of IT to develop the country and to be the leader in the advancement of IT among the Arab nations. In a long term, such position and change will enable Jordanians to obtain greater opportunities to improve their standard of living (Foreign Ministry of Jordan, 2008).

In summary, IT development in Jordan, like other developing countries in the world, is influenced by culture, laws, IT infrastructure, and the availability and role of skilled personnel. In addition, the continual, worldwide advancement in IT and accelerating changes that prevent a poor country like Jordan from catching up with decision making concerning the most advanced IT standards and modalities also affect the development of IT in Jordan (Al Jaghoub & Westrup, 2003).

2.5 LITERATURE RELATED TO ACCOUNTING INFORMATION SYSTEMS

The previous sections have provided an overview of Jordan, its accounting profession and IT development. This section proceeds to discuss the literature relating to AIS, which is an important component of modern IS (Mitchell et al., 2000). To simplify the discussions, this section is divided into several sections; the first section presents an overview of the history of AIS, and the second section provides an overview of AIS and AIS research, which is further divided into several sub-sections such as definitions of AIS research, categories of AIS research, and focus of AIS research.

2.5.1 The History of Accounting Information System

In order to state the significant connection between accounting and IT, Miranti (1999) has written an important book that describes the history of accounting and IS and its connections to the theory of the growth of the firm. Miranti argues that changes in corporate organization, strategy, market structure and technology serve as the drivers of modifications in the design and structure of AIS which was an essential significant departure from the traditional approach followed by accounting historians who often focus more narrowly on the details of methodological evolution per se, placing little emphasis on other contextual factors. Levenstein (1998) categorized the purpose of AIS development into three-stage of: (1) operational control; (2) short-term decision making; and (3) long-term capital allocations. These classifications enrich the analysis of firm practice by highlighting how changing priorities influenced information function, flows and content and this categorization also helped to avoid the rigidities inherent in some constructs as the entity or proprietary theories that permeate many methods studied in this field.

Recently, International Federation of Accountants (IFAC) stated that competence in IT is one of the most crucial factor in the knowledge economy, whereby newly emerging professional accountant must posses sufficient IT knowledge and skills due to the pervasive use and indispensability of IT in the business world (IFAC, 2003). While the debate over the impact of IT on accounting profession significantly caught the attention of accounting researchers and professional over the last decade, McMickle (1989) argued that the relationship that exists between the two disciplines can be traced back to the 1950s.

According to McMickle (1989), AIS was the first system that got the automation in the early years of the computerization era (i.e., payroll, accounts receivable, accounts payable and general ledger). IT started to penetrate accountants and the field of accounting during the 1950s and 1960s allowing the accountants to have the competence and privilege to use the technology at that time. Further evidence shows that on a global approach more intensive training of IT in accounting courses in universities in the USA occurred during these two decades (McMickle, 1989).

However, while accountants were busy with the technical accounting issues such as format of financial statements, they began to lease technical assistants, which were known during that time as "machine accountants" to utilize the technology in their accounting work. Gradually, this group of machine accountants began to distance themselves from the accounting profession and finally took the full responsibility to develop and maintain AIS of the organization (McMickle, 1989). Following this, a large and growing body of literature has investigated the use of IT and other useful information outside the traditional accounting boundary. This experience had significant implications to the structure of AIS. Unfortunately, professional accountants have distanced themselves from this new requirement. The situation worsens when AIS courses were dropped from the accounting curriculum in most of the universities in the USA in the early 1970s (McMickle, 1989). The first serious professional and academic discussions and analysis of the gap between the accountants and IT were carried out particularly during the 1970s. This resulted in poor coordination and divided on the need for IT adaptation in the field (McMickle, 1989). As we progress, many more technologies and software were introduced that are accounting related. For instance, during the late 1980s and early 1990s, the IT entered the new era (technological advancements), which helped to design and implement a new accounting model called "resource-events-agents" (REA) (Hall, 2000).

REA, is based on economic changes rather than one that focuses on debits and credits as in the traditional or conventional accounting model. It avoided the limitations of traditional system and gave AIS the possibility to capture data beyond the historical-and financial related accounting boundary (McCarthy, 1982) and make the model more reliable, systematic and promising. Immediately after that, organizations began to rethink about the way they used IT to provide information and how such information can lead to increase performance and support decision making. In reality, more developed systems across a much wider array of tasks to non-accounting divisions of organizations began to emerge. Consequently, the group which was initially known as machine accountant back in the 1950s began to mature and become stronger to create an independent discipline in the right way known as MIS (Arnold & Sutton, 2001).

Back to the accounting discipline, Arnold and Sutton (2001) argued that while business practices and accounting procedures have consistently developed and matured extensively over the last two decades, the revolution of IT has in many ways impacted the existence of the accounting profession. Since the turn of the century, many have claimed that accounting profession has passed its prime and, in its traditional state, is experiencing decline (Hunton, 2002). The accounting profession began to realize that IT development has actually resulted in them losing control over IS and information.

Williams (2000) argued that the people driving organizations are no longer the accountants; rather they are the IS people. While the issue is still subject to discussion, the evolution of IT has certainly pushed the accounting profession to change the ways of performing many accounting tasks. The related impact of IT on accounting has been a growing market in AIS with high demand for lecturers with AIS skills and for students who have an education that blends accounting and IT skills (Arnold & Sutton, 2002). The reason is that, as argued by Mauldin and Ruchala (1999), new development in IT and business practices have made it possible for accounting professionals and academics to look at the tasks and advantages of AIS from a broader perspective. For example, the integrated and paperless nature of the enterprise resource planning (ERP) system has changed the traditional role of management accountants and auditors (Scapens & Jazayeri, 2003).

Today, beside the rapid changes in management, technology, and the market circumstances, companies are facing various challenges to develop the AIS. In addition, there is an increasing tendency for mergers to increase the products in the market which may change the management structure of the AIS. Generally, in order to face such monumental change, professionals in this field must be more flexible in order to respond quickly and effectively to avoid the technical problems that may happen within the companies. Various accounting software have been developed to help finance professionals to meet those challenges. Such technology helps to deliver information securely across the company and within companies in the country and elsewhere in the world. It involves different stakeholders from suppliers to customers (CODA Group, 2007).

According to CODA Group (2007) any accounting software should cover the following basics: general ledger, sales and purchasing ledger, project ledgers - ideally within a unified ledger for real-time accounting; multi-currency, multi-company, multi-lingual capabilities; on-line enquiry and browsing; simple reporting and easy-to-use analysis functions; and standard integration utilities, using the latest technologies, like web services.

2.5.2 Overview of Information System, Management Information System and Accounting Information System

The American Association for Information System defined IS as a system that collects, organizes, delivers, and presents information for use by individuals in the areas of planning and oversight of the activities carried out by organization (Al-Bayati & Hassan, 1992). O`Brien (1990) defined IS as a group of individuals, procedures and materials that collect, process and provide information within the organization. Mansour and Abu-Noor (1999) defined IS as a system that provides the organization with the necessary information needed for the industry to make decision in a timely manner and appropriate at the administrative level. The main components of IS include receiving and transmitting, storing, processing, retrieving and delivering data at suitable time and place. More recently, the Technical Vocational Schools and

Trade Schools (2008) defined IS as a business application that is made up of the database, application programs, manual and machine procedures and encompasses the computer systems that do the processing. Businesses employ computer-based IS to store, manipulate and display business information.

While various definitions of IS are available, Yahya and Alhubaity (1990) conclude that IS can be seen as the manner of dealing with data such as the source of getting information and placing conservation as well as the source for the transmission and retrieval processes. IS is essential to conduct the necessary operational process for data to reach the conclusion and configure it to benefit the users. They further added that it is also necessary to differentiate between the concepts of system and IS based on their goals and objectives. The basic components of a system consist of inputs, operational processes, outputs, and feedback. The objective of any system can only be achieved when that system has produced the outputs and submitted these outputs to the end users. On the other hand, the aim of the IS can only be achieved when these outputs have been utilized by the users to make various decisions. The following paragraphs discuss the differences between MIS and AIS.

Generally, organizational IS can be divided into two categories such as MIS and AIS (Gelinas, Sutton & Hunton, 2005). However, there have been many disagreements on the similarities and differences between AIS and MIS. In general, AIS can be defined as a system in the economic unit, which consists of several sub-systems, and these sub-systems work together in a coherent, harmonious and with mutual understanding with the objective to provide historical information, current and future financial and non-financial to all those who are interested (Yahya & Alhubaity, 1990). Meanwhile, the term MIS is defined as a group of interrelated parts that work with each other, interacting to transform data into information that can be used to support the administrative functions (planning, control, decision-making, coordination), and operational activities in the economic unit (Bocij, Chaffy, Greasley, & Hiickie, 2003).

Several AIS and MIS textbooks differentiate AIS and MIS based on the types of information produced by the systems. For example, AIS focuses on financial information, while MIS emphasizes non-financial information (Gelinas, Sutton, & Hunton, 2005; O'Brien & Marakas, 2008). Horngren and Sunden (1987) defined AIS as a formal means of gathering and communicating data to aid and coordinate collective decisions in light of the overall goals or objectives of organizations. In a similar vein, Boulianne (2007) define AIS as the scope of information used by managers for decision making. Reneau and Grabski (1987) maintained that AIS includes systems used by accountants or by other decision makers who depend on accounting information to make their decisions either financial or non-financial, or in tasks that involve the application of accounting data.

Eldahrawi and Mohamed (2000) claim that AIS is part of MIS as the former helps organizations in preparing lists of financial information for outside users, while the latter is particularly concerned with all plausible information necessary for the management to achieve optimal use of available resources of the organization.

According to Eldahrawi and Mohamed, the concept of MIS essentially includes all IS within the organization, including AIS. However, many AIS researchers oppose this view. Vaassen (2002) believes this view is not true at the present time and assumes that they are just the opinions that prevailed in the middle of last century. According to him, AIS is well accepted within many organizations as any other systems or tools used and implemented within the economic unit. In addition, AIS has become both the basic system and sub-system within the overall system in the economic unit. Similarly, Moscove, Simkin, and Bagranoff (2001) and Kircher (1967) consider AIS as a system that is not limited to financial information only, but extends to include all information that covers both non-financial and financial information. Vaassen asserts that the role of AIS has been extended to the preparation of necessary reports to many users within the organization, not just the accountants. Modern AIS allows them to present all types of information needed by different administrative levels in the planning, control and management decisions. Thus, the supporters of this view consider AIS as the fundamental system within the economic unit, and MIS is part of it (Vaassen, 2002).

The American Accounting Association (AAA) has tried to reconcile the conflicting views on AIS and MIS by suggesting that AIS and MIS are generally two independent systems. In searching for a comprehensive data, accountant needs to obtain numerous data from different systems in the economic unit (represented by MIS) (Eldahrawi & Mohammed, 2000). Nevertheless, in doing so, one will find overlaps or similarities of characteristics between the two systems.

Honig (1999) classified computerized AIS into three major tiers. The ERP system, which is an integrated software package design to provide complete integration of an organization's business information processing systems and all related data, dominates the highest tier. The next two tiers consist of the high-end and the low-end systems. The low-end and high-end AIS are distinguished by the ease and speed with which information is pulled from the accounting database, the quantity of information that can be stored in the database, the intensity of use, and the ease of modification and customization (Spivak & Honig, 1997).

The ERP system is conceptually based on event-driven systems concept which includes the capturing of both financial and non-financial data to facilitate access and ad-hoc analysis (Gelinas, Sutton, & Hunton, 2005). Among the popular modules offered by ERP vendors are purchase and sales order management, inventory and materials management, production and assembly, transportation, service and maintenance, marketing and sales, warehouse management, financial accounting, and human resource management (Everdinge, Hillegersberg, & Waarts, 2000).

In conclusion, AIS is considered an important factor in the accomplishment of organizational effectiveness especially in facilitating decision making process. The following section discusses the definition and scope of AIS from AIS researchers' point of view.

2.5.3 Definition of Accounting Information System Research

In recent years, there has been an increasing amount of literature that attempted to define AIS. There is a greater challenge facing accounting researchers to undertake AIS research projects because of the difficulty in defining AIS as a discipline. Arnold and Sutton (2002) noted that discussions on AIS have mainly focused around the width of a given definition with criticisms ranging from the too narrow to the too broad. Considering the definition of AIS, research in this area is an essential aspect to any meaningful discussion which is related to AIS field such as the extant of AIS research, the criticisms of the extant AIS studies, and the future of AIS frontiers.

In an earlier study conducted by McCarthy (1990), he stated that "the distinguishing feature of AIS is its involvement in transaction processing for accountability purposes in an organization" (p. 10). McCarthy's definition of AIS is perhaps observed to be one of the earliest definitions of AIS in terms of the proposition for frontiers of AIS research. However, Sutton's (1992) view of AIS research is considered as one of the most important discussions that have been held around as it took a much wider view of AIS research. Sutton (1992) argued that while AIS might be usefully perceived as a subset of MIS from a teaching standpoint, identifying an area of IS that is not of importance to AIS research is difficult.

Murthy and Wiggins (1999) also debated the similarities and differences between AIS and MIS in their discussions. They defined AIS as "the logical intersection of the broad fields of accounting and MIS, where the relationship between the AIS and MIS comes from computer-based systems that produce information" (p. 3). They further argued that even though both AIS and MIS concentrated on IS, AIS focuses more on the information itself whereas MIS emphasizes the systems that produce information. However, similar to Sutton (1992), Murthy and Wiggins further indicate that AIS research can expand beyond just the explicit intersection into both accounting and MIS domains.

Hunton (2002) adopts a similar view to McCarthy's (1990) where he views accounting as "a specialized IS aimed at recognizing, measuring, recording, processing, and reporting economic events affecting business entities" (p. 60). The difference between accounting and IS disciplines centers on the economic implications of business events. Hunton further noted that while both disciplines investigate similar intra-enterprise issues, the IS discipline is most concerned with technical aspects of incorporating IT into organizations, whereas the AIS discipline is most interested in leveraging IT to improve business performance while simultaneously maintaining effective internal controls. In the context of this study, AIS refers to characteristics of financial and management accounting information. However, it is not restricted to the historical data only but also future-oriented data that can help companies improve business performance while maintaining effective internal controls of the organizations.

2.5.4 Categories of Accounting Information System Research

Based on extensive reviews of AIS literature, Arnold and Sutton (2002) categorize AIS research into two categories, which are social science research and design science research, which are discussed in the following sections.

2.5.4.1 Design Science Research

According to David, Dunn, McCarthy, and Poston (1999), design science research represents the authority systems which focus on the quality of AIS, which relates to: (1) systems concepts, (2) models, (3) design and development techniques, and (4) systems implementation and validation. Examples of this category of research include database accounting systems (Colantoni, Manes, & Whinston, 1971; Everest & Weber, 1977), Resource-Event-Agent model (McMarthy, 1990) and CASE tool for accounting database design (Rockwell & McCarthy, 1999).

Previous literature on the domain of AIS research emphasized that most of researchers in this category were infatuated with technology instead of focusing on the underlying concepts or theories related to design, development, or application of the technology. Arnold and Sutton (2002), however, emphasized that, simply building a system does not advance research - rather the question that follows relates to the concept of which proof was being sought. Eventually, Arnold and Sutton's study concluded that the design science perspective does not provide a good foundation for understanding the impact of IT evolutionary advancements on accounting.

2.5.4.2 Social Science Research

Social science research in the area of AIS has been adopted by many AIS researchers. This domain is responsible to provide a research frame that is suitable for establishing theories and testing those theories as they relate to the impact of IT on individuals, organizations, and society. These types of research are evident mostly in decision-making contexts (March & Smith 1995; Sutton & Arnold 1995). Generally, researchers in this category of AIS research conduct experiments and field research to evaluate theories and measure hypothesis, and carry out statistical testing for the hypothesis to get the findings.

There are several theories that can be applied in the AIS research field. Choosing the theory depends on the area of research. Theories considered useable within AIS research include: organizational information processing theory; contingency theory; agency theory; knowledge-based theory: task-technology fit theory; unified theory of acceptance and use of technology; real options theory; transaction cost economics; and resource-based view of the firm (March & Smith, 1995). Accordingly, this study is based on Galbraith's (1973, 1977) contingency theory in order to examine the relationship between contingency factors including IT sophistication and AIS design, and the effect of sophisticated AIS design on IT benefits. This theory is chosen as a basis for this research because it postulates the idea that there is no one best way to manage an organization, and that the effectiveness of an organization depends on a variety of factors such as environmental conditions, business strategy, organizational structure and management style, to name a few. In the context of the present research, because the main assumption here is that the effectiveness of AIS on the organization is different from one organization to another organization depending on the factors that influence it, thus the use of contingency theory seems to be the most plausible theory to help explain how AIS works.

2.6 FOCUS OF ACCOUNTING INFORMATION SYSTEM RESEARCH

Generally, the focus of AIS researches can be classified into two categories (Ismail, 2004). The first category comprises studies that view AIS from the financial accounting perspective, known as financial accounting system (FAS). The second category viewed AIS from the management accounting perspective, known as management accounting system (MAS). According to Hall (2000), FAS is responsible for providing external users the standard historical financial-related information such as balance sheet, and profit and loss statements, while MAS is responsible for preparing both financial and non-financial related information for internal users. The following sections discuss the literatures relating to both FAS and MAS.

2.6.1 Financial Accounting System

As mentioned above, AIS studies can be divided into two types i.e. FAS and MAS (Ismail, 2004) based on the type of information and the type of users served by the respective system (Alkashi, 2006). According to Altahlh (2007), parties that use information produced by FAS include: present and prospective investors; present and prospective lenders; suppliers; customers and employees; and relevant government agencies. Altahlh further adds that the concepts of the quality of information determine the characteristics of the accounting information usefulness. Therefore, the outputs of FAS should be characterized by the qualitative characteristics of accounting information such as relevance, reliability of the information, ability of information understanding, ability of information for comparison, suitable timing, comparative importance, and optimal disclosure. In Jordan, current accounting standards necessitate the qualitative existence for accounting information in order to give credibility and reliability to the accounting information which are produced by AIS, whether by manual or computerized system (Altahlh, 2007). Among the common information produced by FAS include balance sheet, profit and loss statement, and cash flow statement.

Reviews of FAS literature indicate that FAS studies have focused on SMEs. Large companies, in particular listed companies, with sophisticated FAS prepared and produced audited annual report, and in some cases quarterly reports, to meet the statutory requirements and also for the benefits of their shareholders and other interested parties. Large companies, in addition to FAS information, also rely heavily on information produced by MAS, for decision making purposes. Therefore, accounting research on large companies focuses more on MAS rather than FAS. On the other hand, findings from several studies suggested that financial accounting information remains the principal source of information for the management of SMEs (see Gorton, 1999; McMahon, 2001; McMahon & Davies, 1994; Thomas & Evanson, 1997 for examples of FAS studies among SMEs), thus explains lack of focus of FAS studies among large companies as opposed to SMEs.

2.6.2 Management Accounting Systems

As explained in the previous section, FAS study mostly focused on SMEs, whereby such study is almost non-existent among large companies. While SMEs are still struggling with their FAS, most large companies concentrated on the use of IT to enhance their MAS to help them make better decisions. Compared to the FAS, the MAS is more future-oriented and varies according to specific requirements of the management. MAS is responsible for providing management with information for strategic, management and operational decision-making purposes (Hall, 2000). Therefore, it is crucial for companies competing in the international market to adopt advanced AIS which not only focus on FAS but more importantly for MAS to survive (Davila & Foster, 2005; Moores & Yuen, 2001; Sandino, 2005). Seven MAS information elements of import to organizations include cash budget, variance analysis, operating expense approval policies, capital expenditure approval policies, product profitability, customer profitability, and customer acquisition cost (Davila & Foster, 2005).

Mak (1989) suggested that MAS studies focused on two broad dimensions of MAS: (1) the use of management accounting techniques; and (2) the characteristics of MAS. However, more recent studies, as suggested by Davila and Foster (2005), concentrated on factors that influence MAS adoption decisions and its implication on performance of large companies. While this section discusses literature relating to the use of management accounting techniques and factors influencing MAS adoption, the following section discusses in greater details AIS design, which is the focus of this study.

Previous studies have investigated the use of management accounting techniques among large companies. Chenhall and Langfield-Smith (1998), for example, investigated the extent to which manufacturing firms in Australia have adopted certain traditional systems and recently developed management accounting practices such as activity-based costing. This study found that, the rates of adoption of traditional management accounting practices were higher than the new techniques. The findings of the study suggested that the majority of these companies, particularly larger ones, have adopted a range of management accounting techniques that emphasis non-financial information. In a more recent study, Smith, Abdullah, Abdul Razak (2008) confirm the dominance of financial accounting for the purposes of management control, with minimal adoption of innovative management accounting tools, even for large companies.

Conversely, other related studies have found that traditional management accounting techniques are not suited for companies operating in contemporary setting characterized by intense global competition, rapid technological change and the development of new management approaches, such as total quality management, just-in-time and flexible manufacturing systems (Bromwich & Bhimani, 1994; Bunce, Fraser, & Woodcock, 1995; Cooper, 1988).

Recently a group of developed techniques, including activity-based costing, value chain analysis, target costing, product life cycle analysis, shareholder value chain analysis, and benchmarking have been proposed as ways of linking operations to the company's strategies and objectives. All recently-developed management accounting practices, activity-based costing has gained a high profile as a technique to enhance the accuracy of product costing and to help understand the way in which resources are used across the firm's value-chain to deliver strategic outcomes (Shank & Govindarajan, 1993).

Other researchers extended MAS study by examining the impact of the interaction between contextual factors and MAS design on organizational performance. For example, Chenhall and Morris (1986), and Gordon and Narayanan (1984) explored the relationship between environmental uncertainty, organizational structure and MAS design. The findings of these studies provided a strong empirical evidence to support the propositions that environmental uncertainty and organizational structure influenced the characteristics of MAS.

Mak (1989) examined the relationships between perceived environmental uncertainty, sophistication of control systems (i.e. operational control systems, management control systems, and strategic planning), and financial performance using the interaction approach to fit. This study found very limited support that fits between environmental uncertainty and sophistication of control systems related to financial performance. However, this study showed strong support that consistency among components of the control systems was related to financial performance. This suggests that internal consistency among organizational subsystems may be more important to organizational performance.

Agbejule and Burrowes (2007) investigated the relationship between perceived environmental uncertainty, supplier development and the use of broad scope MAS information. The results revealed that perceived environmental uncertainty is a determinant of supplier development, which, in turn, is a determinant of the use of MAS. In other words, supplier development plays a mediating role in the relationship between perceived environmental uncertainty and the use of broad scope MAS information.

Shank and Govindarajan (1993) investigated the relationship between environmental uncertainty, performance evaluation style, and business unit performance and they found that, when the environment is uncertain, a long-range view of planning is more important than in a stable environment. Many other studies found that in a competitive environment, managers are compelled to process considerably more MAS information to reduce uncertainty (Chenhall & Morris, 1986; Chong, 1996; Mia, 1993). Gul (1991) and Gul and Chia (1994) point out that in the relatively stable environment if managers go on making extensive use of broad scope MAS information, it is likely to results in information overload and may even hamper performance.

Chong and Chong (1997) examined the intervening role of MAS on the relationship between strategy and environmental uncertainty on organizational performance. They suggested that organizational strategy and environmental uncertainty are important antecedents of MAS. They further argued that sophisticated MAS design will eventually lead to better performance. Earlier, Abernethy and Guthrie (1994) found that the effectiveness of business units is dependent on a match between MAS and organizational strategic choice. Mia and Chenhall (1994) examined the mediating role of managers' use of management accounting information in the relationship between the intensity of market competition and business unit performance. They found that increasing intensity of market competition was associated with use of the accounting information and consequently suggested that increasing the use of the information is associated with improved business unit performance.

Alcuaz (1996) conducted a study on the differences between any processes conducted before and after adopting advanced new MAS in sales order processing system and found that all transactions after the MAS adoption were more efficiently managed. For example, statements of accounts receivables and inventory and balances were automatically updated, and as a result the packing and delivery of goods was smoother and quicker.

More recently, Davila and Foster (2005) found two important factors that influence MAS adoption and sophistication i.e. chief executive officer's (CEO) knowledge of accounting and its importance to the business strategies, and company size. Granlund and Taipaleenmak (2005) examined the effects of MAS on the performance of the companies in eight new economical companies. The findings of the study showed that the unique setting and the environmental influences such as CEOs' beliefs for the value of MAS adoption lead to important differences in how these systems are used.

The above discussions have indicated that many studies have been conducted to investigate the characteristics of MAS and its influence factors. The findings of these studies generally support the proposition that appropriate fit between contingency factors and MAS design contribute to superior performance. Among the dominant factors found to have affected the characteristics of MAS include environmental condition, organizational structure, size of the organization, and more recently business strategy. However, most of these studies neglected the influence IT on the characteristics of MAS. Few studies that incorporate IT in their studies also defined IT in a narrow perspective. The next section provides an overview of several researches that attempt to integrate IT into their studies.

2.7 ACCOUNTING AND INFORMATION TECHNOLOGY

As previously discussed, the relationship between accounting and IT has existed since half a century ago (McMickle, 1989). Indeed, as suggested by Xiao et al. (1996), accounting has always been seen as a front-runner in IT usage. Accounting in most cases is the first area to be computerized in organizations (Macintosh, 1985).

Nowadays, the application of IT in accounting has become all pervasive even to the smallest businesses (Ismail & King, 2005).

Both of accounting and IT are considered as integral parts in modern business. There are many reasons to believe that IT has greatly affected the accounting profession. The evolution of IT has fundamentally changed the way accountants perform their jobs. In the simplest form, the automation of AIS has enabled accountants to generate annual reports in a more timely and accurate basis. Furthermore, the automation of AIS provides the opportunity for accountant to deviate from the traditional number crunching role to a business advisor. However, despite facilitating the work of an accountant, the sophistication of IT poses also greater challenges to an auditor. Therefore, modern accountant needs to acquire sufficient IT skills and knowledge to be effective (IFAC, 2003). The following paragraphs discuss general studies relating to accounting and IT.

IT-related issues have received the attention of accounting professionals and researchers since the 1970s when accountants started to realize that they were losing control over information and IS (McMickle, 1989). Accountants were forced to revise the way they used IT to provide information and support their tasks, including the technique of developing applications (Arnold & Sutton, 2001). Therefore, Janie (2005) argued new generation accountants should have sufficient capability for evaluating IT issues such as strategic IT alignment, IT value delivery, and IT resources measurement.

One of the earliest studies relating to accounting and IT was conducted by Clark and Cooper (1985). They found that the use of computer-based AIS has become widespread in all the organizations including SMEs. However, the use of IT at that time was limited to transactional system. King, Lee, Piper, and Whittaker (1991) found limited evidence that IT is used to support decision-making. In the early days, IT usage in accounting mainly focuses on the automation aspect, whereby routine manual accounting procedures are changed to automated processes (Williams, 1991). The automation of accounting processes has greatly saved the processing times and made book-keeping more comprehensive, accurate, timely and frequent (King, et. al., 1991). Wichmann, Robinson, and Gifford (1987) suggested that organizations should use IT to provide more timely and detailed information to assist in interpreting the organizational financial position, thus IT should be viewed on the basis that it provides many opportunities for accountants. Despite this, IT usage does not help produce more focused and tailored information such as management accounting information (McCosh, 1986). These results were to be expected in the era of accountants that emphasized the 'number-crunching' role (Mitchell, Reid, & Smith, 2000). More recently, Gelinas et al. (2005) revealed an interesting finding. Using an expert panel opinion survey and assigned a relative degree of sophistication to each of the twelve types of software used by accountants and six types of hardware that are used to support the applications, their study found a positive impact of IT sophistication and cultural innovative, on IT sophistication and in IS success, particularly system quality, information quality and companies impact which is beyond the expectations of the study. In addition, they found a negative relationship between IT sophistication and companies' size.

Other than general IT, the ERP system has received great attention from AIS researchers quite recently (Fotiadis & Hatzithomas, 2007; Ifinedo & Nahar, 2006). Over two decades ago, Clark and Cooper (1985) suggested that IT knowledge and skills are important for accountants, together with their financial and business skills, to contribute to successful implementation of computerization projects. King et. al., (1991) argued that the IT revolution has changed the fundamental duties of management accountants from accumulation, analysis and preparation toward interpretation, and evaluation to control and involvement in decision-making. Since then many studies have investigated the impact of IT or more specifically of system such as ERP on management accounting and the management accountant itself (see for example Booth, Matolcsy, & Wieder, 2000; Caglio, 2003; Doran & Walsh, 2004; Granlund & Malmi, 2002; Hyvonen, 2003; Rom & Rohde, 2006; Scapens & Jazayeri, 2003; Spraakman, 2005).

The previous discussions suggested that many accounting researchers have attempted to incorporate IT into the studies over the last two decades. However, it is important to note that most AIS studies are very descriptive in nature, as the majority of these studies take a simple approach to data analysis and lack rigorous statistical tests or sufficient data (Xiao et. al., 1996). Their exploratory nature, in many instances, fails to reveal other important areas such as the determinants of the AIS and IT sophistication and more importantly, their impact on organizational performance. Therefore, a more comprehensive study is still needed to further explain the phenomena (Hunton & Flowers 1997).

2.8 ACCOUNTING INFORMATION SYSTEM DESIGN

Alfredson, Leo, Picker, Pacter, and Radford (2005) stated that the International Accounting Standards Board (IASB) is committed to developing, in the public interest, a single set of high quality, understandable and enforceable global accounting standards that require transparent and comparable information in general purpose financial statements but that is impossible without AIS to generate these kind of required information. Briggs, Vreede, Nunamaker, and Sprague (2003) explained the effect of accounting information generated by AIS as follows: "In order to succeed, managers need information so they can decide. They must decide so they can control. They must control so the organization can survive. A successful IS, therefore, must deliver timely, accurate, and complete information to decision-makers with a minimum of mental and economic cost." (p. 8)

Recognizing the importance of AIS to the success of organizations, many studies have attempted to characterize AIS design to understand factors that influence it. Several studies have also examined the subsequent impact of the relationship between contingency factors and AIS design on organizational performance. While these studies had provided important insights into the role of contingency factors in influencing AIS design and the impact of AIS design on performance, the scope and definition of AIS used by researchers varied. It is important to note that researchers have used the terms AIS and MAS interchangeably, thus posing difficulty to compare between studies. Therefore, this section attempts to review and discuss the scope of MAS and/or AIS used by previous studies.

Yadav (1985) classified IS characteristics into three categories: (1) architectural characteristics, (2) information presentation structures, and (3) information characteristics. Of these three, information characteristics are considered key AIS design variables by many AIS researchers (see for example Abernethy & Guthrie, 1994; Chenhall & Morris, 1986; Choe & Lee, 1993; Chong, 1996; Chong & Chong, 1997; Gordon & Narayanan, 1984; Gul, 1991; Gul & Chia, 1994; Mia, 1993; Mia & Chenhall, 1994). However, AIS researchers did not consistently define the characteristics of accounting information (Ismail, 2004). Among the characteristics of accounting information used by AIS researchers to represent AIS design include focus, aggregation, orientation, time horizon, financial or non-financial, and quantitative or qualitative.

Gorry and Scott-Morton's (1971) can be considered as one of the earliest AIS studies. They classified the characteristics of information into seven categories: source, scope, level of aggregation, time horizon, currency, required accuracy, and frequency of use. They relate the characteristics of information to different levels of managerial activities such as strategic, management and operational. Gordon and Miller (1976), and Gordon, Larcker, and Tuggle (1978), on the other hand, viewed AIS characteristics based on the format, form, focus, orientation, time horizon, and frequency. Findings from these studies suggested that environmental characteristics, organizational structure, and decision-making styles would influence the characteristics of AIS (Gordon & Miller, 1976). Swanson (1978) classified organizational information according to whether it is inner-directed or outer-directed, internally-based or externally-based, and self-referencing or outer-referencing. In 1984, Gordon and Narayanan considered AIS design to include external, non-financial and ex ante, in addition to internal, financial and ex post information to examine the relationships between organizational environments, organizational structure and AIS design.

Ewusi-Mensah (1981) provided a list of information variables which reflect the requirements for different external organizational environment such as information quality, information availability, information value, impact on decision-making, organizational interaction, organizational search, response time, time horizon, information source, and information type. This study considered accounting information beyond the traditional scope of accounting framework, whereby this contemporary view of accounting is that of an IS that facilitates decision-making (Gordon et al., 1978).

There are several other studies that incorporate AIS design into their research framework. Macintosh (1981), for example, proposed a model which combines both personal decision styles and organizational technology to derive four distinct IS styles, each of which is suited to a particular technology. The author suggested that accounting and IS should be designed to be congruent with the organizational contexts which they serve. Mauldin and Ruchala (1999) developed a model that links AIS design alternatives to technological, organizational and cognitive styles and to task performance. The model focused on the accounting task such as mental processes, complexity, task demands, frequency of occurrence, and then suggested that a matching process between task requirements and AIS design alternatives. These studies, however, do not set out clearly the types of accounting information proposed in their framework.

In 1995, the Institute of Management Accountants (IMA) suggested that information provided to managers by AIS can be characterized into three characteristics such as focus, quantification, and time horizon (Bromwich & Bhimani, 1994). However, the most significant study relating to AIS design was conducted by Chenhall and Morris (1986). They classified accounting information into four dimensions: (1) scope, (2) timeliness, (3) aggregation, and (4) integration. The classification made by Chenhall and Morris is considered the most popular classification of AIS that is widely adopted by many AIS researchers such as Abernethy and Guthrie (1994), Boulianne (2007), Chong (1996), Chong and Chong (1997), Gul and Chia (1994), Ismail and King (2005, 2006), and Mia and Chenhall (1994). With the exception of Gul (1991) and Ismail and King (2005, 2006), most researchers tend to adopt the AIS design proposed by Chenhall and Morris (1986) on a piecemeal basis, whereby the most popular AIS dimension adopted was scope. Boulianne (2007) suggested that narrow-scope AIS consists of internal, financial, and historical information, while broad-scope AIS consists of external, non-financial, and future-oriented information. For the purpose of this study, all four dimensions of AIS design namely; scope, timeliness, aggregation, and integration were used to reflect the sophistication of AIS design adopted by the responding Jordanian companies.

2.9 LITERATURE RELATED TO INFORMATION TECHNOLOGY

IT literature has significantly developed over the last two decades. The first IT-related research can be traced back into the late 1970s. IT studies during late 1970s and early 1980s focused on the issues of IT adoption and sophistication and the influence factors. For example, DeLone (1981), and Ein-Dor and Segev (1978) found that formalization of organizational structure was the determining factor that influence IT adoption. In addition to organizational factor, Welsh and White (1981) argued that the business strategy also played an important role in IT adoption. Organizations with formal business strategies tend to adopt more sophisticated IT. Findings from these studies suggested that several contingency factors such as organizational size, organizational structure, and environmental condition have been identified to influence IT adoption and/or sophistication (Weill & Olson, 1989).

Starting in 1980s and early 1990s, IT issue has shifted from IT adoption to IT success, often represented by the performance of adopting organizations. However, most studies have found that IT did not have a direct impact and in some cases have negative impact on performance (Shin, 2001). Baily (1986), Morrison and Berndt (1991), and Roach (1987), for example, found a negative relationship between technology-related variables and performance. More recently, Morikawa (2004) found a positive and significant relationship between IT and company profitability and innovation, but only for smaller companies. Similarly, Nir, Jeffrey, Shewchuk, Burke, and Brooks (2006) examine the relationship between investment in IT and its financial performance of the Florida hospitals and they found a significantly positive relationship between increased levels of IT use and different measures of financial performance. Following this, IT researchers have shifted their focus to finding potential factors that could explain the phenomenon such as IT alignment issue.

The issue of IT alignment with the firm's business strategy constitutes one of the five main problems faced by IT managers in large enterprises (Luftman, Kempaiah, & Nash, 2006). IT alignment with business strategy has been shown to significantly contribute to the business performance of SMEs (Raymond & Bergeron, 2008). Following this, Shin (2001) suggested that IT is just a tool and need to be aligned with other organizational factors such as business strategy to be effective. Hirschheim and Sabherwal (2001) also suggested that strategic IT alignment is able to improve not only IT success but also organizational success.

Following this phenomenon, the concept of alignment has become popular among IT researchers. Ives and Learmonth (1984) argued that most of the strategic IT studies were based on the original work of Michael Porter on industry analysis and the formulation of competitive strategies. Porter's (1980) model identifies cost leadership, product or service differentiation and focus strategies as important determinants for firms to remain competitive. Although the analysis did not specifically address IT, it provided a framework for investigating the role that IT can play in a firm's competitive strategy (Ives & Learmonth, 1984). Ives and Learmonth's study, which can be considered as one of the earliest IT strategy studies, has used a customer resource life cycle as a model to explain new opportunities for the strategic applications of IT. The model focuses on the firm's relationship with its customers and how this relationship can be changed or enhanced by the strategic application of IT. Earlier, McFarlan and McKenney (1983) developed a strategic grid framework which classifies firms on the basis of the criticality of existing applications and the potential criticality of applications under development.

Sabherwal and King (1991) adopted an inductive approach to develop a theory towards the strategic applications of IT. Mahmood and Mann (1993) found the alignment between IT investment and organizational strategic would have an impact on economic performance. Similarly, Lim's (2006) study which examined the impacts of IT investment on performance found that careful selection of IT strategies that aligned with competitive position would increase organizational value. The study further proposed a framework for AIS research to IT return on investment based on accounting performance measures. In addition, Doms, Jarmin, and Klimek (2004) found a strong relationship between investment in IT and productivity growth. More recently, Wu, Yeniyurt, Kim and Cavusgil (2006) examined the effect of IT on supply chain capabilities and company performance. The study found that IT-enabled supply chain capabilities can work as a motivation in transforming IT-related resources into higher value for a company.

Chan, Huff, Barclay, and Copeland, (1997) and Luftman and Brier (1999) examined the alignment between IT strategies and business strategies while other studies investigated the linkage between business goals and IT goals (Reich & Benbasat, 1996, 2000), the integration between business planning and IT planning (Teo & King, 1997). The results from these studies suggested that strategic IT alignment is crucial in determining both IT success and organizational success.

In summary, the above discussions indicate that a considerable number of studies have been carried out in IT literature. However, IT researchers defined IT from different perspectives. Generally, IT can be defined as the computer and communication system used to acquire, encode, transmit, store, and process information (Banker, Kauffman, & Mahmood, 1993). Daniels (1995) defined IT as the combination between technology and business or the application of technology to business processes, gathering data and preparing information to help managers in decisions making. Turban, McLean, and Wetherbe (1996) on the other hand, defined IT as the technological side in IS such as the physical facilities which include hardware, database software, devices, and services in addition to management that support all computing resources in an organization. They further stated that IT applications include operation, documentation, integration, and maintenance. In a more recent study, Alkadi and Alkadi (2004) defined IT as a collection of individual technology components that are typically organized into computer-based IS.

Based on the review of past IT literatures, Thong (1999) concluded that IT is a multi-dimensional variable, which can be viewed from both narrow and broad perspectives. Kagan, Lau, and Nusgart (1990), for example, viewed IT as one dimension, which relate to the sophistication of the application software adopted by organizations. Raymond and Pare (1992), on the other hand, argued that IT sophistication need to be viewed from a much broader perspective. They further argued that the adoption of different measures of IT sophistication leads to uncertain results and makes it difficult for comparative analysis. Therefore, based on their extensive review of past literature, they developed a more comprehensive measure of IT sophistication. Raymond and Pare (1992) defined IT sophistication as "a multi-dimensional construct which includes aspects related to technological support, information content, functional support, and IT management practices" (p. 7). This construct includes four dimensions: technological, informational, functional, and managerial. Technological sophistication reflects the number or diversity of IT used. Informational context is characterized by the nature of its application portfolio such as transactional and administrative applications, and the degree of integration of the applications. The functional dimension relates to both the structural aspects of the IS function and the implementation process. Finally, the managerial function relates to the mechanisms employed to plan, control and evaluate present and future applications.

2.10 INFORMATION TECHNOLOGY BENEFITS

IT plays a vital role in organizational success (Chang, Lin, & Wu, 2002). Therefore, the most important issue nowadays is not whether the organizations should have IS or not, but that it should have an effective IS (Cragg & Tagliavini, 2006). Accordingly, the issues of IS success and its determinants are considered to be critical in the field of IS (Chang & King, 2005; DeLone & McLean, 1992; Seddon, Staples, Patnayakoni, & Bowtell, 1999; Hatzithomas, Stamelos, Fotiadis, & Mylonakis, 2007; Spraakman, 2005; Targowski & Tarn, 2007; Wo-Chung et al., 2007). The term IT benefits is identical to IS success in IS literature (Hunton & Flowers, 1997). For example, Leonard and Sittig (2007) and Weill and Olson (1989) used the term IT benefits to reflect the success of IS implementation. Indeed, IT benefits has long been a subject of study in IS literature (see DeLone, 1988; DeLone & McLean, 1992; Ein-Dor & Segev, 1981; Kudyba & Vitaliano, 2003; Magal & Lewis, 1995; Melville, Kraemer, & Gurbaxani, 2004; Mirani & Lederer, 1998; Montazemi, 1988; Tanriverdi, 2005). The DeLone and McLean's IS success model has become a standard for the specification and justification of the measurement of the dependent variable in IS research (DeLone & McLean, 2002).

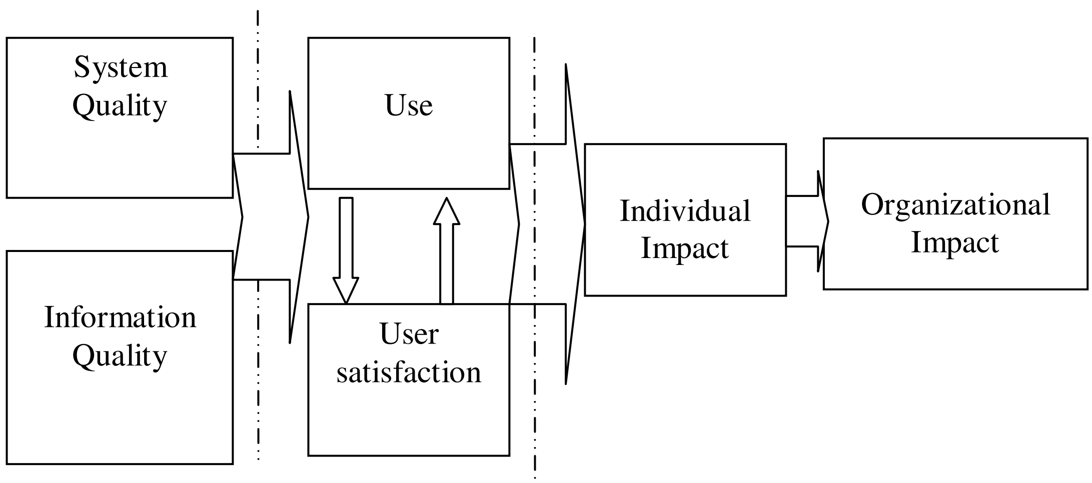
In addition, many studies have examined the relationship between IT and organizational performance or between AIS design and organizational performance. However, few clear guidelines exist about how effectiveness should be measured as scholars seem to disagree what should constitute IS success. In reviewing the literature on IT benefits, DeLone and McLean (1992) found that previous scholars seemed to consider the unidimensionality of IT benefits. IT benefits were either separately measured in terms of system quality, information quality, user satisfaction, or system use, to name a few, as can be seen in Table 2.1. For example, some scholars have used system quality, while others have used other measures such as user satisfaction. In addition, these different dimensions used to measure IT benefits are also defined differently by different authors. This further complicates understanding of how to approach and hence measure IT benefits. For example, system use as one of IT benefits that has been used, is defined by Seddon (1997) as the recipient consumption of the output of an IS, whilst Dix, Finlay, Abowd, and Beale (2004) measured it in terms of its learnability, flexibility, and robustness.

The same applies to measure of user satisfaction of IS (Hatzithomas et al., 2007). User satisfaction reflects attitudes towards IS which depends on system availability, accuracy, completeness, consistency, robustness, flexibility, unobtrusiveness. Early study categorised user satisfaction into three dimensions: IS, personnel and services, and knowledge and involvement (Baroudi & Orlikowski, 1988). Bailey and Pearson (1983) provided 36 dimensions that may influence in some way user satisfaction. Indeed a lot of researchers have employed user satisfaction in order to define the success of IS with one and unique variable (Yoon, Guimaraes, & O'Neal, 1995). Negash, Ryanb, and Igbaria (2002) preferred to describe user satisfaction using the variable of overall satisfaction that has been the result of two items.

King and Scherms's (1978) study is one of the earliest studies that investigated IT benefits. Based on the findings of their study, IT benefits are divided into the following types: benefits from contributions of calculating and printing tasks, benefits from contributions to record-keeping tasks, benefits from contributions to system restructuring capability, benefits from contributions of analysis and simulations capability, and benefits from contributions to process and resource control. The categorization of IT benefits reflects the predominant use of IT at the time. King and Scherms argued that some benefits could be intangible, thus this makes it difficult to quantity. Furthermore, Mirani and Lederer (1998) benefits of IS projects can be classified into three categorises such as strategic, informational, and transactional. They further explained that each category consist of several sub-categories. For example, strategic benefit consists of competitive advantage, alignment, and customer relations. Informational benefit consists of information access, information quality, and information flexibility. Finally, transactional benefit consists of communication efficiency, systems development efficiency, and business efficiency.

Because of the conflicting views and perspectives as to what accounts for IT benefits, DeLone and McLean have put forth a viable recommendation. They argue that IS success should not be seen from one particular angle as this is misleading since IS success should be seen from the various parties that are affected directly and indirectly from the IS implementation or use. Hence, based on their review of 100 papers containing empirical IS success measures that had been published in seven publications during the seven years 1981-1987, they managed to classify IS success measures into six categories as shown in Figure 2.2. The categories are system quality, information quality, system use, user satisfaction, individual impact, and organizational impact.

Figure 2.2 Delone and McLean Model (1992)



Source: Delone and McLean (1992)

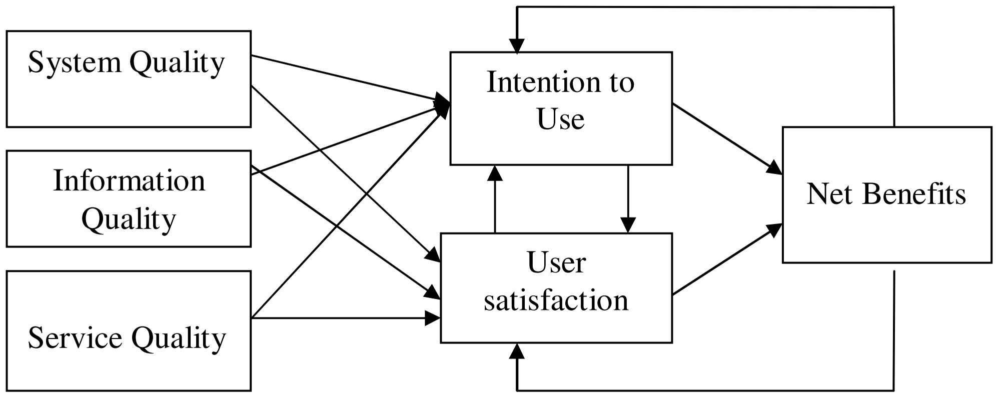
Delone and McLean further assert that because each dimension of IT benefit is conceptually different, they are suggesting that future research consider IT should be measured simultaneously by six dimensions. In other words, they are suggesting that when measuring IS success, researchers should "systematically combine" measures from their six IS success categories so that a comprehensive and holistic measure is employed that better reflect the impacts IT has on the organization as a whole. Despite its importance, Delone and McLean's (1992) model is also subject to criticisms. For example, Seddon (1997) proposed a well-known respecifications of the original model; one of his concerns was that the model had elements of both process and variance models, making it, in his view, difficult to interpret and use. The changes made separated the process and variance components. However, Delone and McLean contended that Seddon's (1997) model was too complicated and lacked parsimony. Delone and McLean (2003) stated that their original model, as a process model, had three components: creating and using the system, and the effects of its use. However, each of these steps was necessary, though not sufficient, for the outcome. They also supported the variance component by citing many empirical studies that have fully or partially examined the model.

Despite several criticisms to the model, Ballantine et al., (1996) assert that the DeLone and McLean model is a positive development in furthering research in IS success because it was the first study that tried to impose some order on IS researchers' choices of success measures. Similarly, Seddon et al., (1999) asserted that the DeLone and McLean's work makes several important contributions to the understanding of IS success. Firstly, it consolidates previous research. Secondly, it provides a scheme for classifying the different measures of IS success that have been proposed in the literature into six dimensions. Thirdly, it suggests a model of temporal and causal interdependencies between the identified categories. Fourthly, it makes the first moves to identify different stakeholder groups in the process. Fifthly, it has been considered an appropriate base for further empirical and theoretical research. Sixthly, it has met general acceptance in the IS community.

However, in the years that followed, several researchers have altered or extended the model, while others adapted it for specific applications, such as knowledge management (Kulkarni, Ravindran, & Freeze, 2006) or e-commerce (e.g., Delone & McLean, 2004) systems. Recognizing these potential improvements over their original model, Delone and McLean acknowledged these modifications and revised their model accordingly (Delone & McLean, 2003).

Delone and McLean also modified their model to address some limitations of the original model. A key addition in the updated model was the inclusion of service quality as an additional aspect of IS success (Pitt, Watson, & Kavan, 1995). Service quality was added because of the changing nature of IS that required the need to assess service quality when evaluating IS success. Delone and McLean also recommended that researchers assign different weights to system quality, information quality, and service quality depending on the context and application of the model. Another modification was the elimination of individual impact and organizational impact as separate variables, and replacing them with net benefits. These changes addressed the criticism that IS can affect levels other than individuals and organizations. Thus, the updated model accounted for benefits occurring at any level of analysis (workgroups, industries, and societies) was to be determined by the researcher using the model as shown in Figure. 2.3

Figure 2.3: DeLone and McLean updated model (2003)



Source: Delone and McLean (2003).

Reflecting on this debate, another enhancement to the 2003 model was clarification of the use construct. The authors explained this as: ‘‘use must precede ‘user satisfaction’ in a process sense, but positive experience with ‘use’ will lead to greater ‘user satisfaction’ in a causal sense’’ (Delone & McLean, 2003, p.23). They felt that, given the variability of IS and their contexts, it may sometimes be appropriate to measure intention to use (an attitude) rather than use (a behaviour). They went on to state that if intention to use was a measure, then increased user satisfaction would lead to a higher intention to use, which would subsequently affect use. This resulted in the addition of intention to use in the updated model.

Table 2.1

IT benefits updated model constructs.

Construct	Description
System Quality	Performance of the IS in terms of reliability, convenience, ease of use, functionality, and other system metrics
Information Quality	Characteristics of the output offered by the IS, such as accuracy, timeliness, and completeness
Service Quality	Support of users by the IS department, often measured by the responsiveness, reliability, and empathy of the support organization
Intention to Use	Expected future consumption of an IS or its output
Use	Consumption of an IS or its output described in terms of actual or self-reported usage
User Satisfaction	Approval or likeability of an IS and its output
Net Benefits	The effect an IS has on an individual, group, organization, industry, society, etc., which is often measured in terms of organizational performance, perceived usefulness, and affect on work practices

Finally, the study provide Table 2.2 summarizes the literature on IT benefits and one is able to discern the conflicting views on the measurement of this concept.

Table 2.2

Summary of Literature on IT Benefits

Author (s)	Conclusions
King and Schrems(1978)	Classified benefits of IS into six categories: (a) contribution of calculating and printing tasks (b) contributions to record-keeping tasks, (c) contributions to record-searching tasks,(d) contributions to system restructuring capability,(e) contributions of analysis and simulation capability ,and (f) contributions to Process and resource control.
Jenkins and Rickets (1979)	Developed an instrument to measure user satisfaction with management information systems.
Bailey and Pearson (1983)	Developed an instrument to measure computer user satisfaction.
Ives et al. (1983)	Further developed and refined Bailey and Pearson's (1983) user satisfaction instrument
Parsons (1983)	Suggested that IT could be used by a firm to implement existing competitive strategy, to affect key competitive forces, and to change the products, markets, or production economics of the industry.
Porter and Millar (1985)	Suggested that information technology affects competition in three ways: it alters industry structures, supports cost and differentiation strategies, and spawns new businesses.

Raymond (1985)	Developed an instrument to measure user satisfaction in small businesses.
Srinivasan (1985)	Discussed the relevance of system usage and other measures as surrogates for system effectiveness.
Doll and Torkzadeh (1988)	Developed an instrument to measure end-user computing satisfaction.
Kauffman and Weill (1989)	Offered a framework for research on the performance effects of IT investments, and suggested that researchers carefully select the "unit of analysis" and "locus of value" in generating research designs.
Will and Olson (1989)	Concluded from analysis of six mini case studies in five different industries that the effectiveness with which IT investment is converted to useful output is affected by implementation processes, organizational culture, and management skills.
Dos Santos (1991)	Suggested that new IT investments may yield indirect benefits as well as direct benefits, where indirect benefits would accrue from future projects that used the new technology.
Weill (1992)	Classified IT investments based on three types of organizational objectives: strategic, informational, and transactional. Suggested that it was possible for a single IS to

	have objectives of all three kinds. Used a similar framework in another empirical study (Weill and Olson, 1989).
DeLone and McLean (1992)	Classified IS success into six categories namely; system quality, information quality, system use, user satisfaction, individual impact, and organizational impact. Suggested that IS success model is a dimensional variable.
Farbey et al. (1995)	Identified “8-rung ladder” of IS applications. Higher rungs were associated with high complexity in evaluating potential benefits, greater potential gains, increased risk and uncertainty.
Mirani and Lederer (1998)	Benefits of IS projects can be classified into three categorises such as strategic, informational, and transactional and they stated that the potential IT benefits could be summarized as follows; the competitive advantage able to enhance competitiveness or create strategic advantage, enables the organization to catch up with competitors, alignment aligns well with stated organizational goals, and it also helps establish useful linkages with other organizations, thus enables the organization to respond more quickly to change.
Al-Mushayt (2000)	Made the first attempt to validate DeLone and McLean’s model as a summated measure for overall IT success namely; system quality, information quality, system use, user satisfaction, individual impact, and organizational impact.

Delone and Mclean (2003)	The updated model consists of six interrelated dimensions of IS success: information, system and service quality, (intention to) use, user satisfaction, and net benefits.
Petter and McLean (2009)	They conducted a meta-analysis to determine whether the model had been validated by research studies reported in the literature. By aggregating the results of 52 empirical studies that examined relationships within the IS success model at the individual level of analysis, they found support for the relationships that encompass the model. They also offer insights on IS success based on the findings of their work.

While Delone and Mclean's (1992) model has been revised and extended to include new measures, the original model was chosen for this study because it has been empirically tested either fully or partially by prior researchers. Furthermore, Al-Mushayt (2000) has tested and validated the model as a summated measure which is very important for this study as IT benefits is just one of the important variables used.

2.11 CONTINGENCY THEORY

This study attempts to investigate the relationship between contingency factors such as IT sophistication, business strategy, and environmental conditions, and AIS design, and the subsequent impact of AIS design on IT benefits. For this purpose, contingency theory is used as foundation to explain the potential impact of contingency factors on the design of AIS. Indeed, contingency theory has long been applied in both accounting and IS disciplines (Chapman, 1997; Chenhall, 2003). Consequently, this study is theoretically and empirically constituted upon contingency theory. The utilization of the theory is based on the idea proposed by Burns and Stalker in 1961 which postulates that there is no universal way or one best way to manage an organization, also the design of an organization and its subsystems must 'fit' with the environment (Otley, 1980). The continuous flow of considerable amount of empirical studies which investigate the contingency factors and accounting and/or IS indicate the importance and vitality of this theory. Contingency theory suggests that an organization's structure is based on contextual factors such as environmental conditions, business strategy, organizational structure, production technology, and management style (Abernathy & Lillis, 1995; Gerdin & Greve 2003; Selto, Renner, & Young, 1995).

Studies in both accounting and IS that adopted the contingency approach found that the better fit between contingency variables and AIS/IT would lead to greater AIS/IT benefits and eventually better organizational performance (Weill & Olson, 1989). Detail explanations of the application of contingency theory to the development of research framework are discussed in section 3.2 in chapter three.

2.12 SUMMARY

This chapter has extensively reviewed literature relating to AIS and IT. Figure 2.1 shows in brief the mapping of the sections and theory discussed in this chapter. The chapter also discussed the application of contingency theory in both accounting and IS disciplines. The comprehensive reviews of both accounting and IS literature developed an understanding of the relationship that exists between accounting and IT. The reviews also reveal several issues that can be addressed by AIS researchers, which are issued to develop the theoretical framework of this study and discussed in details in chapter three.

CHAPTER THREE

RESEARCH FRAMEWORK AND METHODOLOGY

3.1 INTRODUCTION

The previous chapter has thoroughly reviewed the literature related to accounting and IT in organization. This chapter presents a research framework to determine the relationships between the research variables. The main research variables are classified into (1) variables relating to IT sophistication, (2) variables relating to AIS design, and (3) variables relating to IT benefits. Other research variables explored are environmental condition and business strategy. The development of research hypotheses was also discussed. This chapter also reviews some of the research designs that have been used in accounting and IS researches, and followed by a discussion of the rationale for a particular design selected for this study. It further describes the importance of carefully designing a questionnaire and suggests an approach for developing a good questionnaire and describes the development of measures for each of the variables used in this thesis, and how these measures were incorporated into the questionnaire.

3.2 RESEARCH FRAMEWORK

Reviews of literature discussed in the previous chapter failed to find a comprehensive model that links IT sophistication, AIS design, and IT benefits. As also discussed in chapter two, the majority of prior studies have either investigated the relationship between contingency factors and AIS design or the relationship between contingency factors and IT sophistication. Several studies have also investigated the impact of the relationship between contingency factors and AIS design on performance and the impact of the relationship between contingency factors and IT sophistication on performance. However, a few studies are known about the influence of IT sophistication on the design of AIS, and the subsequent impact of AIS design on IT benefits.

Furthermore, most studies relating to IT sophistication and AIS design were conducted in developed countries such as the United States, United Kingdom, and Australia. Very little has been researched about the sophistication of IT adopted and the design of AIS in developing countries. To the researcher's knowledge, this kind of study is particularly almost non-existent in the Middle East. Therefore, this study represents a first attempt to explore the sophistication of IT, its relationship with AIS design, and the impact of AIS design on the benefits of IT, in the specific context of Jordanian companies.

The framework for this study was developed around contingency theory. Contingency theory was initially developed as a means of explaining observed differences in the structure of organizations (Mitchellet al., 2000). The theory is based on the conclusions that (1) there is not best way to organize, and (2) any way of organizing is not equally effective (Galbraith, 1973). A variety of contingencies were assumed to constitute the conditions appropriate for a particular type of organization structure.

The contingency theory framework has been adopted as an important basis for accounting research since the 1970s (Ismail, 2004). However, rather than focusing on the organizational structure of organizations, accounting research focused on the design of AIS. Most of contingent-based accounting studies were designed to ascertain which contingencies best explained observed AIS design (Jones, 1985). Organizational structure was considered as one of the many contingency variables that influences AIS design (Mitchell et al., 2000). Basically, the application of the theory is based on the premise that "there is no universally appropriate AIS design that applies equally to all organizations in all circumstances…a contingency theory must therefore identify specific aspects of AIS, which are associated with certain defined circumstances and demonstrate an appropriate matching" (Otley, 1980, p. 413).

Early accounting research suggested environmental conditions, organizational structure, production technology, and management style as the key contingent variables (e.g. Bensaou & Earl, 1998; Burns & Waterhouse, 1975; Chenhall & Morris, 1986; Choe & Lee, 1993; Gordon & Miller, 1976; Gordon & Narayanan, 1984; Gul, 1991; Gul & Chia, 1994; Mia, 1993; Otley, 1980; Waterhouse & Tiessen, 1978). Different business strategies could also influence the design of AIS adopted by organizations (e.g. Abernethy & Guthrie, 1994; Chenhall & Langfield-Smith, 1998; Chong & Chong, 1997; Simons, 1987). More recent accounting research, for example, Banker, Chang and Pizzini (2004) considered business strategy a key driver that influences AIS design. Gartner Group (2007) suggested that the enterprises should continue to define the changing business environments, and user requirements before making any large investments in AIS.

In another major study, Chang (2001) has used factors such as the degree of competition and perceived environmental uncertainty and four dimensions of business strategy of cost leadership, marketing differential, innovation differential, and strategy breadth to determine the effects of environment, strategy, and organizational characteristics on the performance of AIS. The identification of contingent variables is important as it would provide useful insights into the fundamental factors that shape and influence AIS design (Mitchell et al., 2000). Eventually, the appropriate fit between contingent factors and AIS design would enhance organizational performance (Otley, 1980).

In IS literature, the contingency approach is adopted based on the premise that a better fit between contingency variables and uses of computer-based IS would lead to greater IT benefits and eventually better organizational performance (Weill & Olson, 1989). Similar to accounting researchers, the dominant contingent variables of interest among IS researchers include organizational structure, size, environmental condition, technology, and recently business strategy (e.g. Abernathy & Lillis, 1995; Chan et al., 1997; Gerdin & Greve, 2003; Iivari, 1992; Selto et al., 1995; Weill & Olson, 1989).

However, the interest of the present research is not to replicate previous contingent-based studies which examined the relationship between contingency factors and AIS design or the relationship between contingency factors and IT sophistication (such as studies by Boulianne, 2007; Chang, 2001; Gerdin & Greve, 2003; Mitchell et al., 2000; Otley, 1980). Rather, the main objectives of the present study are two-fold. First, it attempts to examine the relationship between IT sophistication and AIS design. Then, it attempts to examine the impact of sophisticated AIS design on the perceived IT benefits. In addition to these two main objectives, it will also investigate the influence of other dominant contingency factors found in both accounting and IS literature such as environmental condition and business strategy on the design of AIS. The central idea of the present research is based on Galbraith's (1973, 1977) information processing theory which extends the contingency framework to explain why contingencies should have such an effect on the structure of AIS design policy variables. Information processing theory assumes that "an organization is a complex system whose primary problem of relating to its environment is the acquisition and utilization of information" (Bolon, 1998, p. 212).

According to Galbraith (1977, p. 4), the greater the uncertainty the greater the amount of information that needs to be processed to achieve a given level of performance. Galbraith further asserts that organizations would respond to the increasing information demand by increasing or reducing their information processing capabilities. The match between processing capability and information requirement is considered to be an antecedent to organizational effectiveness (Ismail, 2004).

Based on this idea, the present study proposed that a better fit between the sophistication of IT and the design of AIS would lead to greater benefits of IT deployment. This proposition is in tandem with Van de Ven and Drazin's (1985) suggestion that "the concept of fit or alignment should not be confined to structural contingency theory only but can be applied to any theory that postulates that organizational performance is a function of the match, congruence, intersection, or union of two or more factors" (p. 361).

Galbraith (1973, 1977) identified two mechanisms by which organizations may enhance their information processing capabilities. First, he discussed an investment in vertical IS. Vertical IS can receive, process, and distribute information up and down organizational hierarchy to locations where it is needed most for effective decision-making (Bolon, 1998). Second, he examined the need for lateral relationships within organizations. Although Galbraith did not specifically focus this method on IT, Bolon (1998) argued that IT can be applied in terms of integrating horizontal systems that provide information by cutting across organizational functional areas.

Following Bolon's (1998) suggestion, the present study reflects both mechanisms by considering IS implemented to provide information up and down and across the organization. Galbraith (1973, 1977) added that if the two mechanisms are viewed as too costly relative to their benefit, the manager might reduce the need to process the information by creating slack resources or self-contained tasks. The first method involves reducing the required level of performance, whilst the second method focuses on minimizing and concentrating on data relevant to own specific group or area (Ismail, 2004). However, given the highly competitive environment under which many organizations today operate, the application of both methods is thought to be less appropriate for the survival of modern organizations. At the time Galbraith's idea was written, it might be appropriate to have the alternative solutions, as computerization project used to be a very costly and risky business. However, the intensity of competition and the continuous decline of computing costs suggest the alternative solutions proposed by Galbraith as less appropriate in the context of today's businesses. Based on the above discussions, an outline research model for the study is illustrated in Figure 3.1. The research model will be discussed later in detail in Section 3.4 after all the variables have been explained in Section 3.3.

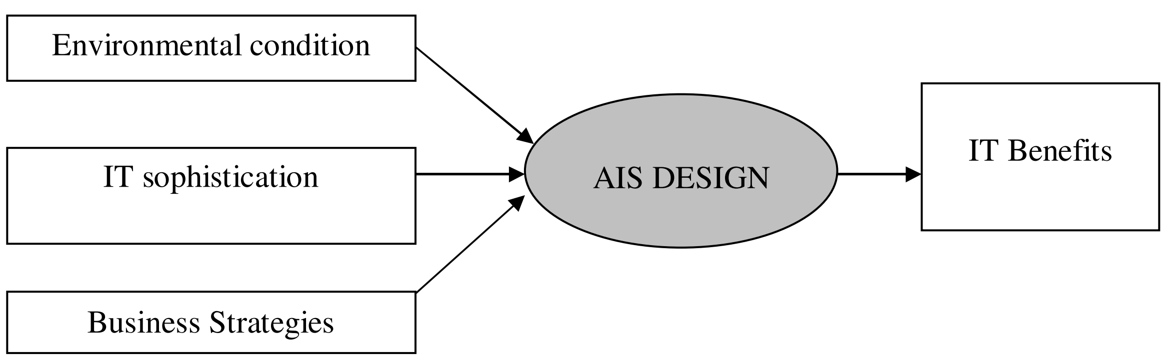


Figure 3.1. The outline of research model

3.3 MAJOR VARIABLES

A major motivation for the present research was to examine the importance of aligning IT deployment with AIS design. Hence, the emphasis is on the variables of IT sophistication, AIS design, and perceived IT benefits. Other variables explored are environmental condition and business strategy. A greater understanding of these variables could assist organization with many decisions related to AIS design and IT utilization.

3.3.1 IT Sophistication

In identifying the impact of IT on organizations, a number of researchers have attempted to characterize IT (e.g. Cragg & King, 1992; Karake, 1995; Kudyba & Vitaliano, 2003; Melville et al., 2004; Montazemi, 1987; Tanriverdi, 2005). Most of these studies have used Nolan's 'stages of EDP growth' model (Nolan, 1973, 1979) as a theoretical foundation. However, as discussed earlier in Chapter Two, this concept has been recognized as a multi-dimensional variable where researchers have selected various dimensions to reflect the sophistication of IT of an organization. In an attempt to present an integrated view of the diverse approaches to characterizing IT sophistication, Raymond and Pare (1992) develop a multi-dimensional construct which includes all aspects related to technological support, information content, functional support, and management practices. While this concept of IT sophistication was originally developed in the specific context of small and medium-sized businesses, it is thought with considerations of the latest technology available, no less relevant to the large business context.

IT sophistication integrates not only aspects related to IT usage but also IT management, which is equally if not more important in the context of large businesses than smaller businesses. The reason is that larger businesses with various business functions often adopt more sophisticated and thus complicated technologies which require proper management to optimize the benefits (Raymond & Pare, 1992). These authors defined IT sophistication as “a construct which refers to the nature, complexity and interdependence of IT usage and management in an organization” (p. 7). Technological sophistication reflects the number or diversity of IT used. Informational context is characterized by the nature of its application portfolio. Functional dimension relates to the structural aspects of the IS function and IT implementation process. Finally, managerial dimension of IT sophistication relates to the mechanisms employed to plan, control and evaluate present and future applications. The criterion variables for each dimension are summarized in Table 3.1. While the concept was developed more than a decade ago, it does provide a comprehensive characterization of IT beyond the technological sophistication normally adopted by researchers. For the purpose of this study, only criterion variables perceived as most important and reflect the most recent IT developments will be considered.

Table 3.1

Criterion Variables of IT Sophistication

Perspective	Dimensions	Criterion Variables
IT usage	Technological	Variety of IT used, hardware characteristics, development tools, man-machine interface, processing mode, and type of operation
	Informational	Applications portfolio, and integration of applications
IT management	Functional	IS personnel specialization, role of the IS function, decisional level, type of development, position of the IS function, and user participation
	Managerial	Organizational objectives, top management implication, IT investment, IT adoption process, presence of consultants, IT planning process, control of IT, evaluation of IT

Source: Raymond and Pare (1992).

3.3.2 Accounting Information System Design

The terms 'AIS' and 'MAS' are used interchangeably by accounting researchers in order to refer to AIS design (Ismail, 2004). According to Chenhall (2003), MAS refers to the systematic use of management accounting practices to achieve some goals, while AIS is a broader term that encompasses both financial accounting and management accounting, and it is used for the purpose of this study.

Reviews of accounting literature indicated that information characteristics have been considered as key AIS design variables (e.g. Abernethy & Guthrie, 1994; Chenhall & Morris, 1986; Choe & Lee, 1993; Chong & Chong, 1997; Ewusi-Mensah, 1981; Gordon & Narayanan, 1984). As discussed earlier in Chapter One, AIS definition has evolved over the years from one focusing on the provision of more formal, financially quantifiable information to assist in decision making processes to one that embraces a much broader scope of information (Chenhall, 2003). Among the dimensions used by previous researchers to reflect the design of AIS include focus, orientation, time horizon, aggregation, integration, timeliness, financial and non-financial, and quantitative and qualitative. The description of each dimension is summarized in Table 3.2.

Table 3.2

Dimensions of AIS Design

Dimension	Descriptions	Researchers
Focus	Addresses whether the data items are to be rather broad and diffuse or whether they are to be rather specific and narrow	Gordon et al. (1978) Chenhall and Morris (1986) Choe and Lee (1993)
Orientation	Determines whether the data items report primarily internal facts (relates to the	Gordon et al. (1978) Ewusi-Mensah (1981)

	organization itself) or facts with external origin (deals with events outside the domain of the organizations)	Choe and Lee (1993) Gordon and Narayanan (1984) Ismail and King (2005, 2006)
Time horizon	Refers to whether the data items are ex-post, which relates to past events, or ex-ante, which pertains to future events	Gordon et al. (1978) Gordon and Narayanan (1984) Ismail and King (2005, 2006)
Timeliness	Refers to the provision of information on request and the frequency of reporting systematically collected information	Chenhall and Morris (1986) Ismail and King (2005, 2006)
Aggregation	Represents whether the reports contain too little detail information or too much detail information	Chenhall and Morris (1986) Lederer and Smith (1989) Ismail and King (2005, 2006)
Integration	Refers to the information that needs to be generated to reflect the impact of the interacting effects of the various functions in the organizations and the formulation of targets	Chenhall and Morris (1986) Gul (1991) Ismail and King (2005, 2006)
Financial / non-financial	Financial information is expressed in monetary terms, whereas non-financial information is not expressed in monetary terms	Gordon and Narayanan (1984)
Quantitative	Quantitative information is expressed in	Ewusi-Mensah (1981)

/ qualitative	numeric terms, but qualitative information is expressed in nonnumeric terms	Choe and Lee (1993)

Of all these dimensions, the classification made by Chenhall and Morris (1986) is the most popular and widely adopted by many accounting researchers (e.g. Abernethy & Guthrie, 1994; Gul, 1991; Gul & Chia, 1994; Chong, 1996; Chong & Chong, 1997; Ismail, Tayib, & Abdullah, 2001; Ismail & King, 2004, 2005, 2006). Based on their review of past studies related to AIS design, Chenhall and Morris (1986) reclassified AIS design into four dimensions, namely, scope, aggregation, integration and timeliness. These four dimensions include all dimensions of AIS design highlighted in Table 3.2. The description of each dimension is summarized in Table 3.3.

Table 3.3

Information Characteristics

Dimensions	Characteristics
Scope	External information, non-financial information, and future-oriented information
Timeliness	Frequency of reporting, and speed of reporting
Aggregation	Aggregated by time period, aggregated by functional areas, and analytical or decision models

Integration	Precise targets for activities and their interrelationship within organization, and reporting on intra-sub-unit interactions

Source: Chenhall and D. Morris (1986)

According to Chenhall and Morris (1986, p. 19), the ‘scope’ of AIS refers to “focus, quantification, and time horizon”. Traditional AIS provides information which focuses on events within the organization, is quantified in monetary terms, and relates to historical data. A broad scope AIS, on the other hand, provides information related to the external environment which may be economic or non-economic. It also includes non-monetary measurement of many of these external environmental characteristics and also provides estimates of the likelihood of future events occurring. Broad scope information was found to have direct relationship with perceived environmental uncertainty and organizational interdependence.

The second dimension, ‘timeliness’, refers to the “provision of information on request and the frequency of reporting systematically collected information” “(Chenhall & Morris, 1986, p. 20). Timely information is expected to provide reports upon the most recent events and to provide rapid feedback on decisions, and is particularly important under uncertain environmental condition.

‘Aggregate’ information refers to the “various forms of aggregation ranging from provision of basic raw, unprocessed data to a variety of aggregations around periods of time or areas of interest such as responsibility centers or functional areas” (Chenhall & Morris, 1986, p. 21). It also refers to summation in formats consistent with formal decisional models such as discounted cash flow analysis, cost-volume-profit analysis, and inventory control models.

Finally, 'integration' refers to the "coordination of the various segments within the organization. AIS characteristics which may assist coordination would include the specification of targets which account for the effects of the interacting segments and information on the impact that decisions in one area have on operations throughout the organization "(Chenhall & Morris, 1986, p. 22). Both aggregation and integration type of information were found to have direct relationships with decentralized structure and organizational interdependence.

Previous studies that adopted Chenhall and Morris' (1986) instrument used it to measure either the usage of AIS information (e.g. Chong & Chong, 1997; Mia, 1993; Mia & Chenhall, 1994), the perceived usefulness or importance of AIS information (e.g. Abernethy & Guthrie, 1994; Chenhall & Morris, 1986; Gul, 1991; Ismail & King, 2005, 2006), or the availability of AIS information (e.g. Gul, 1991; Gul & Chia, 1994; Ismail & King, 2005, 2006). Studies that measure the availability of AIS information assumed that the information available would be used for making business decisions.

While the original AIS design variable proposed by Chenhall and Morris (1986) suggested a four-dimensional measure, most studies tend to adopt the model on a piecemeal basis. The most popular dimension adopted by previous researchers to measure AIS design is broad scope information (e.g. Boulianne, 2007; Choe & Lee, 1993). Studies that adopted all four dimensions of AIS design such as Gul (1991) and

Ismail and King (2005, 2006) treated them as a unidimensional variable. Similar to these studies, the present study adapted Chenhall and Morris's instrument to measure the availability of AIS information among Jordanian companies.

3.3.3 Perceived Information Technology Benefits

There is a considerable amount of literature on specific benefits of IT implementation. One of the earliest studies that has explored the IT benefits were conducted by King and Schrems (1978). The authors classified the benefits of IT into six categories as follows: (a) contribution of calculating and printing tasks (b) contributions to record-keeping tasks, (c) contributions to record-searching tasks (d) contributions to system restructuring capability (e) contributions of analysis and simulation capability ,and (f) contributions to process and resource control.

Mirani and Lederer (1998) categorized IT benefits into three types as follows: strategic, informational, and transactional. These categories offer items under separate sub-dimensions of any one of them. For example, strategic benefits were divided into competitive advantages, alignment, and customer relations. Also, informational benefits are similarly comprised of information access, information quality, and information flexibility. Finally, transactional benefits are also shown to be of three types: communications efficiency, systems development efficiency, and business efficiency. In addition, there are many researches that have attempted to identify factors that potentially influence the benefits of IT implementation. However, IS scholars encounter difficulty in isolating a definitive body of contributing factors since the meaning of IT benefits varies considerably among studies (Hunton & Flower, 1997).

In an attempt to present an integrated view of the diverse approaches to defining IT benefits, DeLone and McLean (1992) synthesized a six-dimensional taxonomy based on a review of 180 published conceptual and empirical studies, namely; system quality, information quality, system use, user satisfaction, individual impact and organizational impact. DeLone and McLean's taxonomy basically addresses IT benefits at all three levels namely; individual, system and organizational (Hunton & Flower, 1997). The description of each dimension of DeLone and McLean's model is summarized in Table 3.4.

Table 3.4

IT Benefits Variables

Dimensions	Descriptions
System quality	Focuses on technical characteristics of the information processing system itself
Information quality	Refers to quantitative and qualitative characteristics of the information systems output
System use	Reflects recipient consumption of the information systems output
User satisfaction	Indicates recipient response to the information systems
Individual impact	Refers to the effect of information on recipient attitude and behavior
Organizational impact	Measures the effect of information on organizational performance indicators

Source:.DeLone and McLean (1992)

While a number of other IT benefits models have been proposed both before and after DeLone and McLean's (1992) model, this model was the most popular among IS researchers because, as Ballantine et al. (1996) suggested, the DeLone and McLean's model is a positive development in furthering research in IT benefits in several aspects. Among others, the model consolidates previous research, classifies the measures of IT benefits into plausible groupings and so has intuitive appeal, begins to identify different stakeholder groups in the process, and a number of researchers have considered it to be a suitable foundation for further empirical and theoretical research and as such it has met with general acceptance. Furthermore, Ballantine et al. (1996) describe DeLone and McLean's model as 'one of the more complete and better known'. The model has been used as a basis for empirical research and has been refined and expanded by a number of IS researchers (Ballantine et al., 1996, p. 5).

In addition, all the new models that have been introduced (e.g. Ballantine et al., 1996; Myers, Kappelman, & Prybutok, 1997; Seddon, 1997) are an extension of the original model, in that they included new variables and not omitted any of the original variables. For example, Myers et al. (1997) updated the existing model to include the emerging IT dimensions of 'service quality' and 'work group impact' and provide a comprehensive method for organizing the various measures of IT benefits. However, these extended models have not been tested empirically like DeLone and McLean's model or evaluated by other IS researchers.

Despite being the most popular IT benefits model, with the exception of Al-Mushayt (2000), previous empirical research adopted the model on a piecemeal basis, not as a multi-dimensional variable. Al-Mushayt represents the first attempt to validate DeLone and McLean's model as a summated measure for the overall IT benefits. The results of the study indicated that the model is valid, unidimensional, and reliable and can be summated. Following Al-Mushayt, this study adopted DeLone and McLean's model to represent perceived IT benefits among Jordanian companies.

3.3.4 Other Contingency Factors

Among the dominant variables hypothesized by researchers in the theoretical development of contingency theories in accounting and IS literature include environmental condition and business strategy. Therefore, this study will concentrate on these variables to examine the impact of contingency factors on AIS design.

3.3.4.1 Environmental Condition

Environment appears to be the most dominant variable in contingency studies. It has been argued that environmental uncertainty makes managerial planning and control more difficult (Duncan, 1972) due to the unpredictability of future events (Chenhall & Morris, 1986). Uncertainty of the environment even makes a well-formulated plan obsolete and impractical (Teo & King, 1997). According to Jones (1985), environmental uncertainty can arise from outside because of the action of competitors, rapid changing technology or the threat of government interventions.

A number of researchers have attempted to define and operationalize environmental uncertainty. For example, Duncan (1972, p. 314) defines environment "as the totality of physical and social factors that are taken directly into consideration in the decision-making behaviour of individuals in the organization." Duncan suggests that the internal environment consists of those relevant physical and social factors within the boundaries of the organization, whilst external environment consists of those factors outside the boundaries. Three components of internal environment include organizational personnel, organizational functional and staff units, and organizational level. The external environment consists of customers, suppliers, competitors, socio-political, and technological.

Gordon and Narayanan (1984) operationalized environmental uncertainty in terms of the managers' perceptions about the predictability and stability in various aspects of their organization's industrial, economic, technological, competitive and customer environment. Govindarajan (1984) adopted the concept of task environment, which composed of four major components: customers; suppliers of material, labor and capital; competitors for both markets and resources; and regulatory groups such as governmental agencies. Earlier, Khandwalla (1977) operationalized environmental uncertainty in terms of the managers' perceptions about the degree of change and unpredictability in the firm's markets, competitors, and production technology. Since the instrument was originally developed and tested in large organizations, it is considered appropriate to use the same instrument in this study.

3.3.4.2 Business Strategy

The two types of business strategies i.e. cost leadership, and innovative differentiation also appear to be important variables in contingency studies (e.g. Abernethy & Guthrie, 1994; Chang, 2001; Chong & Chong, 1997; Fotiadis, Haramis, & Soubeniotis, 2005; Porter, 1980; Paopun, 2000). It has been argued to have a strong relationship to the environment (Fisher, Kent, Nottingham, & Field, 2005; Stimson, Stough, & Roberts, 2002). Organizational strategic choice would determine its environmental domain which in turn influence the scope of information required to cope with the uncertainty (Chong & Chong, 1997).

Much of the original strategy measurement work involved the use of typologies. Two well-known strategy typologies that have been adopted by accounting as well as IS researchers were developed by Miles and Snow (1978), and Porter (1980). Porter’s three overall strategies are cost leadership, differentiation and focus. A cost leadership strategy aims to exploit scale, scope and other economies, producing a highly standardized, homogenous product, and using state of the art technology. A differentiation strategy aims to emphasize the uniqueness of a product as perceived by the customers. Finally a focus strategy combines the elements of cost leadership and product differentiation, directed at a specific market segment in a unique way.

On the other hand, Miles and Snow's (1978) typology of strategies divides business unite into prospector, defender, analyzer, and reactor types. Firms following a prospector strategy frequently add and change their products and services, and are consistently attempting to be first in the market. They are innovators, flexible and entrepreneurial in their outlook and continually undertake a relatively high rate of new products and market development. A defender operates in relatively stable product areas and focus on maintaining market share through cost leadership, quality and service. Combining the strengths of the defender and the prospector, the analyzer seeks to simultaneously minimize risk while maximizing opportunities for growth. A reactor essentially lacks a consistent strategy. Its strategy has characteristics of each of the other type's strategies at different times and thus is difficult to categorize clearly.

The term strategy has been employed in the literature in various ways. The common theme is the Porter's typology strategy. Chang (2001) divided business strategy according to Porter's (1980) typology into four dimensions: cost leadership, marketing differential, innovation differential, and strategy breadth to determine the effects of strategy on the performance of AIS. Chang stated that the effects of business strategy can be as follows: (a) when a company pursuing cost leadership strategy, higher degree of aggregation information will improve operation procedure; (b) when a company's goal was for marketing differential, more timely and integration information were needed and less aggregated information should be provided for a better performance of operation improvement and managerial performance; (c) when a company was pursuing innovation differential strategy, AIS should provide more timely information; (d) when a company was pursuing strategy breadth strategy, more emphasis should be on aggregation and integration information; (e) when a company pursuing marketing differential strategy, organization structure, or facing higher task uncertainty, the emphasis on user participation will improve user satisfaction and managerial performance. However, Paopun (2000), in adopting business strategy based on Porter's (1980) typology, divided it into two i.e. cost leadership and innovative differentiation strategies. In addition, Fotiadis et al. (2005) explained three types of strategic competition with different basic rules:

1. The first is based on cost i.e. when a company can produce in lower cost than its competitors (i.e. companies producing high tech products).

2. The second is based on the product differentiation i.e. when a company can offer a different composition of the product specifications i.e. services and quality (airline companies offering tickets plus tourist packets).

3. The third is based on high specialization in a small market area and is characterized by the lower cost or the differentiation of the product specifications.

Porter's strategy typology in contingent-based accounting studies has been found to be a useful means of classifying generic strategies across a wide range of industries (Chang, 2001). In this manner, the present study adapts Porter's strategy typology used by Paopun (2000) by dividing strategy into cost leadership strategy and innovative differentiation to investigate the impact of strategic choice on AIS design. The third strategy suggested by Fotiadis et al. (2005) is excluded because it is relevant to the SME context which is not the focus of this study.

Based on the above discussion, the outline of research model presented in Figure 3.1 (p.81) can now be modified to incorporate all the specified dimensions and variables. The enhanced research model is presented in Figure 3.2.

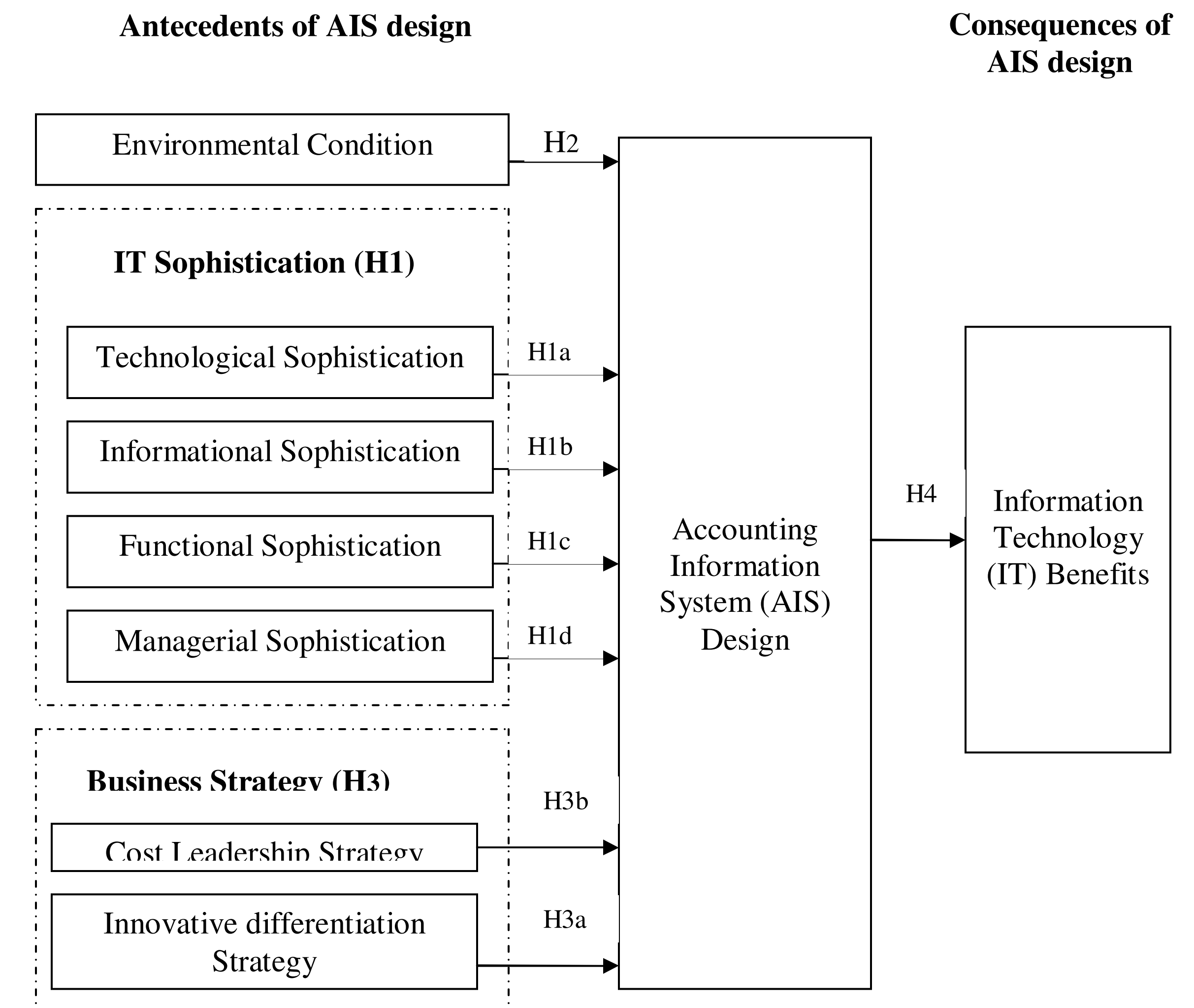


Figure 3.2. The enhanced research model

3.4 HYPOTHESES DEVELOPMENT

Figure 3.2 shows the proposed relationship between contingency factors and AIS design and the consequent effect on perceived IT benefits. A discussion of the research propositions is presented in the following sections.

3.4.1 IT Sophistication and AIS Design

From the information processing perspective, IT is one of the mechanisms that can be used to increase organizational information processing capabilities (El Louadi, 1998, Ismail & King, 2006). Huber (1990), for example states that "use of advanced IT leads to more available and more quickly retrieved information, including external information, internal information, and previously encountered information, and thus leads to increased information accessibility." (p.65). Daft and Lengel (1986) also placed particular emphasis on IT as a means by which organizations reduce uncertainty. El Louadi (1998) confirmed that organizational IT sophistication has a direct effect on the amount of external and internal information provided. More recently, Ismail and King (2007) found a significant relationship between IT sophistication and AIS alignment. Therefore, it is expected that firms with more sophisticated IT are more likely to have more sophisticated AIS design than those that are not.

Hypothesis 1: There is a positive relationship between IT sophistication and the sophistication of AIS design among Jordanian listed companies.

Since IT sophistication is a multidimensional variable as suggested by Raymond and Pare (1992), the general hypothesis above is divided into four sub-hypotheses relating each of four dimensions of IT sophistication to AIS design, as follows.

3.4.1.1 Technological Sophistication and AIS Design

The technological dimension of IT sophistication has been used in the literature in various ways such as variety of IT used, hardware characteristics, development tools, man-machine interface, processing mode, and type of operation (Lehman, 1985; Raymond & Pare, 1992). As mentioned before, very few studies investigated the specific relationship between technological sophistication and AIS design, whilst these studies found significant and positive relationships between technological sophistication and better design of AIS. Recently, Ismail and King (2005) stated that many studies have been conducted to understand how IT has been used to support information requirements. Because it is a core assumption in accounting research that sophisticated technologies will provide a sufficient quantity of information for accountants, it follows that such information can be used when designing AIS so that more relevant information can be supplied to managers (Boulianne, 2007). For example, when companies have different types of technologies such as Office Support System (OSS), Decision Support System (DSS), Database System (DS), Enterprise Resources Planning (ERP), Supply Chain Management (SCM), Customer Relationship Management (CRM), Local Area Network (LAN), AIS will be designed by taking into consideration these various technologies at hand to achieve enhanced information that will be relevant to end users which will lead to better organizational effectiveness (Devaraj & Kohli, 2000; Doms et al., 2004; Gartner Group, 2002). As mentioned earlier, using of sophisticated IT leads to relevant information being reported upon request which in turn leads to increase in information accessibility and reliability. Therefore, it is expected that companies with more sophisticated technologies will have more sophistication in AIS design. Thus, the hypothesis can be stated as follows.

Hypothesis1a: There is a positive relationship between technological sophistication and the sophistication of AIS design among Jordanian listed companies.

3.4.1.2 Informational Sophistication and AIS Design

Informational dimension of IT sophistication refers to the type of applications portfolio and integration of these applications (Raymond & Pare, 1992). Targowski and Tarn (2007) concluded that the benefits of the IS implementation has something to do with a concept of the application portfolio. Use of advanced applications such as order entry, budget variances, production variances, budgeting, production planning and control, and activity-based accounting leads to more available and more quickly retrieved information. Hence, it is expected that firms with more sophisticated informational applications will have a higher degree of AIS design. ERP system for example consists of multiple and integrated modules, whereby information produced by the system would assist management make informed and better decisions. In the case of AIS design, it can be postulated that the more sophisticated the applications adopted by organization, the more sophisticated AIS will be. Therefore, the hypothesis can be stated as follows:

Hypothesis 1b: There is a positive relationship between informational sophistication and the sophistication of AIS design among Jordanian listed companies.

3.4.1.3 Functional Sophistication and AIS Design

Researchers have used various dimensions such as decisional level and user participation to represent functional sophistication (see for example, Conarth & Mignen, 1990; Kim & Lee, 1986; Montazemi, 1988; Olson & Ives, 1981; Tait & Vessey, 1988). Choe (1996) found a significant positive relationship between user participation and AIS design. User participation in IS development such as participation in programming, participation in system maintenance and problem solving, elaboration of development schedule, elaboration of development budget, and training of new users on available system can help in the design of AIS by providing ways on how to improve and produce accounting systems that can avoid incorrect administration transactions. At the end, user participation can improve the performance of system design quality by aligning the system to fit the various needs of the organization (Tait & Vessey, 1988). Zeffane, Cheek and Meredith (1998) also stated that the degree of user participation was found to have a significant effect upon the quality of data such as accuracy, timeliness, and completeness of data. With the advent of modern technologies, the role of accountant has shifted from number crunching to business advisor. Due to the nature of their work, Elliot (1992) argues that accountants understand the business process better than others. Therefore, accountants' active participation in the IS implementation would contribute to better or more sophisticated AIS implementation because they will be able to provide significant inputs and suggestions to the AIS design to the advantage of the organizational performance. Hence, the hypothesis can be stated as follows:

Hypothesis 1c: There is a positive relationship between functional sophistication and the sophistication of AIS design among Jordanian listed companies.

3.4.1.4 Managerial Sophistication and AIS Design

The term managerial sophistication has been employed in the literature in various ways such as top management support, IT investment, IT adoption process, control of IT, and evaluation of IT (Raymond & Pare, 1992). The most dominant managerial dimension found to have implication on IT implementation was top management commitment. Considering the amount of resources such as financial and human effort invested in IT project among large businesses, commitment from top management is crucial to ensure successful IT implementation such as AIS. In addition, nowadays, top management can determine the success or failure of computerization projects because they play a dominant role in IS planning such as financial resource planning, human resource planning, information requirement planning, implementation planning, and post implementation planning (Kanungo & Chouthoy, 1998; Lin, Huang, Cheng, & Lin, 2007). In the context of AIS, top management with IT knowledge are in a better position than those without this knowledge, because they can understand the company's AIS design and then use their knowledge in IS development planning that will match the company's information needs. In other words, the extent of planning by top management in IS development is very important because they can decide which kind of IS is able to provide the required information. Therefore, it is expected that in companies where the top management highly participate in IS development and planning more sophistication in AIS design will be accomplished. Hence, the hypothesis can be stated as follows.

Hypothesis 1d: There is a positive relationship between managerial sophistication and the sophistication of AIS design among Jordanian listed companies.

3.4.2 Environmental Condition and AIS Design

Gordon and Miller (1976, p. 60) hypothesized that "as environmental dynamism increases, organizations would require more non-financial accounting information on matters such as competitors actions and consumer tastes, increase the frequency of reporting and make greater use of forecasted information." Chong and Chong (1997) re-emphasized the importance of external, non-financial and future-oriented data in a turbulent and uncertain environment. It is through the management of external information that businesses will be able to reduce the uncertainty that they perceive in their environment (Gordon & Narayanan, 1984). For example, broad scope, timely and frequent, aggregated and integrated accounting information would be particularly useful for managers to respond rapidly to changes in the competitive environment and market demand (Gul, 1991). However, Mia (1993) warned that sophisticated accounting information is only effective in terms of performance when the level of environmental uncertainty is high. When uncertainty of the environment is low, management is able to make relatively accurate predictions about the market, thus requires less sophisticated information (Gul & Chia, 1994). Therefore, it is expected that firms that operate in a more turbulent and uncertain environment are more likely to have more sophisticated AIS design than those that are not.

Hypothesis 2: There is a positive relationship between perceived environmental uncertainty and the sophistication of AIS design among Jordanian listed companies.

3.4.3 Business Strategy and AIS Design

Chong and Chong (1997) suggested that business strategy would determine its environmental domain, which in turn influence the scope of accounting information required to deal with the uncertainty. Chenhall (2003) suggested that strategy differs from other contingency variables because it is not an element of content but rather the means whereby managers can influence the nature of the external environment, and the technologies of the organization. Dermer (1977) and Otley (1980) suggested that business strategy is the important factor that influences the main characteristics of AIS design. Furthermore, early researchers like Gordon and Miller (1976), Miles and Snow (1978), and Porter (1980) proposed that AIS design is used differently depending on the organization’s strategy. Simons (1990) found evidence that organizations with appropriate strategies employ AIS in successful ways.

Theoretically speaking, companies employ certain business strategies to improve their business performance (Fisher et al, 2005). To effectively plan and implement business strategy, firms need updated and resourceful business information (Chang & Jevons Lee, 1992). One of the ways to do this is through the design of AIS (Bolon, 1998; Ismail & King, 2007). It has been shown that the better and more sophisticated the AIS design is, the better the performance of companies (Chang, 2001; Fisher et al, 2005). Hence, the following hypothesis is formulated.

Hypothesis 3: There is a positive relationship between business strategy and the sophistication of AIS design among Jordanian listed companies.

Since business strategy is a multidimensional variable as suggested by Paopun (2000), the general hypothesis above is divided into two sub-hypotheses relating to each of two dimensions of business strategy as the follow:

3.4.3.1 Cost Leadership and AIS Design

Cost leadership is one of the important strategies adopted by previous contingency studies such as Chang (2001), Fotiadis et al. (2005), Paopun (2000) and Porter (1980). The purpose of cost leadership strategy is to exploit scale, scope and other economies, to produce a highly standardized, homogenous product, and to use state-of-the-art technology. Chang (2001) has concluded that when a company pursues a cost leadership strategy, it would require a higher degree of aggregation information to improve operational procedure. In other words, cost leadership strategy aims to reduce costs through the whole business process from manufacturing to the final stage of selling the product. Any processes that do not contribute towards minimization of cost base should be outsourced (Akan, Allen, Helms, & Spralls, 2006). Low costs will permit a firm to sell relatively standardized products accepted by customers at the lowest price to gain competitive advantage and increase market share (Akan, et al., 2006; Husted & Allen, 2006; Porter 1980). That means, the cost efficiency gained in the whole process will enable a firm to mark up a price lower than competitors for longer time which ultimately could not match such a low cost base. These competitive advantages gained by adopting cost leadership strategy lead us to know what is the features acceptable is to many customers and in turn put these features into IT team regards avoid the variances in next business process. However, costing information needed by managers to make effective decisions rely on the sophistication of AIS design (Bolon, 1998). In other words, this direct us to understand that sustainability of the competitive advantage reached through low cost strategy enhance in other way designing a sophisticated AIS. Therefore, this study proposed the following:

Hypothesis3 a: There is a positive relationship between cost leadership strategy and the sophistication of AIS design among Jordanian listed companies.

3.4.3.2 Innovative Differentiation and AIS Design

Innovative differentiation strategy is another widely used strategy by previous contingency studies such Abernethy and Guthrie (1994), Chang (2001), Chong and Chong (1997), Paopun (2000), and Porter (1980). Innovative differentiation strategy aims to emphasize the uniqueness of a product as perceived by the customers. In other words, the strategy is aimed at the broad market that involves the creation of a product or services that is perceived throughout its industry as unique. The company or business unit may then charge a premium for its product. This specialty can be associated with design, brand image, technology, features, dealers, network, or customers service. Differentiation is a viable strategy for earning above average returns in a specific business because the resulting brand loyalty lowers customers' sensitivity to price. Increased costs can usually be passed on to the buyers. Buyer's loyalty can also serve as entry barrier-new firms must develop their own distinctive competence to differentiate their products in some way in order to compete successfully. Previous studies such Kim and Mauborgne (2004) suggests that a differentiation strategy is more likely to generate higher performance because differentiation creates a better entry barrier. However, similar to cost leadership strategy, the innovation differentiation strategy can only be effectively planned and implemented via sophisticated AIS design. Only sophisticated AIS can supply information to help managers make effective decisions relating to the strategy (Bolon, 1998). In other owrds, it leads us to the understanding that sustainability of the competitive advantage reached through innovative differentiation strategy will in turn improve the designing of AIS which ensure consistent increase in market share and stable profits, consequently superior performance. Therefore, this study proposed the following hypothesis:

Hypothesis3 b: There is a positive relationship between innovative differentiation strategy and the sophistication of AIS design among Jordanian listed companies.

3.4.4 AIS Design and IT Benefits

The issue of IT benefits has long received the attention of IS literature (e.g. DeLone, 1988; Ein-Dor & Segev, 1981; Kudyba & Vitaliano, 2003; Magal & Lewis, 1995; Melville et al., 2004; Mirani & Lederer, 1998; Montazemi, 1988; Tanriverdi, 2005). However, while the results of several studies found a direct relationship between IT sophistication and IT benefits (Hatzithomas, Stamelos, Fotiadis, & Mylonakis, 2007; Lim, 2006; Nir, 2006), several others could not explain the direct relationship (Roach, 1988). To explain the differences, Shin (2001) argued that IT could not directly influence IT benefits but need to be aligned with other factors to be effective. Shin argued that the sophistication of IT may increase the capability of information processing, thus the type and extent of information generated. The information generated would then help the managers to make more effective decisions which in turn influence the benefits gained from IT implementation. In the context of AIS, sophisticated IT adopted by companies would lead to more sophisticated AIS design, which enable AIS to generate various types of information to meet user's needs for information (Chenhall & Morris, 1986; El Louadi, 1998; Huber, 1990). According to Mitchell et al. (2000), modern AIS can generate a various types of information including accounting and non-accounting information to manage short-term problems and integrate operational considerations within long-term strategic plans. In a similar vein, Vaassen (2002) confirmed that the new role of AIS is to provide all types of information needed by different administrative levels within the company. Review of IS literature shows that the new AIS models have made it possible for modern AIS to capture not only historical and financial-related data but also non-financial and future-oriented data (Hall, 2000; Mauldin & Ruchala, 1999). Hence, it is expected that companies that have achieved AIS design are more likely to be successful in IT implementation than those that are not Previous studies that have adopted Chenhall and Morris' (1986) model such as Gul and Chia (1994), Ismail and King (2005),(2006) found that the availability of AIS information have helped management makes better business decisions which in turn improve IT benefits. This supports the idea that companies with more sophisticated AIS design would derive greater benefits than those companies with less sophisticated AIS design. Therefore, the relationship between sophistication AIS design and IT benefits is represented by the flowing hypothesis:

Hypothesis 4: There is a positive relationship between the sophistication of AIS design and perceived IT benefits.

3.5 METHODOLOGY OF THE STUDY

3.5.1 Research Strategies

Since the study of AIS is very much related to IS, the discussions of research strategies are mostly based on those adopted by IS researchers such as Farhoomand (1992), Galliers (1992), Hamilton and Ives (1983), Mingers (2003), and Orlikowaski and Baroudi (1991). Selecting an appropriate approach and method is a critical issue in conducting a research (Galliers, 1992).

In the IS area, many attempts have been made to classify research approaches. One of the earliest studies was been conducted by Galliers (1992) who provided a taxonomy of prevalent IS research approaches. This taxonomy provides researchers with a tool that offers a choice of suitable research approaches which include ten major research strategies: laboratory experiments, filed experiments, subjective/ argumentative research, simulation, forecasting and futures research, case studies, action research, surveys, and role/game playing, reviews.

More recent study was conducted by Mingers (2001, 2003). Mingers reviewed all IS related papers published during 1993-1998. The study suggested that about 80% of the evaluated papers contained some form of empirical research, where surveys, interviews, experiments, and case studies were the dominant approaches. Alternatively, approaches like participant observation, grounded theory, and soft systems methodology, were rarely used. Other studies provided evidence that although several research methods are suggested (Galliers, 1992), only surveys, experiments, interviews, and case studies are predominantly used within the IS area

(Orlikowaski & Baroudi, 1991). Likewise, Choudrie and Dwivedi (2005) found that the survey method was used predominantly in IS area.

Mingers (2003) discussed ten major research strategies being undertaken in the IS field. Each of these strategies is reviewed to assess its applicability to the present study as follows:

Observation. Observation is probably one of the most common ways of finding out about things (Cano, 2002). Scholars use observation in almost all of our daily activities. According to Cano, one type of observation is systematic observation. Systematic observation is considered most important observation methods in research methodologies. That is because researchers could derive knowledge that can be generalized. In other words, researchers engaging in systematic observation of a particular phenomenon attempt to gain valid information that can then be shared and transmitted to other researchers who are also studying the same phenomenon.

Experiments. Experiment can be laboratory experiments or field experiments (Galliers, 1992). Laboratory experiments are used to identify the precise relationship between variables in a designed and controlled environment using quantitative analytical techniques. On the other hand, field experiments are an extension of laboratory experiments into the real-life situations of organization and/or society. The key feature for this approach is to construct an experiment in a more realistic environment than is possible in the artificial situation.

Survey or questionnaire. Survey approach is sometimes regarded as an easy research approach and is the most popular and common technique used in business and management research (Ismail, 2004). However, as with any other research approach and method, it is easy to conduct a survey of poor quality rather than one of high quality and real value. As a significant part of research in IS is done with survey instruments, the IS research community will benefit from an easily accessible source of information about survey methods. Surveys can be divided into two categories: questionnaire and interview (Trochim, 2006). Questionnaires are usually paper-and-pencil instruments that the respondent completes. Besides, interviews are completed by the interviewer based on what the respondent says (Trochim, 2006).

The questionnaire approach gives the researcher more control over the research process. Its weakness is that it requires a lot of time and effort to be spent in designing and piloting the questionnaire. Pinsonneault and Kraemer (1993) highlight three different characteristics of a survey approach. First, the purpose of the survey is to produce quantitative descriptions of some aspects of studied population. Second, the main way of collecting information is by asking people structured and predefined questions. Third, information is generally collected about a fraction of the study population (a sample), but it is collected in such a way as to be able to generalize the findings to the population.

Case study. Case study is the most common qualitative method used in IS research (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991). The strength of this approach is that it enables the capture of reality in considerably greater detail than is possible with the survey approach. Therefore, it is good at identifying new variables and possible relationships. As a result, this approach has been found to be very useful for theory building. The weaknesses associated with the case study approach is that its application is usually restricted to a few organizations or events, and the difficultly in acquiring similar data from a statistically meaningful number of similar organizations, and hence the problems associated with making generalizations from individual case studies. Therefore, its utility in theory testing is limited.

Simulation. Simulation is a "method used to solve problems which are difficult or impossible to solve analytically by copying the behaviour of the system by generating appropriate random variables" (Chatfield, 1988, as quoted in Galliers, 1992, p.156). Its limitations relate to the difficulties associated with devising a simulation that accurately reflects the real world situation.

Interview. The interview approach is one of the most important data collecting methods in qualitative research, yet it has remained an unexamined craft in IS research (Myers & Newman, 2007). The interview approach has some of advantages and disadvantages: it is the best means for selecting and evaluating personal qualities. In addition to be of great benefit in the diagnosis and treatment of humanitarian problems, especially emotional them, it also has a great benefit in consulting. Furthermore, it provides the researcher with additional information stream obtained by other means and methods of collecting information. By the way, the interview approach has some weaknesses such as that the success obscures to a large extent on the willingness of respondent cooperation and gives reliable and accurate information. In addition, there is a very high probability of personal bias in the data because it is affected by the psychological situation (Obedat, 2000).

3.5.2 Selection of Research Strategy

The extant literature in IS discussed above suggested that there are many types of research strategies. For instance, the terms 'survey' and 'questionnaire' were used indistinguishably. Researchers also used the terms ‘case study’ and ‘interviews’ synonymously (Mingers, 2003). It has become a necessity to clarify the different terminologies used for different types of research method. According to a number of scholars (e.g. Farhoomand, 1992; Farhoomand & Drury, 1999; Mingers, 2001; Orlikowski & Baroudi, 1991), a survey method is more dominant in the IS area. Similarly, Palvia et al. (2003), in reviewing the methodologies used in seven leading MIS journal for 5-years period, found that a quantitative survey method is the most popular. Likewise, Choudrie and Dwivedi (2005) found that most studies that have investigated IT adoption used two main research methods, namely survey and case study methods. Seventy four percent of them employed the survey approach, which suggests that it is the most widely used method in IT research. Mingers (2001) also stated that the survey method was employed in 63% of the articles in IT adoption researches.

The uses of survey approach are also subject to disadvantages whereby important variables have to be known in advance. Therefore, it can only be used in a relatively well-understood situation. For the purpose of the present study, a comprehensive review of the literature shows that there are a large number of studies in the area of accounting and IS in large business which will provide a source of likely important variables.

The present study based its sample selection very close to Mingers' (2003). The decision was made based on two major reasons: first, Mingers' approach is the most recently published work; second, it encompasses a large number of research methods associated with all three epistemological standpoints, namely positivist, interpretivist, and critical. There are several types of tools employed to conduct a survey including questionnaires, interviews, observation and content analysis. The questionnaire is the most widely used data collection technique in survey research (DeVaus, 2002). Therefore, this study will adopt the questionnaire method to obtain data from the sample companies in Jordan.

There are many different ways in which the questionnaire can be administered: postal service, telephone, and face-to-face interview (May, 1997) and more recently the web-based questionnaires, that is, via e-mail and the World Wide Web (Burton, 2000; Dillman, 2000).

- Face-to-face interview is suitable for the exploratory stages of research. The major advantage for this method is that the researcher can adapt the questions necessary. The major disadvantages are the geographical limitations which can consume time and cost.
- Telephone interview is suitable for asking structured questions where responses need to be obtained quickly from a geographically spread sample. The main disadvantage of this method is that the respondent can finish the telephonic interview without any notice.

- Mail questionnaire survey is suitable when the sample is large and distributed in wide geographical areas with minimal cost (Burton, 2000). However, Jobber (1991, p. 176) warned that the disadvantage of this method is that too many questions that require effort on the part of the respondent will result in non-response.
- Internet survey is suitable for use with e-mail and/or Web access. This method has several advantages such as low costs, high speed and early recognition of valid addresses (Burton, 2000). However, this method has several weaknesses such as the response rates particularly e-mail surveys are not as high as mail surveys (Schaefer & Dillman, 1998).

Based on the above discussion, the questionnaire approach was thought to be the most appropriate data collection method.

3.5.3 The Sampling Process

Sekaran (2006, pp. 266-267) defines sampling as "a process of selecting a sufficient number of elements from the population, so that by studying the sample and an understanding of its properties or the characteristics of the sample subjects, we will be able to generalize the properties or characteristics would make it possible for us to generalize such properties or characteristics to the population elements." According to Churchill (1999) there are six-step procedures that can be used as a guideline to the sampling process in this study.

Step 1: Define the population. The population refers to the "entire group of people, events, or things of interests that the researcher wishes to investigate" (Sekaran, 2006, p. 265). The population of this study is 260 Jordanian companies listed at Amman Stock Exchange (ASE) 2008.

Step 2: Identify the sampling frame. Sample frame is a list from which a sample can be taken and which leads to ultimately to the sample of units about which information is to be obtained.

Step 3: Select a sampling procedure. The step of selecting a sample procedure is interrelated with the identification of the sampling frame because the choice of sampling methods is based on what the researcher can develop for a sampling frame (Churnhill, 1999).

Step 4: Determine the sample size. Sample size refers to the number of units that need to be surveyed to get precise and reliable findings (Fink, 1995). Considering the small population size of Jordanian listed companies, it is decided to include all Jordanian companies listed at the ASE (260 companies). The size is sufficient to conduct appropriate statistical procedures. According to Comrey and Lee (1992), the sample sizes of 200 should be considered fair.

Step 5: Select the sample elements. One of the main variables in this study is AIS design. Therefore the accountants in companies listed at the ASE are considered appropriate as the element of the present study.

Step 6: Collect the data from the designated elements. The questionnaire survey was conducted between May and July 2008. Since Jordan is a small country and most companies are located in the capital city of Amman, questionnaires were distributed by hand to the accountants of 260 companies. This method was also thought to increase the response rate.

3.6 MEASUREMENT AND QUESTIONNAIRE DESIGN

3.6.1 The Design of Measurements Scale

In order to measure the five variables identified in this study, the researcher used many types of measurement scales. Interval scales involve the use of statements in a questionnaire accompanied by pre-coded categories, one of which is selected by the respondent to indicate the extent of their agreement or disagreement to a given statement. Literature is abundant with evidence that researchers use interval scales in business to measure business concepts such as attitudes, perceptions, feelings, opinions and values (Hair, Money, Samouel, & Page, 2007). Consequently, this study adopted an interval scale using a five-point Likert scale to measure variables such as functional sophistication items, managerial sophistication items, cost leadership strategy items, innovative differentiation strategy item, environmental condition items, AIS design items, and IT benefits items. In addition, nominal scales are used to measure several variables such as technological sophistication items and informational sophistication items. Nominal and ordinal scales are used to measure companies' and respondents' profiles.

3.6.2 The Design of the Questionnaire

There are five main variables used in this study. The measurements of the constructs were adopted from previous studies such as Al-Mushayt's (2000), Chenhall and Morris's (1986), Khandwalla (1977), Paopun's (2000), and Raymond and Pare's (1992).

In order to design the questionnaire and to get a high response rate, the researcher followed the main guidelines of Dillman (1978, 2000) and Sudman and Bradburn (1982). First, the questionnaire was translated from English language to Arabic language. It was anticipated that it would be easier for the respondents to understand if the questionnaires were posed in Arabic language and this would encourage them to respond to the survey. Sekaran (2000) suggests that it is important to ensure that the translation of the instruments is developed accordingly. Therefore, the English version was translated into the Arabic language by a native Arabic who is fluent in both languages (English and Arabic) and has expertise in AIS field. The Arabic questionnaire was then translated back into English again by another person with the same qualification. Finally, the researcher examined and compared the translation version with the original version.

The questionnaire was designed using a booklet type questionnaire. Sudman and Bradburn (1982) argue that using the booklet type questionnaire (1) prevents pages from being lost or misplaced, (2) makes it easier for the respondent to turn the pages, (3) looks more professional and is easier to follow, and (4) makes it possible to use a double page format for questions about multiple events or persons. The respondents were asked to circle the appropriate response, while for multiple choice-questions, the respondents were asked to tick their responses. The researcher left a space at the end of the questionnaire for respondents to make comments. The questionnaires were printed on orange papers for the first distribution and in blue papers in the second distribution to differentiate them.

3.6.3 The Structure of the Questionnaire

The questionnaire was designed based on four basic principles as suggested by Dillman (1978). The four principles were applied on the basis that they would increase the respondents' motivation for, and confidence, in completing the questionnaire. The four principles are:

- Order the questions in descending order of importance and usefulness.
- Group the questions that are similar in content together, and within areas, by type of question.

- Take advantage of the cognitive ties that respondents are likely to make among the groups of questions in deciding the order of the questions involved.
- Position the questions that are most likely to be objectionable to respondents after the less objectionable one.

Consequently, questionnaire was structured into seven main sections, each encompassing a different theme as follows:

1. Section A of the questionnaire consists of questions related to the company profile. The questions focus on the company background to elicit information regarding the type of industry, age of company, status of computerization. Ordinal and nominal scales were used to measure the data.

2. Section B of the questionnaire was designed to investigate the level of IT sophistication adopted by the respondents companies. This section contains four distinct questions that are relevant to the IT sophistication dimensions, namely; technological sophistication, informational sophistication, functional sophistication, and managerial sophistication. Two types of scales were used to measure the variables. Nominal scale was used to measure the technological and informational sophistication, while interval scale to measure the functional and managerial sophistication.
3. Section C of the questionnaire was designed to investigate the adopted business strategies (cost leadership strategy and innovative differentiation

strategy) by respondents companies. Respondents were asked to indicate using a five-point scale the extent to which their companies' business strategies incline to one or other of each pair of statements.

4. Section D consists of six questions designed to elicit information on the company's relationship to its external environment condition. In order to measure the relationship between environmental conditions and AIS design, this study used a five-point Likert scale.

5. Section E consists of nineteen questions designed to elicit information relevant to the four dimensions of AIS design, namely, scope, aggregation, integration, and timeliness. This section aims to measure the extent to which the respondents' computer-based systems are supporting each of the information characteristics identified. For this purpose, a five-point Likert scale which ranged from 1 (not available) to 5 (extensively available) was used.

6. Section F consists of six questions designed to measure the level of IT benefits of the responding companies' computer-based IS. In order to measure the questions related to IT benefits this study has adopted an instrument developed by Al-Mushayt (2000). The instrument which was developed based

on DeLone and McLean (1992) uses a 5-point Likert scale which ranges from 1 (strongly disagree) to 5 (strongly agree).

7. Section G of the questionnaire consists of questions related to the respondent profile such as current position, experience, gender, age, and the educational qualifications. In order to measure the personal information ordinal and nominal scales were used.

Table 3.5 summarizes the different sections representing each variable in the questionnaire.

Table 3.5

Sections of the Questionnaire

Sections	Theme
A	Company profile and structure
B	Dimensions of IT sophistication
C	Dimensions of business strategy
D	Environmental conditions
E	AIS design
F	IT benefits
G	Personal information of respondent

3.6.3.1 Company Profile Questions

The purpose of the questions in this section is to understand the profile of responding companies such as company age, industry type, and company size.

3.6.3.2 IT Sophistication Questions

The measurement of IT sophistication constructs are based mainly on Raymond and Pare (1992), who have developed and validated an instrument designed to measure the level of sophistication in the use and management of IT. The instrument was tested with a sample of small manufacturing firms in Canada, and was then adapted by other researchers like Hussin et al. (2002) and Raymond, Pare, and Bergeron (1995). Even though the instrument was originally developed for SMEs, it is also relevant for large companies because it is reasonable to speculate that technologies and computer applications are already employed by large size companies. In addition, Raymond and Pare (1992) recommended to use these instruments in the context of large business.

The construct of IT sophistication is multidimensional and includes all aspects related to technological support, information content, functional support, and management practices. However, it may not feasible to include the full version of the instrument in this study. IT sophistication is but one of several important parts of the instrument that has to be completed by the respondent in each organization. Adopting the entire set will only result in a lengthy questionnaire, which may affect the response rate (Hussin, 1998). Therefore, only four criterion variables from Raymond and Pare's (1992) instrument perceived to be the most important and to reflect the recent IT developments are included in this study. The descriptions of each of the variables are presented in Table 3.6.

In addition to these four variables, respondents were also asked to indicate the year their company first implemented a computer-based IS.

Table 3.6

IT Sophistication Items

Perspective	Dimensions	Items	Sources
IT Usage	Technological	• Office support system	Raymond and Pare (1992)
		• Decision support system	Thong (1999)
		• Database system	Paopun (2000)
		• Accounting system	
		• Enterprise Resource Planning (ERP) system	
		• Supply Chain Management (SCM) system	Raymond and Pare (1992)
		• Customer Relationship Management (CRM) system	Xiao et al. (1996) Cragg et al. (2002)
		• Local Area Network (LAN)	
	Informational	• General ledger	Raymond and Pare (1992)
		• Accounts receivable	Cragg and King (1992)

		• Accounts payable • Billing • Order entry • Purchasing • Inventory • Production planning and control • Payroll • Cost accounting • Financial accounting • Financial analysis • Budgeting • Project management • Production variances • Budget variances • Modeling • Personnel management	Xiao et al. (1996) Hunton and Flowers (1997)
IT Management	Functional	• Participation in information systems planning • Participation in develop applications • Participation in programming	Raymond and Pare (1992) Thong (1999) Cragg et al. (2002)

		• Participation in system maintenance and problem solving • Elaboration of development schedule • Elaboration of development budget • Participation as active members of development term • Training new users on available systems	
	Managerial	• Financial resources planning • Human resources planning • Information requirements analysis • Implementation planning • Post-implementation planning	Raymond and Pare (1992) Thong (1999) Cragg et al. (2002)

3.6.3.3 Business Strategy Questions

The measure of strategic choice in this study is based on the typology originally proposed by Porter (1980, 1985), who has classified strategies into three categories, namely, cost leadership, innovative differentiation, and focus. Paopun (2000) adopted

Porter's strategy and used cost leadership and innovative differentiation to measure business strategy because contemporary studies have shown evidence of companies practicing such a "hybrid strategy". Kim and Mauborgne (2004) assert that successful organizations adopt a mixture of low cost and differentiation strategy. More recent study by Prajogo (2007) stated that organizations employing the mixture of business strategies (low cost and differentiation strategy) outperform the ones adopting one generic strategy and the successful combination of those two strategies will result in sustainable competitive advantage. Following Paopun, the present study also focused on two strategic ways that represent the business strategies i.e. cost leadership and innovative differentiation. The respondents were asked to indicate to what extent they adopted these strategies in their companies five years ago.

3.6.3.4 Perceived Environmental Uncertainty Questions

Duncan (1972) suggests that external environment consists of customers, suppliers, competitors, socio-political, and technological factors. In this study, perceived environmental uncertainty measurement is developed to measure the responding companies' relationship to their external environment. In measuring perceived environmental uncertainty, the questions were adopted from Khandwalla (1977), who operationalized environmental uncertainty in terms of the managers' perception about the degree of change and unpredictability in the firm's markets, competitors, and production technology. The original instrument was adapted and validated by Miller and Droge (1986), Crawford (1997), and Chow, Heaver, and Henriksson (1995).

Using similar questions, the respondents were asked to assess the degree of change and unpredictability in terms of the action of their competitors, demand for their products, change of their marketing practices, and rate of technological change in their industry.

3.6.3.5 AIS Design Questions

Chenhall and Morris (1986) developed and tested an instrument designed to measure AIS design in large organizational context. They classified AIS design into four dimensions, namely, scope, aggregation, integration, and timeliness. As it has been tested and validated, in large organizational context, the same instrument is adapted in this study to measure AIS design in Jordanian companies. Each dimension of AIS design is used to examine the extent to which the Jordanian companies' computer-based system provides each of the information characteristics identified. The descriptions of each of the information characteristics are presented in Table 3.7.

Table 3.7

AIS Design Items

Dimensions	Information characteristics	Example(s)
Scope	Future-oriented	Future trends in sales, profits, expenses, cash flow etc.
	Non-economic	Customer preferences, employee attitudes, attitudes of consumer bodies, competitive threats etc.

	External	Economic conditions, population growth, technological changes etc.
	Nonfinancial-production	Output rates, scrap levels, machine efficiency, employee absenteeism etc.
	Nonfinancial-market	Market size, growth share etc.
Aggregation	Sectional reports	Information provided on the different sections or functional areas such as marketing and production, or sales, cost or profit centers
	Temporal reports	Information on the effect of events on particular time periods such as monthly/quarterly/annual summaries, trends, comparisons etc.
	Effects of events on functions	Influence of events on different functions such as marketing or production associated with particular tasks or activities
	Summary reports-sections	Information on the effect of different sections' activities on summary reports such as profit, cost, revenue reports for other sections
	Summary reports-organizations	Information on the effect of different sections' activities on summary reports such as profit, cost, revenue reports for the overall firm
	What-if statements	Information in forms that enable to conduct 'what-if analysis
	Decision models	Information in formats suitable for input into decision models such as discounted cash flow analysis,

		incremental or marginal analysis, inventory analysis, credit policy analysis etc.
Integration	Sub-unit interaction	Information on the impact that a decision will have throughout the firm, and the influence of other individuals' decisions on other area of responsibility
	Precise target	Targets for the activities of all sections within the firms
	Organizational effects	Information that relates to the impact that decisions have on the overall performance of the firms
Timeliness	Speed of reporting	Information to arrive immediately upon request
	Automatic receipt	Information supplied automatically upon its receipt into IS or as soon as processing is completed
	Frequency of reporting	Reports provided frequently on a systematic, regular basis such as daily reports, weekly reports etc
	Immediate reporting	No delay between an event occurring and relevant information being reported

3.6.3.6 IT Benefits Questions

DeLone and McLean (1992) proposed an integrated view of the diverse approach to defining IT benefits. DeLone and McLean's taxonomy addresses IT benefits at the individual, system and organizational levels. Based on DeLone and McLean's six dimensional taxonomy, Al-Mushayt (2000) developed six questions to measure organizational IT benefits. Using similar questions, the respondents were asked to indicate the level of benefits of their computer-based IS in terms of systems quality, information quality, information use, user satisfaction, individual impact, and organizational impact. The descriptions of each of the dimension are presented in Table 3.8.

Table 3.8

IT Benefits Items

Dimensions	Items
Systems Quality	E.g. system reliability, features and functions, and response time
Information Quality	E.g. information clarity, completeness, usefulness, and accuracy
Information Use	E.g. regularity of use, number of enquiries, duration of use, and frequency of reports requests
User Satisfaction	E.g. overall satisfaction, enjoyment, difference between information needed and received, and software satisfaction
Individual Impact	E.g. design effectiveness, problem identification, and improved individual productivity
Organizational Impact	E.g. contribution to achieving goals, cost/benefit ratio, overall productivity gains, and service effectiveness

3.7 INSTRUMENT VALIDATION

3.7.1 Instrument Validity

The validity of the questionnaire instruments were tested by a committee of twelve Professors, Associate Professors and lecturers in the accounting departments in the Jordanian public and private universities, such as Jordanian University, Yarmouk University, Al-Albait University, Irbid National University, Alzaitoonah University, Petra University, and Hashemite University. Generally, they all agreed with the importance and contribution of this study to Jordan. Based on their feedback, some modifications were made to the original questionnaire. For example, additional computer applications were added to reflect the current usage by large companies. Finally, a total of 76 items which met the instrument validity were used for data collection.

3.7.2 Instrument Reliability

The reliability of scale indicates the stability and consistency with which the instrument is measuring the concepts and helps to assess the goodness of measure (Sekaran, 1992). In other words, the reliability of scale indicates how free it is from random error (Pallant, 2001). There are two frequent indicators of scale's reliability used: test-retest reliability, and internal consistency. Cronbach's coefficient alpha is the most commonly used statistic to measure the internal consistency. To confirm the questionnaire instruments' reliability, the researcher has conducted a pilot study. The questionnaires were distributed to 40 companies. Out of 40 questionnaires distributed, only 32 were returned and later used for reliability test. According to Hair, Black, Babin, Anderson, and Tatham (2006), reliability estimate of .7 or higher suggests a good reliability, but reliability between .6 and .7 may be acceptable. Table 3.9 below shows the Cronbach's alpha values of the variables used in this study.

Table 3.9

Reliability Analysis

Factors	Cronbach's Alpha
Functional Sophistication	.772
Managerial Sophistication	.825
Cost leadership strategy	.886
Environmental Conditions	.835
AIS design	.733
IT benefits	.796

The result in Table 3.9 shows that the Cronbach's alpha values indicate a good reliability for all variables; all variables have value higher than .70. Consequently, the questionnaires were distributed to the remaining 220 Jordanian listed companies.

3.8 SUMMARY

This chapter has comprehensively discussed the research model variables in the context of existing literature based on which the hypotheses were developed. To test the hypotheses, the present study has finally chosen to employ the survey approach as the main research strategy, after a discussion on the advantages and disadvantages of different research strategies available were explored. The choice of a survey research involving questionnaires was made on the basis that this particular research strategy is the most common method used in previous IS and accounting studies.

Further, the present study has decided to include all Jordanian listed companies at the Amman Stock Exchange (ASE) since they involve a small number of population of large companies which are 260. Before the questionnaires were eventually distributed the companies in question, validation of the instrument used to measure the main variables was carried out. In particular, the reliability of the scales used was checked and it was found that generally the instruments were reliable when the Cronbach's alpha values show values higher than .70 for all variables.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This study aims to examine the relationship between contingency factors, AIS design, and IT benefits. This chapter presents the research findings based on the data collected from respondent companies. The data were first analyzed using descriptive statistics to understand the characteristics of the companies that participated in the study. Multiple regression was then conducted to examine the impact of IT sophistication and other contingency factors such as business strategies and environmental condition on the sophistication of AIS design, and linear regression to examine the potential subsequent impact of AIS design on IT benefits.

4.2 RESPONSE RATE

To reiterate, 220 questionnaires were distributed to Jordanian listed companies at the Amman Stock Exchange (ASE) in 2008. The questionnaire contained criterion variables adopted from previous studies. According to Jobber (1989, p. 134), response rate can be defined as “the percentage of total questionnaire mailed (and not returned by the postal service as undelivered) that were returned by respondents.” In this study, attempts were made to increase the response rate such as by reminding the respondents through telephone calls and self visits (Sekaran, 2006). As a result of these efforts, out of 220 questionnaires distributed personally by hand to the respondent companies, only 182 companies responded and returned the questionnaires making a response rate of 82.72%. Out of these, two questionnaires were discarded from analysis because they were not completely filled. Eventually, 180 questionnaires were used for further analysis, making a valid response rate of 81.81%. This response rate is considered excellent considering that, according to Sekaran (2006) the response rate of 30% is acceptable for surveys. Table 4.1 shows the response rate and the usable questionnaires for this study.

Table 4.1

Response Rate of the Questionnaires

Response	Frequency/Rate
Number of distributed questionnaires	220
Returned questionnaires	182
Returned and usable questionnaires	180
Returned and excluded questionnaires	2
Questionnaires not returned questionnaires	38
Response rate	82.72%
Usable response rate	81.81%

4.3 TEST OF NON-RESPONSE BIAS

As other previous studies that are based on voluntary participations, there is a probability to get differences in some significant manners between the respondents and non-respondents (Matteson, Ivancevich, & Smith, 1984). Because of the difficulties associated with the identification of non-respondents characteristics in any research, the test of non-response bias was conducted. According to Armstrong and Overton (1977), non-respondents and late respondents were supposed to have similar characteristics. Pallant (2001) suggested that independent sample t-test can be used when the researcher wants to compare the mean scores on some continuous variable for two different groups of subjects. In order to test the characteristics of non-respondent and late respondents, the researcher has categorized the sample into two groups: early responses (i.e. those returned within one month after distribution) and late responses (i.e. those returned after one month of distribution). Independent sample t-test was conducted on continuous variables such as AIS design and IT benefits.

Based on the response time (early and late response) discussed above, 79 respondents were classified as early responses and 101 late responses. Table 4.2 provides the result of non-responses test. The p values of the analysis revealed no statistically significant difference between the two groups (significant $p > .05$). According to Pallant (2001), if the significance level of the Levene's test is above .05 ($p > .05$), then this means that the assumption of equal variances between the early response and late response has not been violated. In order to find out if there is a significant difference between the two groups, sig "2 tailed" ($p > .05$) was used. Table 4.2 shows the significance level of the Levene's test for AIS design ($p = .244$) and IT benefits ($p = .95$), which indicates that the p value for both of them are larger than .05. This shows that the assumption of equal variances has not been violated. Besides, the significance levels for AIS design ($p = .166$) and for IT benefits ($p = .127$) further confirm that there is no significant difference between the two groups. Therefore, further analysis was carried out on the full 180 responses.

Table 4.2

Test of Non-Response Bias

Variables	Levene's test for equality of variances			
		F	Sig.	Sig. (2-tailed)
AIS design	Equal variances assumed	1.368	.244	.166
	Equal variances not assumed			.162
IT benefits	Equal variances assumed	.004	.950	.127
	Equal variances not assumed			.132

4.4 PROFILE OF COMPANIES

This section provides background information about the Jordanian listed companies that responded to the questionnaires. The characteristics examined include industry type, company age, and the number of companies using computers.

4.4.1 Industry Type

In the first part of the survey, respondents were requested to indicate the industry sector their company belongs to according to the ASE categorizations. As shown in Table 4.3, almost half of the companies were from the financial sector (42.8 %), 23.9% were from the services sector, and 33.3% were from the industrial sector.

Table 4.3

Industry Type

Industry type	Frequency	Percentage
Financial Sector	77	42.8
Services Sector	43	23.9
Industrial Sector	60	33.3
Total	**180**	**100.0**

4.4.2 Company Age

The results in Table 4.4 provide the age categorization of the respondent companies. It is observed that 71.1% of the companies were established more than 10 years ago, suggesting that the respondents can be considered as matured companies.

Table 4.4

Company Age

Company age	Frequency	Percentage
10 years or less	52	28.9
11 – 20 years	68	37.8
21 – 30 years	36	20.0
31 – 40 years	18	10.0
More than 40 years	6	3.3
Total	**180**	**100.0**

4.4.3 Use of Computers

The result in Table 4.5 provides the computerization status of the surveyed companies. The result shows that all respondent companies use computers.

Table 4.5

Number of Companies Using Computers

Status of computerization	Frequency	Percentage
Yes	180	100.0

4.5 PROFILE OF RESPONDENTS

The questionnaires were addressed to the accountants of the sample companies. The reason was that accountants have influence on the design of AIS and its performance (Elliot, 1992). Respondents were asked to provide information on; gender, age, education level, and work experience.

4.5.1 Gender

Table 4.6 shows that 60.6% of the respondents are male, and this indicates the dominance of male employees in occupying accountant positions.

Table 4.6

Gender of Respondents

Gender	Frequency	Percentage
Male	109	60.6
Female	71	39.4
Total	**180**	**100.0**

4.5.2 Age

The result in Table 4.7 shows that almost half of the respondents are between 30 and 39 years old (47.8%), 17.2% are below 30 years old, and the remaining 35% are 40 years old and above. This indicates that the majority of the respondents have had considerable working experience.

Table 4.7

Age of Respondents

Age	Frequency	Percentage
20 - 29 years	31	17.2
30 - 39 years	86	47.8
40 - 49 years	44	24.4
50 years and over	19	10.6
Total	**180**	**100.0**

4.5.3 Education Level

The result in Table 4.8 shows that nearly two-third of the respondents have a bachelor's degree (69.4 %), 15.0 % have a master's degree, 7.2% have a diploma's degree, and the remaining 8.3% have other educational qualifications.

Table 4.8

Education Level of Respondents

Education level	Frequency	Percentage
Diploma	13	7.20
Bachelor’s degree	125	69.4
Master’s degree	27	15.0
Others	15	8.30
Total	**180**	**100.0**

4.5.4 Length of Employment

Table 4.9 presents the number of years the respondents have been employed at their company. It is observed that most of the respondents have been employed at the company for more than 5 years (76.1%). Therefore, they can be considered to be familiar with the goals and operations of their companies.

Table 4.9

Length of Employment

Length of employment	Frequency	Percentage
Less than 5 years	43	23.9
5 – 10 years	42	23.3
11 – 15 years	45	25.0

More than 15 years	50	27.8
Total	**180**	**100.0**

4.5.5 Length in Current Position

As shown in Table 4.10, the number of years in a position reflects the level of experience the respondents have being accountants. It is observed that the most of respondents have been at the current position for more than 5 years (68.3%), indicating that they have considerable accountancy experience in their companies. The longer the accounts are in the company, the more able they are in helping the company achieve its objective through the provisions of their inputs on various activities, such as designing better and more effective AIS.

Table 4.10

Length in Current Position

Length in current position	Frequency	Percentage
Less than 5 years	57	31.7
5 – 10 years	51	28.3
11 – 15 years	47	26.1
More than 15 years	25	13.9
Total	**180**	**100.0**

4.6 IT SOPHISTICATION

In the second section of the survey, respondents were requested to indicate the year computer-based system was first implemented in their companies to measure the level of IT experience of the respondents companies. The respondents were then asked to answer questions relating to the sophistication of IT adopted based on four perspectives i.e. technological, informational, functional, and managerial.

4.6.1 Number of Years Using Computer-based System

This study used the number of years using computer-based system to determine the level of IT experience acquired.

Table 4.11

Number of Years Using Computer-based Systems

Number of years using computers	Frequency	Percentage
Less than 5 years	38	21.1
5 - 10 years	70	38.9
11 - 15 years	48	26.7
16 - 20 years	18	10.0
More than 20 years	6	3.3
Total	**180**	**100.0**

The results in Table 4.11 show that 78.9% of the companies have used IT for at least 5 years. It is observed that more than one-third of respondent companies (38.9 %) have been using computer-based systems between 5 and 10 years, and a small percentage (3.3 %) for more than 20 years. About one-fifth of respondent companies (21.1%) have been using computer-based systems less than five years. The result suggests that the majority of the Jordanian companies in the sample have considerable experience with computer-based systems.

4.6.2 Technological Sophistication

This study used a variety of IT to measure the technological sophistication of the respondents companies. Table 4.12 shows the type of technologies adopted by the respondent companies.

Table 4.12

Type of Technologies

Types of technologies	Number of positive responses	Percentage
Office support systems	168	93.3
Decision support systems (DSS)	155	86.1
Local area network (LAN)	149	82.8
Database systems	143	79.4
Accounting system	119	66.1
Enterprise resource planning (ERP)	118	65.6

Supply chain Management (SCM)	113	62.8
Customer Relation Management (CRM)	105	58.3

The results in Table 4.12 show that more than 90% of the companies use office support systems. About 86% of the companies use DSS and 83% connected to LAN. However, a lesser percentage of the companies use database systems (79.4%), and accounting system (66.1%). More than half of the companies use ERP (65.6%), SCM (62.8%), and CRM (58.3%), which suggest that some companies have adopted advanced technologies. In order to gauge the level of technological sophistication, a summated value was calculated to determine the number of technologies used.

Table 4.13

Distribution of Total Number of Information Technology Adopted

No. of technologies adopted	No. of responses	Percentage
1 technology	6	3.3
2 technologies	3	1.7
3 technologies	29	16.1
4 technologies	22	12.2
5 technologies	14	7.8
6 technologies	8	4.4
7 technologies	19	10.6

8 technologies	79	43.9
Total	**180**	**100.0**

The result in Table 4.13 shows a relatively high level of technological sophistication among the Jordanian listed companies. About two-third of the respondent companies (66.7%) have adopted five or more technologies.

4.6.3 Informational Dimension of IT Sophistication

In this study the number of computer applications was used to measure the level of informational sophistication. Table 4.14 shows the breakdown of the types of computer applications adopted by the respondent companies.

Table 4.14

Computer Applications

Computer applications	Number of positive responses	Percentage
General ledger	167	92.8
Accounts receivable	169	93.9
Accounts payable	170	94.4
Billing	123	68.3
Order entry	134	74.4
Purchasing	124	68.9
Inventory	127	70.6

Computer applications	Number of positive responses	Percentage
Production planning and control	126	70.0
Payroll	140	77.8
Activity-based accounting	119	66.1
Cost accounting	125	69.4
Financial accounting	120	66.7
Financial analysis	125	69.4
Budgeting	127	70.6
Project management	116	64.4
Production variances	130	72.2
Budget variances	131	72.8
Modeling	114	63.3
Personnel management	135	75.0
Balanced scorecard	139	77.2

The result in Table 4.14 shows that more than 90 per cent of the companies use basic accounting applications such as accounts payable (94.4%), accounts receivable (93.9%), and general ledger (92.8%). Other applications used by two-third of the companies are payroll, balanced scorecard, personnel management, inventory, financial analysis, cost accounting, purchasing, billing, financial accounting, and modeling applications. However, more than two-third of companies use more advanced applications such as order entry, budget variances, production variances, budgeting, production planning and control, and activity-based accounting. In order to gauge the level of informational sophistication, a summated value was calculated to determine the number of computer applications.

Table 4.15

Distribution of Total Number of Applications Adopted

No. of applications adopted	No. of responses	Percentage
1 application	1	0.6
2 applications	2	1.1
4 applications	3	1.7
5 applications	5	2.8
6 applications	15	8.3
7 applications	1	0.6
8 applications	15	8.3
9 applications	4	2.2
10 applications	4	2.2
11 applications	5	2.8
12 applications	1	0.6
13 applications	8	4.4
14 applications	1	0.6
15 applications	1	0.6

16 applications	9	5.0
17 applications	21	11.7
18 applications	14	7.8
19 applications	27	15.0
20 applications	43	23.9
Total	**180**	**100.0**

As can be seen from Table 4.15, the result shows that the number of computer applications adopted by the surveyed companies range from one application to 20 applications. The result further shows that 6.2% of the companies adopt five applications or less, 30.4% of them adopt between six and fifteen application, and 63.4% of the Jordanian listed companies adopt more than fifteen applications, suggesting that many companies in Jordan have high level of informational sophistication.

4.6.4 Functional Dimension of IT Sophistication

The level of participation in IS development is a criterion variable used to measure the functional sophistication of the respondent companies. Table 4.16 shows the mean and standard deviation of the responses, arranged in descending order of the mean.

Table 4.16

Functional Sophistication

Dimensions[1]	Mean	Standard Deviation
Train new users on available systems	3.83	1.07
Participate in information systems planning	3.74	1.27
Participate as an active members of the systems development	3.68	1.10
Elaborate development schedule	3.67	1.20
Participate in developing applications	3.57	1.15
Elaborate development budget	3.49	1.14
Functional sophistication (overall)	**3.66**	**.98**

Note. [1]5-point scale, in which 1 = no participation and 5 = high participation.

Overall, the participation level is moderate with an average mean value of 3.66. As accountant, respondents participate more on less technical activities such as training new users, information system planning, and being a member of development team. As can be expected, their participation is lower in technical activities such as developing applications. However, rather surprisingly, their participation in development budget is also lower.

4.6.5 Managerial Dimension of IT Sophistication

The level of planning in IS development was used to measure the managerial sophistication for the respondent companies. Table 4.17 presents the means and standard deviations of each item and the overall, arranged in descending order of the mean.

Table 4.17

Managerial Sophistication

Dimensions[1]	Mean	Standard deviation
Post implementation planning	3.95	1.14
Financial resources planning	3.92	1.30
Implementation planning	3.70	.968
Human resources planning	3.68	1.10
Information requirement planning	3.64	1.23
Confirmatory with the company goals	3.55	1.03
Managerial sophistication (overall)	**3.70**	**.97**

Note. [1]5-point scale, in which 1 = no planning and 5 = high planning.

The results in Table 4.17 show that the level of IT planning is moderate with an average value of 3.70. The results indicate that respondent companies focus more on post implementation (mean = 3.95) and financial resources planning (mean =

3.92). Rather surprisingly, their focus is less on information requirement (mean = 3.64) and lowest with confirmatory with company goals (mean = 3.55) planning.

4.7 BUSINESS STRATEGY

In the third section of the questionnaire, the respondents were requested to indicate the business strategies adopted by their companies compared to leading competitors over the last five years. Two types of strategies were asked i.e. cost leadership and innovative differentiation.

4.7.1 Cost Leadership Strategy

Two items used to measure cost leadership strategy were cost of goods sold, and selling, general, and administrative costs (operational expenses). Table 4.18 shows the mean and the standard deviations of the two items and the overall, arranged in descending order of the mean.

Table 4.18

Cost Leadership Strategy

Items[1]	Mean	Standard deviation
Cost of good sold	3.91	1.39
Selling, general, and administrative cost	3.67	1.36
Cost Leadership	**3.79**	**1.35**

Note. [1]5-likert scale, in which 1 = very high and 5 = very low/

Overall, the result in Table 4.18 shows that the tendency toward cost leadership strategy over the last 5 years is relatively moderate with the mean value of 3.79. The result also shows that there is a favorable orientation toward cost of good sold strategy between respondents companies (mean = 3.91) in addition to, moderate orientation toward operational expenses strategy (mean = 3.67).

4.7.2 Innovative Differentiation Strategy

To measure innovative differentiation strategy, the respondents were requested to indicate research and development expenses strategy over last five years. Table 4.19 shows the mean and the standard deviation for the items.

Table 4.19

Innovative Differentiation Strategy

Items[1]	Mean	Standard deviation
Research and development expenses	3.77	1.48

Note. [1]5-Likert scale, in which 1 = very low and 5 = very high

Overall, the result in Table 4.19 shows that the innovative differentiation strategy is relatively moderate with the mean value of 3.77 over the last 5 years.

4.8 ENVIRONMENTAL CONDITIONS

In the fourth section of the questionnaire, the respondents were requested to answer the questions related to their external environment. Table 4.20 presents the means and the standard deviations of the items and the overall, arranged in descending order of the mean.

Table 4.20

Environmental Conditions

Items	Mean	Standard deviation
Competitors actions[1]	3.16	1.25
Marketing practices[2]	2.99	1.45
Technological evolution[3]	2.93	1.38
Product demand[4]	2.76	1.34
Number of new products and services[5]	2.69	1.17
The legal, economical, and political constraints [6]	2.62	1.38
Environmental conditions	**2.86**	**1.15**

Note. [1]5-point scale, in which 1 = unpredictable and 5 = easy to predict; [2]5-point scale, in which 1 = very frequently and 5 = very rarely; [3]5-point scale, in which 1 = very rapid and 5 = very slow; [4]5-point scale, in which 1 = very dissatisfied and 5 = very satisfied; [5]5-point scale, in which 1 = strongly disagree and 5 = strongly agree.

Overall, the result in Table 4.20 shows that the intensity of the environmental conditions is relatively moderate with the mean value of 2.86. The expectations of the respondents regarding to the action of the competitors are moderate regarding to predictability of competitors actions (mean = 3.16). However, their expectations in other items show a more intense environment with mean values below 3.0.

4.9 AIS DESIGN

In the fifth section of the questionnaire, the respondents were requested to describe the extent to which their computer-based systems support each of AIS characteristics identified in Table 4.21. The Table shows the mean value of each item and standard deviation, arranged in descending order of the mean.

Table 4.21

AIS Design

Items[1]	Mean	Standard deviation
Automatic receipt	3.73	1.25
Frequency of reporting	3.71	1.26
Future events	3.69	1.35
Non-economic information	3.67	1.34
Temporal reports	3.65	1.27

Speed of reporting	3.63	1.27
Non-financial information that relates to production	3.62	1.26
Organizational effect	3.59	1.20
External information	3.58	1.30
Immediate reporting	3.57	1.35
Summary reports-organization	3.53	1.23
Decisional models	3.52	1.23
Summary reports-sections	3.51	1.21
Non-financial information that relates to market	3.46	1.28
Sectional reports	3.46	1.28
Sub-unit interaction	3.44	1.20
Effects of events on functions	3.44	1.32
Precise targets	3.37	1.27
"What- if" analysis	3.36	1.28
AIS design	**3.55**	**1.14**

[1]*Note*. 5-point scale, in which 1 = not available and 5 = extensively available.

Overall, the availability of information characteristics is relatively moderate with an overall mean value of 3.55. The most available information characteristics with mean value more than 3.5 are; automatic receipt, frequency of reporting, future events, non-economic information, temporal reports, speed of reporting, non-financial information that relates to production, organizational effect, external information, immediate reporting, summary reports-organization, decisional models, and summary reports-sections. The least available information is what-if analysis (mean = 3.36).

4.10 IT BENEFITS

In order to measure the effectiveness of IT implementation in Jordanian listed companies, respondents were asked to assess the level of success of their computer-based systems. Table 4.22 shows the mean value and standard deviation of each item, arranged in descending order of the mean.

Table 4.22

IT Benefits

Items[1]	Mean	Standard deviation
Systems quality	3.88	1.23
Organizational impact	3.76	1.24
Information use	3.73	1.10
Information quality	3.67	1.20
User satisfaction	3.59	1.18
Positive individual impact	3.59	1.21
IT Benefits	**3.70**	**1.09**

Note. [1]5-point scale, in which 1 = strongly disagree and 5 = strongly agree.

Overall, the level of success of computer-based systems in responding companies is relatively moderate with an average value of mean of (3.70). The most beneficial item is the systems quality (mean = 3.88). While the lowest is user satisfaction and individual impact (mean = 3.59). Since all items receive a mean value greater than 3.50, it can be suggested that Jordanian companies have received a magnitude benefits from the availability of information characteristics generated by computer-based systems.

4.11 GOODNESS OF DATA

As discussed in chapter three, the researcher has conducted reliability and validity tests; such as content validity, construct validity, and criterion validity for all variables.

4.11.1 Content Validity

Content validity refers to the adequacy with which a measure or scale has sampled from the intended universe or domain of content (Pallant, 2001). In other words, the data are considered to have met the content validity if there is unanimity between judges which indicates that the instruments of the study include items that are able to cover all variables which are being measured (Sekaran, 2003). In this study, the researcher ensured the content validity of the questionnaire measurements related to contingency factors, AIS design, and IT benefits among Jordanian listed companies by following three steps of content validity - describing the content domain, determining the areas of the content domain of that test item and comparing the structure of the test with the structure of content domain (Murphy & Davidshofer, 1998). A more recent study (Sekaran, 2003) suggests three steps to measure content validity such as the judgment of those who construct the instrument or other experts familiar with the topic area, conceptualization of the behavioral domain or universe of interest, and high internal consistency reliability. For these purposes, the researcher ensured the content validity based on views and feedbacks from twelve lecturers in accounting departments of public and private Jordanian universities.

4.11.2 Construct Validity

Factor analysis is a general name for a set of techniques whose primary purpose is to define the underling structure data matrix (Hair et al., 2006; Pallant, 2001). The following sections separately discuss the results of factor analysis conducted on all items that measured the variables using interval scale. The main objective of factor analysis is to reduce the wide ranging number of variables into more manageable groups of factors (Lehman, 1989). The technique assumes that there are only a few basic dimensions that underlie attributes of a certain constructed to be measured and it then correlates the attributes to identify these basic dimensions (Churchill, 1999). Factor loadings produced from factor analysis are used to indicate the correlation between each attribute and each score, the higher the factor loading the more significant that attributes is in interpreting the factor matrix (Hair et al., 2006).

To use factor analysis, a number of requirements need to be met, according to Sproull (1988). Variables under study have at least to be of interval scale for factor analysis to be appropriately applied. In this study, most of the variables used were measured using an interval scale. The Kaiser Meyer Olkin (KMO) Measure of Sampling Adequacy test and Bartlett's test of sphericity can been used to test whether it is appropriate to proceed with factor analysis. A small value on the KMO test indicates that the factor analysis may not be a good option. Kinnear and Gray (1994) suggest that the KMO value should be greater than .05 for the factor analysis to proceed. Hair et al. (2006) provide a guideline to interpret the KMO values with the following indicators: KMO value in the .90s are marvelous; .80s are meritorious; .70s are middling; .60s are mediocre; .50s are acceptable but miserable; and below .50 is unacceptable.

The Bartlett test of sphericity and its significance level indicate a relationship among variables in an identity matrix and it determines whether factor analysis is an appropriate technique to use. If the Bartlett test value is not significant (that is, its associated probability is greater than .05) then there is a danger that the correlation matrix is an identify matrix (where the diagonal elements are 1 and the off diagonal elements are 0) and is therefore unsuitable for further analysis (Kinnear & Gray, 1994). What is required is that the value for sphericity is large and the associated significance is small, that is, less than .05. When these criteria are present, further use of factor analysis is suitable.

This section discusses the results of factor analysis conducted on all eight items that measured the functional sophistication variable to find out whether they could be treated as a single measure. The test was conducted using principal component analysis and Varimax rotation with Kaiser normalization. In testing whether factor analysis was appropriate for the functional sophistication construct, KMO and Bartlett tests were first conducted. The results are shown in Table 4.23.

Table 4.23

Factor Analysis for Functional Sophistication

Functional sophistication items	Factor loading
	1
Participation in developing applications	.890
Train new users on available systems	.877
Participation as an active members of systems development	.857
Elaboration of development budget	.847
Elaboration of development schedule	.842
Participation in information systems planning	.769
Percentage of variance explained (%)	71.894
Kaiser-Meyer-Olkin	.871
Bartlett's test of sphericity approx. chi square	795.919
df	15
Sig.	.000

The result in Table 4.23 indicates that the KMO measure for functional sophistication items showed a value of .871 which indicates a ‘meritorious’ adequacy and thus appropriate for using factor analysis (Hair et al., 2006). The observed value of Bartlett sphericity is also very large (795.919) and its associated significance level is very low (.000). Both of the KMO measure and Bartlett test of sphericity results demonstrate that the items used in the functional sophistication measure obviously met the conditions for factor analysis. This means that factor analysis can be applied for the functional sophistication items.

The factor analysis was conducted using principle component analysis (PCA) and Varimax rotation with Kaiser normalization (Hair et al., 2006). The Varimax rotation criterion centers on simplifying the columns of the factor matrix and helps to make the pattern of the items associated with a given factor more distinct (Kim, 1975). As a general rule of thumb, according to Hair et al., the PCA is concerned with determining the number of factor to account for the maximum amount of the variance in the data. Everitt and Dunn (1983) state that the PCA with an Eigenvalue of greater than 1.0 is considered significant and can be used to determine the factors to be extract. In this study, the results of the test revealed that there is one factor with an Eigenvalue of more than 1. The scree plot in Figure 4.1 shows that the plot slopes steeply downward from one factor to two factors before slowly becomes an approximately horizontal line.

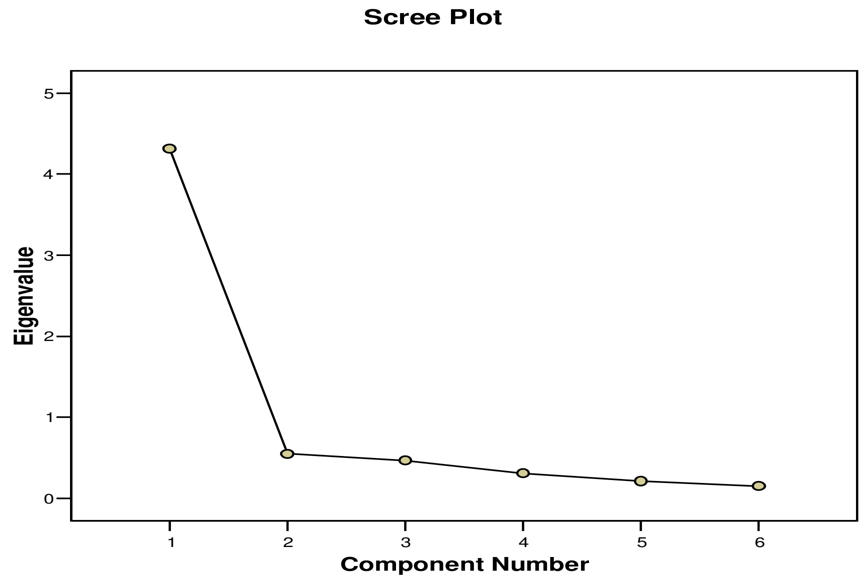


Figure 4.1. Scree plot of functional sophistication

The result in Table 4.23 shows that all of the six functional sophistication items exhibit large factor loading. According to Norusis (1992), factor loading is the correlation between an item and the given factor. As a general rule of thumb, Hair et al. (2006) provide a guideline to interpret the factor loading that, factor loadings with value +.50 or greater are considered very significant; loading of +.40 are considered more important; loading of +.30 are considered significant. In this study, all items have a factor loading of more than .50, suggesting that the items correlate very significantly to the factor itself with factor loadings ranging from .769 to .890. This analysis confirms that the one set of items measured one thing.

A factor analysis was also conducted for all six items that measured managerial sophistication to find out whether they could be measured as a single variable. The test was conducted using principal component analysis and Varimax rotation with Kaiser normalization. In testing whether factor analysis was appropriate for the managerial sophistication construct, KMO and Bartlett tests were first conducted. The result is shown in Table 4.24.

Table 4.24

Factor Analysis for Managerial Sophistication

Managerial sophistication items	Factor loading
	1
Information requirement planning	.901
Financial resources planning	.893
Implementation planning	.864
Confirmatory with the company goals	.846
Human resources planning	.844
Post implementation planning	.801
Percentage of variance explained (%)	73.79
Kaiser-Meyer-Olkin	.803
Bartlett's test of sphericity approx. chi square	970.497
df	15
Sig.	.000

The result in Table 4.24 indicates that the KMO measure for managerial sophistication items showed a value of .803 indicating a ‘meritorious’ adequacy and thus appropriate for using factor analysis (Hair et al., 2006). The value of Bartlett sphericity is also large (970.497) and its associated significance level is very low (.000). KMO measure and Bartlett’s test of sphericity results demonstrate that the items used to measure managerial sophistication obviously met the conditions for factor analysis. The results of factor analysis can be applied for the managerial sophistication items. The results of the test also demonstrate that there is one factor with an Eigenvalue of more than 1. The scree plot in Figure 4.2 shows that the plot slopes steeply downward from one factor to two factors before slowly became an approximately horizontal line.

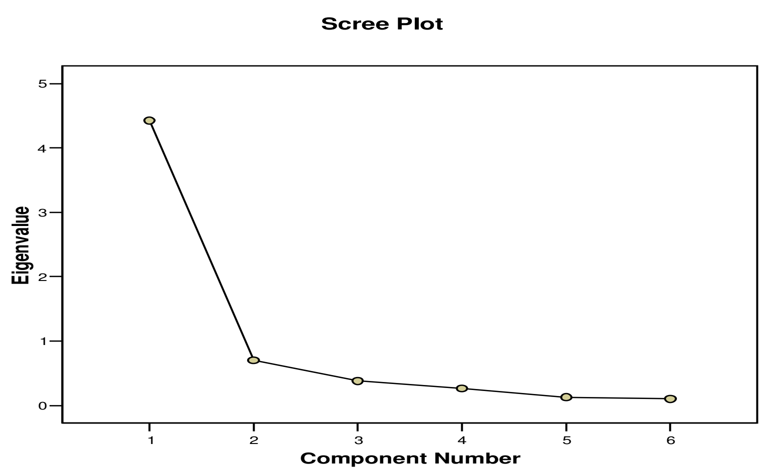


Figure 4.2. Scree plot of managerial sophistication

The result in Table 4.24 show that all of the six managerial sophistication items exhibit a factor loading of more than .50 suggesting that they correlate very significantly to the factor itself with factor loadings ranging from .801 to .901. This analysis confirms that the six items of managerial sophistication measured the same variable.

Similarly, a factor analysis is conducted for two items that measured cost leadership strategy. In order to test whether factor analysis was appropriate for cost leadership strategy, a principal component analysis and Varimax rotation with Kaiser normalization were used. The results of KMO and Bartlett test and factor analysis are displayed in Table 4.25.

Table 4.25

Factor Analysis for Cost Leadership Strategy

Cost leadership strategy items	Factor loading
	1
Selling, general, and administrative cost/sales	.980
Cost of good sold/sales	.980
Percentage of variance explained (%)	95.998
Kaiser-Meyer-Olkin	.500
Bartlett's test of sphericity approx. chi square	332.445
df	1
Sig.	.000

The result in Table 4.25 shows that the KMO value for cost leadership strategy items is .500 which indicates an 'acceptable but miserable' adequacy (Hair et al., 2006). The observed value of Bartlett sphericity is also large (332.445) and its associated significance level is very low (.000). KMO measure and Bartlett's test of sphericity results demonstrate that the items used to measure the cost leadership strategy obviously met the conditions for factor analysis and the factor analysis can be applied for the cost leadership strategy items. The results of factor analysis also demonstrate that there is one factor with an Eigenvalue of more than 1. The scree plot in Figure 4.3 also shows that the plot slopes steeply downward from one factor to two factors.

Figure 4.3. Scree plot of cost leadership strategy

The result in Table 4.25 shows that all of the two cost leadership strategy items exhibit a factor loading of more than .50 suggesting that they correlate very significantly to the factor itself with factor loadings for both of them .980. This analysis confirms that the two items of cost leadership strategy measured the same variable.

Similarly, a factor analysis is conducted on all six items that measured environmental conditions to find out whether they measure a single variable. KMO and Bartlett test were conducted and the results are shown in Table 4.26.

Table 4.26

Factor Analysis for Environmental Conditions

Environmental conditions items	Factor loading
	1
Technological evolution	.909
Number of new products and services	.899
Legal, economical, and political constraints	.894
Product demands	.880
Marketing practices	.842
Competitors actions	.757
Percentage of variance explained (%)	74.856
Kaiser-Meyer-Olkin	.847
Bartlett's test of sphericity approx. chi square	97992.899
df	15
Sig.	.000

From Table 4.26, the KMO measure for environmental conditions items showed a value of .847 which indicates a 'meritorious' adequacy and Bartlett sphericity is significant (.000) (Hair et al., 2006). The KMO measure and Bartlett test's of sphericity results demonstrate that the items used to measure the environmental conditions clearly have met the conditions for factor analysis and the factor analysis can be applied for the environmental conditions items. The results of factor analysis also demonstrate that there is one factor with an Eigenvalue of more than 1. The scree plot in Figure 4.4 shows that the plot slopes steeply downward from one factor to two factors before slowly became an approximately horizontal line.

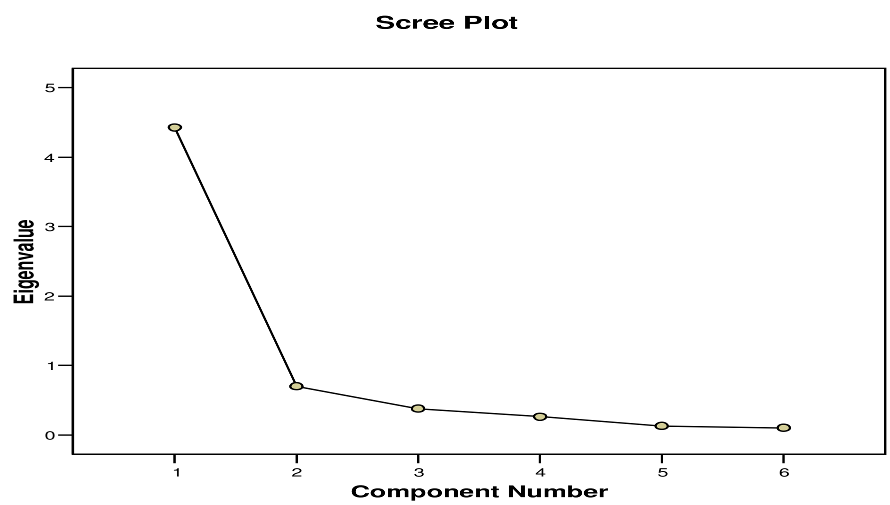


Figure 4.4. Scree plot of environmental conditions

The results in Table 4.26 show that all of the six environmental conditions items exhibit a factor loading ranging from .757 to .909 suggesting that they correlate very significantly to the factor. This analysis confirms that the six items of environmental conditions measured the same variable.

As mentioned before, before proceeding with multiple regression the factor analysis should be conducted for all variables that used interval scale. In line with that, a factor analysis is also conducted for all nineteen items that measured AIS design to find out whether they could be measured as a single variable or four separate dimensions as measured in the original study by Chenhall and Morris (1986). In order to test whether factor analysis is appropriate for AIS design items, a principal component analysis and Varimax rotation with KMO and Bartlett test were conducted and the results are shown in Table 4.27.

Table 4.27

Factor Analysis for AIS design

AIS design items	Factor loading
	1
Non-financial information that relates to production	.927
Frequency of reporting	.926
Automatic receipt	.922
Sectional reports	.921
Decisional models	.918
Organizational effect	.902
Future events	.901

Effects of events on functions	.901
External information	.901
Non-economic information	.898
Non-financial information that relates to market	.894
Summary reports-sections	.894
Speed of reporting	.883
Summary reports-organization	.882
Temporal reports	.881
Sub-unit interaction	.879
Precise targets	.870
“what- if” analysis	.869
Immediate reporting	.862
Percentage of variance explained (%)	80.381
Kaiser-Meyer-Olkin	.940
Bartlett’s test of sphericity approx. chi square	5979.148
df	171
Sig.	.000

Through Table 4.27, the KMO measure for AIS design items showed a value of .940 which indicates a ‘marvelous’ adequacy and appropriate for using factor analysis (Hair et al., 2006). In addition, value of Bartlett sphericity is also very large

(5979.148) and its associated significance level is very low (.000) which demonstrate that AIS design has obviously met the conditions for factor analysis. The results of factor analysis also demonstrate that there is one factor with an Eigenvalue of more than 1. The scree plot in Figure 4.5 shows that the plot slopes steeply downward from one factor to two factors before slowly became an approximately horizontal line.

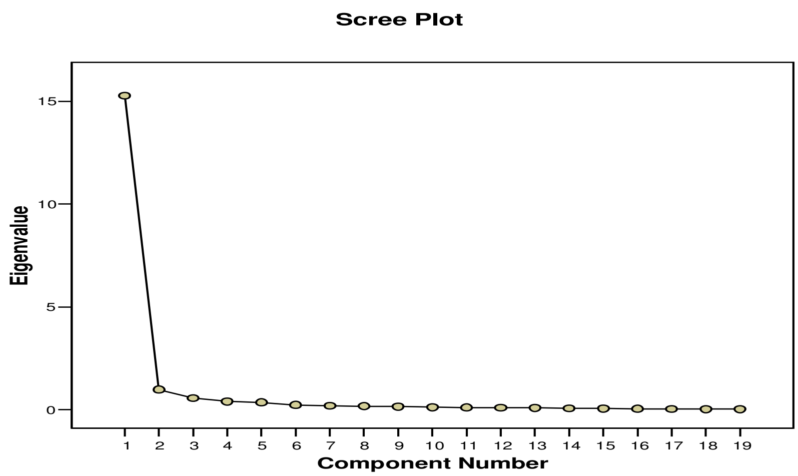


Figure 4.5. Scree plot AIS design

The results in Table 4.27 show that all of the nineteen AIS design items exhibit a factor loading of more than .50 suggesting that they correlate very significantly to the factor itself with factor loadings ranging from .862 to .927. Similar to Gul (1991), this analysis confirms that the nineteen items of AIS design measured as a single variable not in four separate dimensions as measured in the original study by Chenhall and Morris (1986).

Finally, a factor analysis is conducted on all six items that measured IT benefits to find out whether they could be treated as a single measure. Table 4.28 shows the KMO measure (.864) and Bartlet's test of sphericity results (1303.447 and significant .000) demonstrate that the items used to measure the IT benefits clearly met the conditions tests of factor analysis and the factor analysis can be applied for the IT benefits items. The results in Figure 4.6 show that there is only one factor with an Eigenvalue of more than 1, which explained 83.5 percent of the variance. The scree plot in Figure 4.6 also shows that the plot slopes steeply downward from one factor to two factors before slowly becomes an approximately horizontal line. In addition, the factor loading for all six IT benefits items exhibit a factor loadings ranging from .875 to .941, suggesting that the items correlate very significantly to the factor itself. Similar to Al-Mushayt (2000), this analysis confirms that the six items of IT benefits measured a single same variable.

Table 4.28

Factor Analysis for IT benefits

IT benefits items	Factor loading
	1
Information quality	.941
User satisfaction	.936
Positive individual impact	.932
Organizational impact	.900

Information use	.895
Systems quality	.875
Percentage of variance explained (%)	83.487
Kaiser-Meyer-Olkin	.864
Bartlett's test of sphericity approx. chi square	1303.447
df	15
Sig.	.000

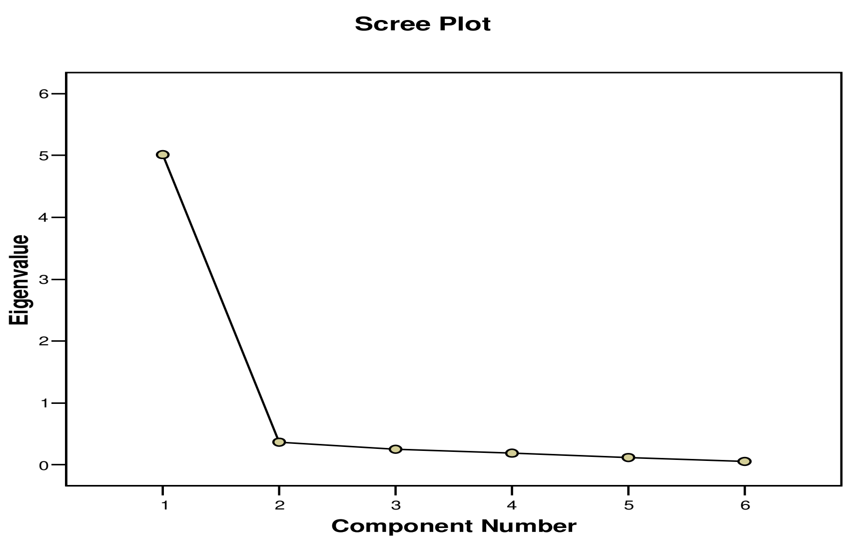


Figure 4.6. Scree plot of IT benefits

4.11.3 Criterion Validity

Criterion validity concerns the relationship between scale scores and some specified, measurable criterion (Pallant, 2001). A criterion-related validity analysis has been conducted using the seven contingency variables as independents variables in first step and AIS design as independent variable in second step of analysis.

Generally, there are many ways to measure criterion validity or collinearity between the independents variables such as Pearson correlations, Tolerance Value, and Variance Inflation Factors (VIF). Multicollinearity test is important because if multicollinearity exists between two or more independents variables it can deteriorate the results of multiple regression. Pearson correlations show the correlation between two independents variables or more in which the correlation is significant at .0l level or at .05 levels. As a general rule of thumb, Pearson correlation with significant value higher than .8 indicates that there is multicollinearity between the independents variables (Allison, 1999; Cooper, & Schindler, 2003; Kennedy, 1985; Sekaran, 2000). In this study, multicollinearity has been examined between the independents variables using Pearson correlation as shown in Table 4.29.

Table 4.29

Pearson Correlations for Independent Variables and Dependent Variables

	AIS	IT	TS	IS	FS	MS	CL	ID	EC
AIS	1								
IT	.798**								
TS[1]	.529**	.483**							
IS[2]	.673**	.591**	.435**						
FS[3]	.398**	.308**	.158	.244**					
MS[4]	.629**	.553**	.371**	.504**	.374**				
CL[5]	.727**	.598**	.419**	.573**	.257**	.453**			
ID[6]	.648**	.556**	.504**	.554**	.214*	.380**	.668**		
EC[7]	.222**	.192**	.293**	.185*	-.050	.209**	.033	.186*	1

*Correlation is significant at the .05 level (2-tailed).

**Correlation is significant at the .01 level (2-tailed).

Note. [1]TS = Technological Sophistication (TS); [2]IS = Informational Sophistication; [3]FS = Functional Sophistication; [4]MS = Managerial Sophistication; [5]CS = Cost Leadership; [6]ID = Innovative Differentiation; [7]EC = Environmental Conditions.

The result in Table 4.29 shows no multicollinearity between independent variables because the Pearson correlation indicators for all independents variables are less than 0.8. As mentioned earlier, there are other methods to test multicollinearity between the independent variables such as Tolerance Value and Variance Inflation

Factor (VIF). According to Hair et al. (2006), the common cut off threshold is a tolerance value of .10, which corresponds to a VIF value less than 10. Table 4.30 provides the Tolerance and VIF values for independents variables.

Table 4.30

Tolerance Value and the Variance Inflation Factor (VIF)

	Collinearity statistics	
Independent variables	Tolerance	VIF
(Constant)		
Technological sophistication	.660	1.514
Informational sophistication	.544	1.840
Functional sophistication	.832	1.202
Managerial sophistication	.620	1.613
Cost leadership	.455	2.196
Innovative differentiation	.464	2.156
Environmental conditions	.845	1.183

The result in Table 4.30 indicates that multicollinearity does not exist among all independent variables because the Tolerance values are more than .10 and VIF values are less than 10. The result suggests that the current study does not have any problem with multicollinearity.

4.11.4 Reliability Test

Reliability refers to the stability and consistency with which the instrument is measuring the concepts and helps to assess the goodness of measure (Sekaran, 1992). In this study, internal consistency is used to test the degree of inter-correlation among items (Sekaran, 2003). Internal consistency can be measured by a number of ways but the most common way is the Cronbach's alpha coefficients that provide an indication of the average correlation among all items that make up the scale (Pallant, 2001). Accordingly, an internal consistency analysis was conducted to test the reliability of the questionnaire instruments. Nunnally (1978) stated that in exploratory studies the alpha value of 0.6 is generally considered sufficient and acceptable, even though a value of Cronbach's alpha .70 is generally considered good. Table 4.31 presents the results of the reliability test for each variable.

Table 4.31

Reliability Analysis

Factors	Cronbach's Alpha
Functional sophistication	.823
Managerial sophistication	.833
Cost leadership strategy	.867
Environmental conditions	.860
AIS design	.774
IT benefits	.800

As can be seen from Table 4.32, the Cronbach's alpha value for each variable ranges from .774 to .867, indicating a high reliability for the study variables (Hair et al., 2006). The result suggests that the variables are appropriate for further analysis.

4.12 METHODS OF MULTIPLE REGRESSION

Multiple regression is a technique that can be used to examine the relationship between one continuous dependent variable and many independent variables. Generally, there are several methods of multiple regression analysis such as standard regression, hierarchical or sequential, and stepwise regression (Palant, 2001). In the standard multiple regression, all of the independent variables are entered into the equation simultaneously (Pallant, 2001) and assumed to be of equal importance (Tabachnick & Fidell, 2007). In this study a standard regression method has been conducted in order to test the relationships between contingency factors and AIS design because all independent variables are assumed of equal importance.

4.12.1 Linearity, Normality and Homoscedasticity

To this point, assumptions underlying regression analysis should be checked. These assumptions are normality, linearity, and homoscedasticity (Hair et al., 2006). The first assumption, linearity, will be evaluated through an analysis of residuals and partial regression plots. The result of testing linearity through scatter plot diagrams is shown in Figure 4.7, which shows no evidence of nonlinear pattern to the residuals.

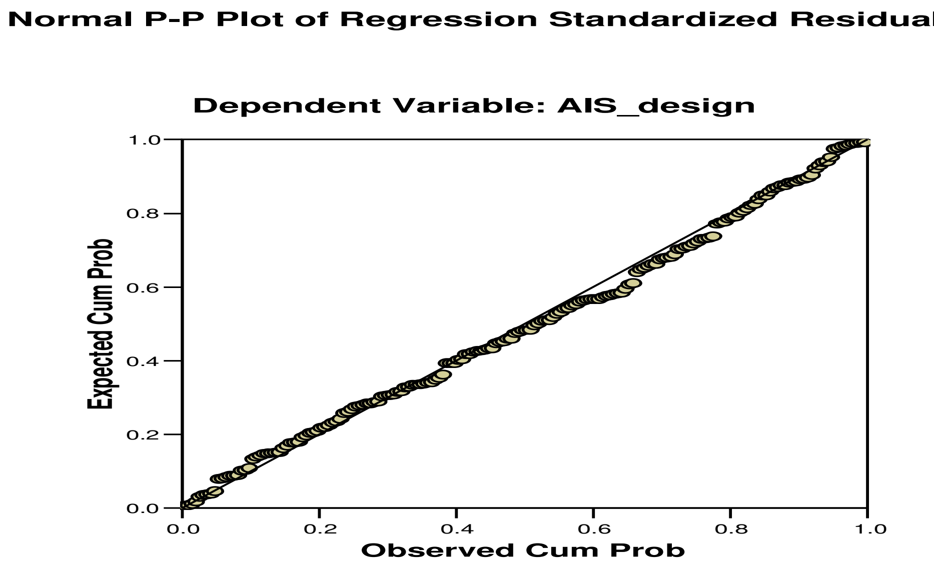


Figure 4.7. Linearity test for AIS design

Likewise, Figure 4.8 illustrates the result of homoscedasticity test. The finding of the homoscedasticity test through scatter plot diagrams of studentized residuals shows that homoscedasticity exists in the set of independent variables and the variance of dependent variable.

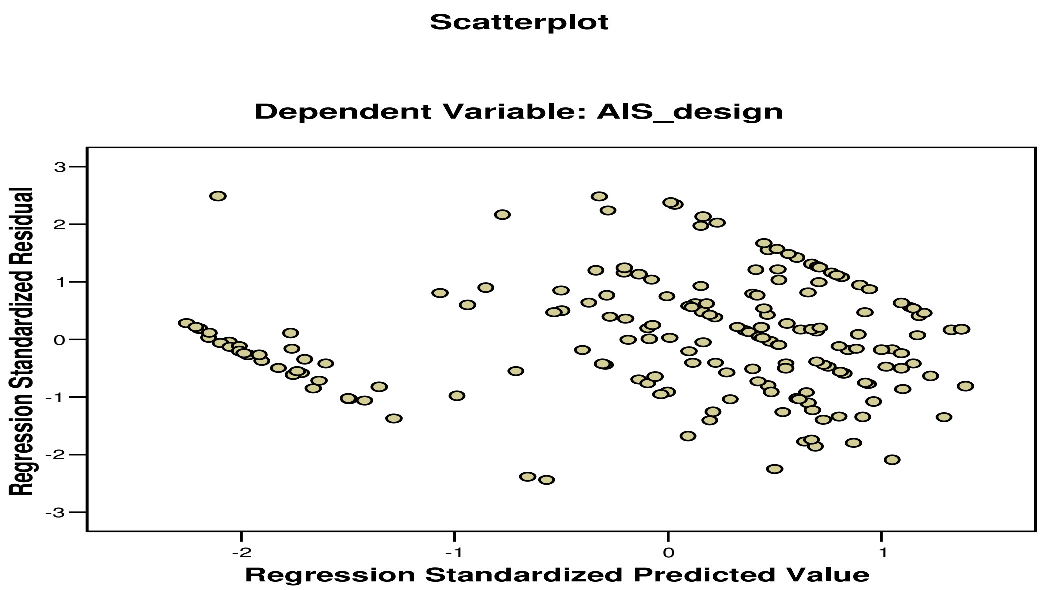


Figure 4.8. Homoscedasticity test for AIS design

The final assumption to be checked is the normality of the error term of the variate with a visual examination of the normal probability plots of the residuals. In order to test the normality, skewness and Kurtosis values were used. Normality exists when standard error for skewness and Kurtosis ratios is between ± 2 at the significance level of .05 (Hair et al., 1998). As shown in Table 4.32, all of the skewness and Kurtosis ratios are between the normal distribution ± 2. Consequently, the assumption of normality is met.

Table 4.32

Statistic Values of Skewness and Kurtosis Ratios (Descriptive Statistics) (n=180)

Variables	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Technological Sophistication	-.563	.181	-1.146	.360
Informational sophistication	-.773	.181	-.901	.360
Functional sophistication	-.124	.181	-1.243	.360
Managerial sophistication	-.774	.181	-.626	.360
Cost leadership	-.962	.181	-.377	.360
Innovative differentiation	-.845	.181	-.783	.360
Environmental conditions	.345	.181	-.755	.360
AIS Design	-.672	.181	-.642	.360
IT Benefits	-.828	.181	-.085	.360

Another test used to check the data normality assumption of the regression model is a histogram of the distribution of the residuals. Figure 4.9 shows that the distribution approximated to normal curve which assert the normality assumption.

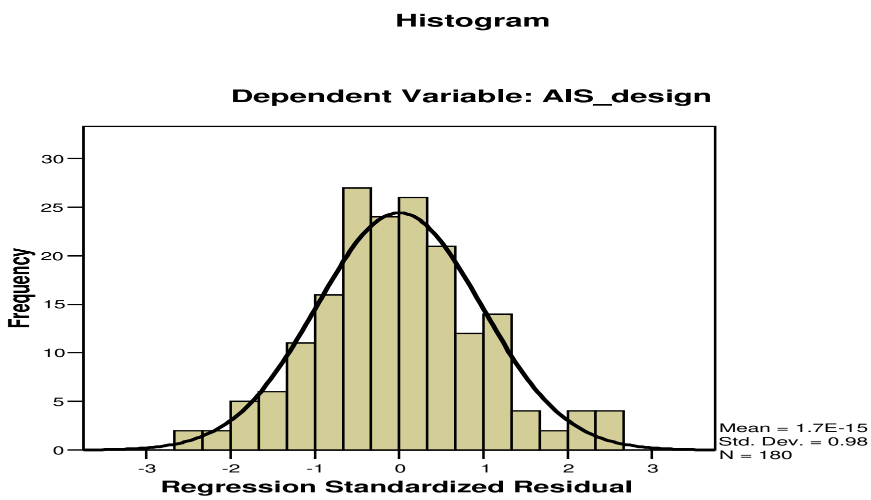


Figure 4.9. Normality test for AIS design

Figures 4.7, 4.8, and 4.9 have displayed the results of linearity, normality, and homogeneity tests for AIS design. Overall the results suggest that the assumptions of linearity, normality, and homogeneity of data are met.

Similarly, the normality, linearity, and homoscedasticity tests were conducted on IT benefits. The result of linearity test through scatter plot diagrams in Figure 4.10 shows no evidence of nonlinear pattern to the residuals.

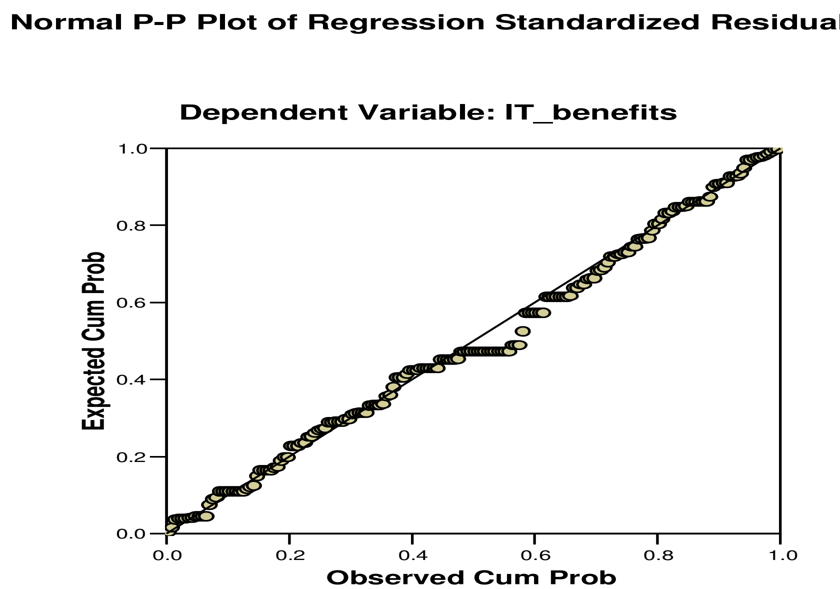


Figure 4.10. Linearity test for IT benefits

Likewise, Figure 4.11 illustrates the results of homoscedasticity test. The finding of the test through scatter plot diagrams of studentized residuals shows that there is homoscedasticity in the set of independent variables as well as the variance of dependent variable.

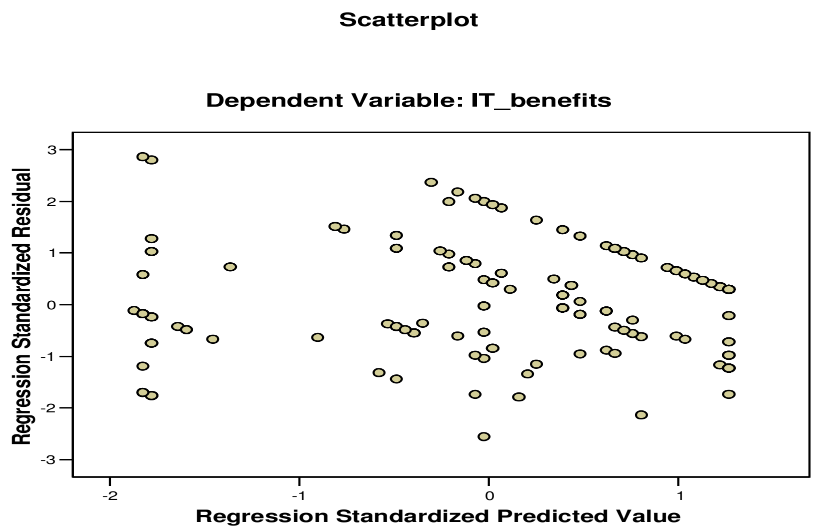


Figure 4.11. Homoscedasticity test for IT benefits

Finally the normality of the error term of the variate with a visual examination of the normal probability plots of the residuals was conducted. To test the data normality assumption of the regression model for IT benefits, a histogram of the distribution of the residuals is plotted. Figure 4.12 shows that the distribution approximated to normal curve which assert the normality assumption.

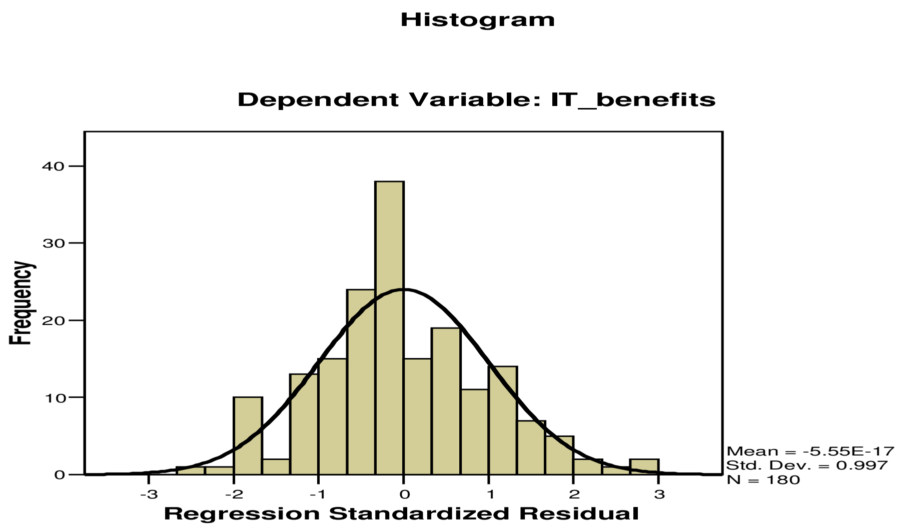


Figure 4.12. Normality test for IT benefits

Figures 4.10, 4.11, and 4.12 have displayed the results of linearity, normality, and homoscedasticity tests for IT benefits. The results indicated that the assumptions of linearity, normality, and homoscedasticity of the data are met.

4.12.2 Correlation Analysis

Correlation analysis is a statistical method used to describe the strength and direction of the linear relationship between two variables (Pallant, 2001). The degree of correlation is concerned to measure the strength and importance of a relationship between the variables. To achieve this, the bivariate association was conducted. The procedure computes Pearson's correlation coefficient with significance levels. Pearson correlation coefficients can only take one value which ranges from - 1 to +1. The magnitude of the absolute value with ignoring the sign provides an indication of the strength of the relationship between two variables. The perfect correlation of 1 or -1 indicates that the value of one variable can be determined exactly by knowing the value of other variable. Besides, the correlation value 0 indicates no relationship between the specified two variables. Cohen (1988) provides a guideline to explain the strength of the relationship between two variables (*r*) as shown in Table 4.33.

Table 4.33

Cohen's Guideline of Correlation Strength

r values	Strength of relationship
r = +.10 to .29 or r = -.10 to -.29	Small
r = +.30 to .49 or r = -.30 to -.49	Medium
r = +.50 to 1.0 or r = -.50 to -.1.0	Large

Table 4.34

Summary of Correlations of Variables

Variables	Correlation coefficient	Strength of relationship
Technological sophistication and AIS	.529**	Medium
Informational sophistication and AIS	.673**	Strong
Functional sophistication and AIS	.398**	Medium
Managerial sophistication and AIS	.629**	Strong
Cost leadership strategy and AIS	.727**	Strong

Innovative differentiation and AIS	.648**	Strong
Environmental conditions and AIS	.222**	Weak
AIS design and IT benefits	.798**	Strong

** Significant at the .01 level (2-tailed)

Table 4.34 presents the summary of relationships between the independent variables and dependent variables. In general, the table shows that there are significant and positive relationships between technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation and environmental conditions and AIS design. The table also shows that the association is weak between environmental conditions and AIS design (r =.222, p < .01), medium between technological sophistication and AIS design (r =.529, p < .01), medium relationship between functional sophistication and AIS design (r =.398, p < .01), and strong relationships between other contingency variables such as informational sophistication, managerial sophistication, cost leadership strategy, and innovative differentiation strategy and AIS design. In addition, the result in Table 4.34 shows a strong relationship between AIS design and IT benefits (r = .798, p < .01).

4.13 TESTING THE MODEL USING REGRESSION ANALYSIS

Multiple regression analysis was conducted in order to provide the researcher with a variety of outcomes that can help him to answer the study questions and to test the research hypotheses. Multiple regression provides the relative contribution for each variable and shows which variable between set of variables the best predictor of an outcome. For example, R^2 indicates how well a set of variables (contingency variables) are able to predict a particular outcome (sophistication of AIS design).

The standard value for R^2 is 1 which means that there is a perfect linear relationship between the dependent and independent variables. On the contrary, R^2 value equal to 0 indicates that there is no linear relationship between the dependent and independent variables. In this model, R^2 value for the first stage of analysis regression model is .734 (refer to Table 4.35), which means that the contingency factors (technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy, and environmental conditions) explain 73.4 per cent of the variance in the sophistication of AIS design.

Standard multiple regression also provides an adjusted R^2 value. "The adjusted R^2 statistic 'corrects' R^2 value to provide a better estimate of the true populations value" (Pallant, 2001, p. 145). ANOVA was used to assess the statistical significance of the result. The result in Table 4.35 demonstrates that the null hypothesis (that the multiple R in the population is equal to 0) is rejected since the model of this study is statistically significant at $p = .000$).

4.14 EVALUATING EACH OF THE INDEPENDENT VARIABLE

This section aims to identify and compare the strength of prediction of the independent variables on the dependent variable. In other words, this study aims to identify which variables in the model contributed to the prediction of the dependent variable using Beta value. In this study, we are interested to compare the contribution of each independent variable in the model. The results in Table 4.35 show that all variables except environmental conditions contributed significantly to the sophistication of AIS design. Cost leadership strategy has the highest contribution on AIS design amongst the independents variables (β = .348). Other variables also significantly and positively contributed to the sophistication of AIS design as arranged in descending order: managerial sophistication, informational sophistication, functional sophistication, innovative differentiation strategy, and technological sophistication.

As can be seen from Table 4.35, the R^2 was statistically significant, with F = 67.719 and p < .001. As a result, the common expression of the regression equation is stated as follows: The sophistication of AIS design = -.630 + .441 technological sophistication + .831 informational sophistications + .165 functional sophistications + .250 managerial sophistications + .295 cost leadership strategy + .095 innovative differentiations + .081 environmental conditions.

The seven contingency predictor variables were observed to have a positive correlate to the sophistication of AIS design as indicated by the positive R value of .857 in Table 4.35. A computed R square value of .734 suggests that the variables explain more than 73.4 per cent of the variance in the sophistication of AIS design (with a standard error estimate of .60012). In other words, almost all contingency factors have magnitude effect on sophistication of AIS design.

Table 4.35

Results of Multiple Regression between Contingency Factors and AIS Design

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.857(a)	.734	.723	.60012

a. Predictors: (Constant), Technological sophistication, Informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy, Environmental conditions
b. Dependent Variable: AIS design

ANOVA (b)

Model		F	Sig.
1	Regression Residual Total	67.719	.000(a)

a. Predictors: (Constant), Technological sophistication, Informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy, Environmental conditions b. Dependent Variable: AIS design

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.630	.236		-2.664	.008
	Technological sophistication	.441	.197	.108	2.233	.027
	Informational sophistication	.831	.220	.202	3.785	.000
	Functional sophistication	.165	.050	.141	3.270	.001
	Managerial sophistication	.250	.059	.213	4.254	.000
	Cost leadership strategy	.295	.049	.348	5.967	.000
	Innovative differentiation strategy	.095	.044	.123	2.134	.034
	Environmental conditions	.081	.042	.081	1.900	.059

* $p < .05$, ** $p < .001$

In this study, the second step of analysis regression model is to test the linear regression between AIS design and IT benefits. R^2 value of .637 indicates that the AIS design explains 63.7 per cent of the variance in the IT benefits with a standard error of estimate of .65833. The results in Table 4.36 show that the Beta value is .798 which indicates that the AIS design has a strong contribution in explaining IT benefits. In addition, AIS design has a significant value less of than .05 which confirms that there is a positive significant relationship between AIS design and IT benefits.

The R^2 was statistically highly significant with F = 312.583 and $p < .001$. Consequently, the general expression of the regression equation is stated as follows: IT benefits = .993+ .763 AIS design.

Table 4.36

Results of Multiple Regression between AIS design and IT Benefits

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.798(a)	.637	.635	.65833

a. Predictors: (Constant), AIS design
b. Dependent Variable: IT benefits

ANOVA (b)

Model		F	Sig.
1	Regression	312.583	.000(a)
	Residual		
	Total		

a. Predictors: (Constant), AIS design
b. Dependent Variable: IT benefits

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.993	.161		6.164	.000
	AIS design	.763	.043	.798	17.680	.000

* p < .001

As mentioned earlier, multiple regression analysis was conducted to test the relationship between the contingency factors and AIS design, and liner regression was carried out in order to test the relationship between AIS design with IT benefits. The regression model of the influence of predictor variables on the AIS design is significant at 95% confidence level with an *F* value of 67.719. It was found that six variables significantly and positively affect AIS design. These variables are technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy. However, environmental conditions did not affect significantly AIS design. Also, the regression model of the influence of predictor variable (AIS design) on the IT benefits is significant at 95% confidence level with an *F* value of 312.583. AIS design was found to significantly and positively influence IT benefits.

4.15 HYPOTHESES TESTING

To recap, the following are research questions to be answered in the present study.

1. What is the relationship between IT technological sophistication and AIS design?
2. What is the relationship between IT informational sophistication and AIS design?
3. What is the relationship between IT functional sophistication and AIS design?
4. What is the relationship between IT managerial sophistication and AIS design?
5. What is the relationship between environmental condition and AIS design?
6. What is the relationship between cost leadership strategy and AIS design?
7. What is the relationship between innovative differentiation strategy and AIS design?
8. What is the relationship between AIS design and IT benefits?

Hypothesis 1:

There is a positive relationship between IT sophistication and the sophistication of AIS design among Jordanian listed companies.

Hypothesis1a:

There is a positive relationship between technological sophistication and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive and significant relationship between technological sophistication and AIS design (t = 2.233, p >.05). The result suggests that for each unit increase in the technological sophistication, there is an expected increase of .441 in the sophistication of AIS design. Therefore, hypothesis 1a is supported.

Hypothesis 1b:

There is a positive relationship between informational sophistication and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive significant relationship between informational sophistication and AIS design (t = 3.785, p > .01). The result suggests that for each unit increase in informational sophistication, there is an expected increase of .831 in sophistication of AIS design. Therefore, hypothesis 1b is supported.

Hypothesis 1c:

There is a positive relationship between functional sophistication and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive and significant relationship between functional sophistication and AIS design (t = 3.270, p > .01). The result suggests that for each unit increase in functional sophistication, there is an expected increase of .165 in sophistication of AIS design. Therefore, hypothesis 1c is supported.

Hypothesis 1d:

There is a positive relationship between managerial sophistication and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive and significant relationship between managerial sophistication and AIS design (t = 4.254, $p > .01$). The result suggests that for each unit increase in managerial sophistication, there is an expected increase of .250 in sophistication of AIS design. Therefore, hypothesis 1d is supported.

Hypothesis 2:

There is a positive relationship between perceived environmental uncertainty and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive but not significant relationship between perceived environmental uncertainty and AIS design (t = 1.900, $p > .05$). Therefore, hypothesis 2 is rejected.

Hypothesis 3a:

There is a positive relationship between cost leadership strategy and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive and significant relationship between cost leadership strategy and AIS design (t = 5.967, p > .01). The result suggests that for each unit increase in cost leadership strategy, there is an expected increase of .295 in sophistication of AIS design. Therefore, hypothesis 3a is supported.

Hypothesis 3b:

There is a positive relationship between innovative differentiation strategy and the sophistication of AIS design among Jordanian listed companies.

The result in Table 4.35 shows a positive and significant relationship between innovative differentiation strategy and AIS design (t = 2.134, p > .05). The result suggests that for each unit increase in innovative differentiation strategy, there is an expected increase of .095 in sophistication of AIS design. Therefore, hypothesis 3b is supported.

Hypothesis 4:

There is a positive relationship between the sophistication of AIS design and perceived IT benefits.

The result in Table 4.36 shows a positive significant relationship between AIS design and perceived IT benefits (t = 17.680, p > .01). The result indicates that for each unit increase in AIS design, there is an expected increase of .763 in perceived IT benefits. Therefore, hypothesis 4 is supported.

Table 4.37 summarizes results of research findings related to the strength of the relationships and the assumption of hypothesis.

Table 4.37

Summary of results

Hypothesis	Significant	T-value	Assumption of hypothesis
H1a	Yes	2.233	Supported
H1b	Yes	3.785	Supported
H1c	Yes	3.270	Supported
H1d	Yes	4.254	Supported
H2	No	1.900	Not Supported
H3a	Yes	5.967	Supported
H3b	Yes	2.134	Supported
H4	Yes	17.680	Supported

As being hypothesized, technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, and innovative differentiation strategy positively influence the sophistication of AIS design. Similarly, as being hypothesized AIS design is positively associated with perceived IT benefits. However, environmental condition did not seem to influence the sophistication of AIS design.

Results show that, cost leadership has the biggest effect between contingency factors on AIS design followed by managerial, informational, functional, technological sophistication, innovative differentiation strategy.

4.16 SUMMARY

In summary, a very good response rate was achieved (82.72%). For the survey, the test of non-response bias also demonstrated that there is no statistically significant difference between early and late response. As a result of that, the issue of non-response bias did not significantly affect the generalization of the findings of this study. Factor analysis was conducted in order to test the construct validity of for all interval scale variables; Reliability was also tested for all interval scale variables to see how free it is from random error. Further, the researcher tested the assumptions of normality, linearity, and homoscedasticity and the results show that the assumptions were generally met. Standard multiple regression was conducted in order to investigate the relationships between contingency factors and sophistication of AIS design, and linear regression was conducted to investigate the relationship between AIS design and IT benefits. All independent variables except environmental conditions were found to positively contribute to the sophistication of AIS design, which in turn influence perceived IT benefits.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

The overall purpose of this study has been to understand the relationships between seven contingency factors and AIS design, and subsequently the relationship between sophistication of AIS design and IT benefits among Jordanian listed companies. This final chapter presents the discussions of the findings related to the relationships between seven contingency factors and AIS design, and subsequently the relationship between AIS design and IT benefits among Jordanian listed companies. To this end, the chapter starts with the recapitulation of the study followed by the study's hypotheses. Implications of the study from both theoretical and practical perspectives are also explained in detail. Finally, the limitations, and suggestions for future research, and the overall conclusions are discussed.

5.2 SUMMARY AND CONTRIBUTION OF RESEARCH FINDINGS

In general, this study has focused on the following questions: (1) What is the relationship between technological sophistication and AIS design? (2) What is the relationship between informational sophistication and AIS design? (3) What is the relationship between functional sophistication and AIS design? (4) What is the relationship between managerial sophistication and AIS design? (5) What is the relationship between environmental condition and AIS design? (6) What is the relationship between cost leadership strategy and AIS design? (7) What is the relationship between innovative differentiation strategy and AIS design? and (8) What is the relationship between AIS design and IT benefits? In the following section, each of these issues is discussed in further detail in term of existing knowledge and the contribution of the findings in furthering understanding in the area.

5.2.1 Information Technology Sophistication and AIS Design (H1)

There has been limited research on IT sophistication issue especially in large size companies in the developing countries, particularly in Jordan. This study focused on Jordan, as an example of developing country, to address the lack of attention given to the IT sophistication issue. The study adopted the Rayamond and Pare's (1992) IT sophistication multi-dimensions namely technological, informational, functional, and managerial sophistication. There have been many criterion variables to reflect the four dimensions of IT sophistication. This study has chosen a variety of IT used to measure technological sophistication, while applications portfolio was used to measure informational sophistication. User participation in IS development was used to reflect the functional sophistication, and top management planning in IS development was used to measure the managerial sophistication as explained in details in next four sections.

5. 2.1.1 Technological Sophistication and AIS Design (H1a)

To recap, this study chose a variety of IT used (i.e. office support systems, DSS, and ERP) in Jordanian listed companies to measure technological sophistication. The results demonstrate that the Jordanian listed companies have reached maturity in technological sophistication. For example, 93.3% of the Jordanian listed companies use office support systems and 86.1% of the Jordanian listed companies use DSS. Furthermore, 82.8% of these companies are connected to LAN. In general, about two-third of the Jordanian listed companies have adopted five or more IT technologies (66.7%), indicating that there is relatively high level of technological sophistication among the Jordanian listed companies.

In examining the hypothesis related to the relationship between technological sophistication and AIS design, it was found that there is a significant and positive relationship between technological sophistication level and AIS design. The result implies that companies that invested in sophisticated technologies such as office support systems, DSS, and ERP would have more sophisticated AIS design and thus are more capable in generating sophisticated and contemporary accounting information.

The result is consistent with previous studies such as Chang et al.'s (2002) who found that IT plays a vital role in organizational successes. Doms et al. (2004), also found a strong relationship between investment in IT and productivity growth. They found that a high level of technological sophistication will help the organization to generate capable information. Similar result was also revealed by Nir et al. (2006) when they found a significantly positive relationship between increased levels of IT use and different measures of financial performance. Lim (2006) also demonstrated that careful selection of IT aligned with competitive position would increase organizational value. In addition, Wu et al. (2006) found that IT-enabled supply chain capabilities can work as a motivation in transforming IT-related resources into higher value for a company. In this vein, the present study recommends that Jordanian listed companies increase their investments in advanced type of technologies to improve AIS design.

5. 2.1.2 Informational Sophistication and AIS Design (H1b)

To recapitulate, this study used computer applications (i.e. activity-based costing system, order entry system, balanced scorecard, and inventory system) implemented in Jordanian listed companies to reflect informational sophistication. The study has used Raymond and Pare's (1992) measurements in order to gauge the informational sophistication level at the Jordanian listed companies. The results show that the Jordanian companies have reached maturity in informational sophistication. For example, more than 90 per cent of the companies are using basic accounting applications such as accounts payable (94.4%), accounts receivable (93.9%), and general ledger (92.8%) and about two-third of them are using more advanced applications such as order entry, budget variances, production variances, budgeting, production planning and control, and activity-based accounting. In general, almost two-third of the companies adopt between 16 and 20 applications (63.4%), indicating that many companies in Jordan have a high level of informational sophistication.

In examining the hypothesis related to the relationship between informational sophistication and AIS design it was found that there is a significant and positive relationship between informational sophistication level and AIS design. The result implies that companies with more sophisticated computer applications would have more sophisticated AIS design since usage of advanced applications such as modelling would help the companies to generate useful information for making business decisions. This result is consistent with those demonstrated by previous studies (e.g. Hatzithomas et al., 2007; Spraakman, 2005; Targowski & Tarn, 2007; Wo-Chung et al., 2007). Therefore, this study recommends that Jordanian listed companies increase their level of investments in more advanced type of computer applications to improve their AIS design.

5.2.1.3 Functional Sophistication and AIS Design (H1c)

This study adopted user participation in IS development (i.e. participation in developing applications, elaboration of development schedule, and training new users on available systems) in Jordanian listed companies to reflect functional sophistication. This study used the instrument of Raymond and Pare's (1992) to measure the functional sophistication level at the Jordanian listed companies. The results show that the Jordanian companies have moderately reached the functional sophistication. For example, many companies have involved users to participate in most of IS developments activities such as training them about the available systems (mean = 3.83), and planning (mean = 3.74) indicating that many companies in Jordan have moderate level of functional sophistication.

In examining the hypothesis related to the relationship between functional sophistication and AIS design it was found that there is a significant and positive relationship between functional sophistication level and AIS design. The result implies that companies that encourage users' participation, in which users refer to accountants in the context of this study, in IS implementation would have more sophisticated AIS design. The possible explanation is that an accountant being the advisors of the company's financial and non-financial activates can help IT team to design a system that is able to meet the requirements of users from at both operational and strategic levels. This result is in line with previous studies' findings (i.e. Raymond & Pare, 1992; Jarvenpaa, and Ives 1991; Wo-Chung et al., 2007). For example, Wo-Chung et al. (2007) found that companies with higher participation in IS activities are more likely to adopt a formal IT benefits realization methodology. Since the findings of this study have shown that companies with high participation in IS development are more likely to reflect sophistication in AIS design, this study recommends that Jordanian listed companies increase and encourage users to participate in IS development to further improve the AIS design.

5.2.1.4 Managerial Sophistication and AIS Design (H1d)

To recap, this study has used Raymond and Pare's (1992) instrument to measure managerial sophistication in the Jordanian listed companies. The level of IS planning by top management (i.e. financial resources planning, human resources planning, information requirement planning, implementation planning, confirmatory with the company goals, and post implementation planning) is used to measure managerial sophistication. The results demonstrate that the Jordanian listed companies have moderate managerial sophistication in IS planning. For example, the level of planning in post implementation is observed at the mean value of 3.95. Other levels of IS planning record mean values ranging from 3.5 to 4.0.

In examining the hypothesis related to the relationship between managerial sophistication and AIS design it was found that there is a significant and positive relationship between managerial sophistication level and AIS design. The result implies that companies that encourage top management in planning of IS development planning would have more sophisticated AIS design because they can help IS designers to design a system that is able to meet the requirement of the user's need for information. The result is consistent with the findings reported by previous studies such as Kanungo and Chouthoy (1998) who found that when organizations do not use IT effectively and do not develop and implement strategies to use IT for both incremental as well as radical organizational improvements, they are not likely to experience significant IT-related benefits. More recently, Karimi, Somers, and Gupta (2001) found that the IT-leader firms have a higher level of IT management sophistication and a higher role of IT leaders compared to IT-enabled customer focus, IT-enabled operations focus, and IT-laggard firms. Similarly Wo-Chung et al. (2007) found that firms with high sophistication in managerial perspective are more likely to obtain better organizational performance. Because high level of managerial sophistication is more likely to reflect a more sophisticated AIS design, this study suggests that Jordanian listed companies increase the level of planning in IS development between top management to improve the design of AIS.

5.2.2 Environmental Conditions and AIS Design (H2)

This study has adopted Khandwalla's (1977) instrument to measure the environmental conditions in the Jordanian listed companies. The relationship between Jordanian listed companies and their external environment (i.e. actions of the competitors, changes in marketing practices that have to be adopted to remain competitive, rate of technological evolution in the same industry and the legal, economical, and political constraints surrounding the company) was used to measure the effect of environmental conditions on AIS design. In this study, the descriptive analysis shows that many Jordanian listed companies tend to perceive that the environmental conditions in Jordan are moderate (mean = 2.86).

In examining the hypothesis related to the relationship between perceived environmental conditions and AIS design, no significant relationship exists between perceived environmental conditions level and sophistication of AIS design. The result implies that conditions of the Jordanian environment such as competitors action, marketing practices, and the legal, economical, and political constraints do not influence companies' decisions regarding the sophistication of AIS design. Theoretically speaking, in intense environment companies require more information and hence more sophisticated AIS design to help them survive. However, within the context of Jordan, it appears that the environmental conditions there do not influence or affect the companies' AIS design. This may be because the sophistication of IT design currently adopted by Jordanian companies has enabled them to generate sufficient information irrespective of the conditions of the environment.

5.2.3 Business Strategy and AIS Design (H3)

Many studies have investigated business strategy issues on companies performance (Paopun, 2000; Porter, 1980, 1985). Based on the typology originally proposed by Porter (1980, 1985) and following Paopun, this study has employed two strategies (cost leadership, and innovative differentiation) to represent the business strategies used by Jordanian listed companies. Porter (1980, 1985) classified strategies into three categories, namely, cost leadership, innovative differentiation, and focus. Paopun (2000) adopted two of Porter's strategies (cost leadership and innovative differentiation) to measure business strategy in accordance to contemporary studies which have shown evidence that companies practicing such a "hybrid strategy" are more successful. In other words it is argued that the successful combination of these two strategies will result in sustainable competitive advantage.

5.2.3.1 Cost Leadership Strategy and AIS Design (H3a)

To recapitulate, this study used Porter's typology to measure cost leadership strategy. The items developed by Porter such as cost of good sold/sales, and selling, general, and administrative cost/sales were used to represent cost leadership strategy employed by Jordanian listed companies. The results show that the Jordanian listed companies moderately implemented cost leadership strategy over the last five years (mean = 3.79). For example, the result shows a favourable orientation toward cost of good sold strategy amongst Jordanian listed companies (mean = 3.91) and moderate attitude toward operational expenses strategy (mean = 3.67).

In examining the hypothesis related to the relationship between cost leadership strategy and AIS design it was found that there is a significant and positive relationship between cost leadership strategy and AIS design which is consistent with previous studies' findings. For example, Chang (2001) found that when a company pursues cost leadership strategy, the higher degree of aggregation information will improve its operation procedure. In other words, when a company implements a cost leadership strategy, it will attempt to reduce costs through the whole business process from manufacturing to the final stage of selling the product and any processes that do not contribute towards minimization of cost base will be outsourced to other organizations with the view of maintaining a low cost base and this will lead to cost efficiency which in turn will enable the company to design sophisticated AIS (Akan et al., 2006). Since it is shown here that cost leadership strategy will facilitate toward a sophisticated AIS design, the present study suggests that Jordanian listed companies should employ this strategy more to help them improve their AIS design.

5.2.3.2 Innovative Differentiation and AIS Design (H3b)

This study used Porter's typology to measure innovative differentiation strategy. Research and development expenses/sales were used to represent the innovative differentiation strategy in Jordanian listed companies. The results show that the Jordanian listed companies have a moderate attitude toward innovative differentiation strategy over the last five years with mean value (3.77).

In examining the hypothesis related to the relationship between innovative differentiation strategy and AIS design it was found that there is a significant and positive relationship between innovative differentiation strategy and AIS design which is consistent with previous studies' findings. For instance, Chang (2001) noted that, based on his study, when a company pursues innovation differential strategy, AIS should provide more timely information. Since the present study has revealed that innovative differentiation strategy is more likely to produce a sophisticated AIS design, it recommends that Jordanian listed companies maintain their employment of innovative differentiation strategy to help improve the design of AIS.

5. 2.4 AIS Design and IT Benefits (H4)

This study has used Chenhall and Morris's (1986) typology to measure AIS design. Items such as automatic receipt, frequency of reporting, future events, non-economic information, temporal reports, speed of reporting, and non-financial information that relates to production were used to represent the AIS design in Jordanian listed companies. Furthermore, the study has adopted a comprehensive measure (i.e. systems quality, organizational impact, information use, information quality, and user satisfaction) developed by Al-Mushayt (2000), which was based on the concept introduced by DeLone and McLean (1992), to measure IT benefits. The results show that in general the Jordanian listed companies have moderate availability of accounting information characteristics generated by computer-based IS(mean = 3.55).

In examining the hypothesis related to the relationship between AIS design and IT benefits it was found that there is a significant and positive relationship between AIS design and IT benefits. The result implies that companies with more sophisticated AIS design would derive greater benefits than those companies with less sophisticated AIS design. This finding is consistent with the findings reported by previous studies such as by Chenhall and Morris (1986). Previous studies that have adopted Chenhall and Morris' (1986) instruments such as Gul (1991), Gul and Chia (1994), and Ismail and King (2005, 2006) found that the availability of AIS information assumed to have helped in making better business decisions which in turn improve IT benefits. As mentioned before, Jordanian listed companies that have a sophisticated AIS design (high availability of information characteristics) are more likely to get greater IT benefits. Therefore, this study suggests that Jordanian companies need to improve their AIS design so that they can reap the most possible benefits from the use of IT.

5. 3 IMPLICATIONS FOR RESEARCH

The implications of this research for current and continuing research efforts within accounting, IS, and large size of companies can be divided into methodological issues and theoretical issues. Methodological issues are concerned with the implications of the research design on future empirical efforts, while theoretical issues are concerned with the specific implications of the research's findings for existing theory related to accounting, IS, and large size of companies.

5. 3.1 Methodological Issues

Apart from theoretical contribution, this study also contributes to the methodological perspective. The methodological contributions for this study are discussed below:

5. 3.1.1 Validation of the Measurement of IT Sophistication

Many previous studies have examined the IT sophistication or IT maturity with performance by using the technological sophistication in order to reflect the IT sophistication. Raymond and Pare (1992) used four dimensions of IT sophistication; technological, informational, functional, and managerial sophistication in SMEs context. In this study, the researcher adapted Raymond and Pare (1992) instruments to measure the effect of IT sophistication in Jordanian large size companies on AIS design which consider methodological contribution for this study for validation of the

IT sophistication instrument in developing countries and large size context. The Cronbach's alpha statistic for overall scale of functional sophistication variable was (0.823), and (0.833) for managerial sophistication variable, which generally accepted as representing high reliability (Hair et al., 2006). As hypothesized, results from this study reveal that all four dimensions of IT sophistication (technological, informational, functional, and managerial sophistication) are important in determining the sophistication of AIS design.

5. 3.1.2 Validation of the Measurement of Environmental Condition

Many studies adopted Khandwalla (1977) instruments to examine the effect of uncertainty environment or environmental conditions on AIS design (e.g. Miller and Droge, 1986; Paopun, 2000). Khandwalla (1977) operationalized environmental uncertainty; the degree of change and unpredictability in the firm's markets, competitors, and production technology. In this study, the instrument was tested in large companies in developing country (Jordan context). After pre-testing the instrument with Jordanian listed companies, six questions related to the degree of change and unpredictability in the firm's markets, competitors, production technology, and legal, economical, political constraints surrounding the companies were extracted to reflect environmental conditions. The Cronbach's alpha statistic for overall scale of environmental conditions variable was 0.860, and generally accepted as representing high reliability (Hair et al., 2006). While this study failed to find support for the relationship between environmental conditions and AIS design in Jordan, the instrument can be used for further studies in other developing countries.

5. 3.1.3 Validation of the Measurement of Business Strategies

Many studies adopted porter's (1980) strategy typology to identify organisational strategic choice where respondents were asked to choose a case that most reflect their strategy (e.g. Chang, 2001). Others used Likert-type or semantic differential scale to identify the strategic choice (Paopun, 2000). This study chose Likert-type scale to identify the two popular strategies of the sample companies, which are cost leadership strategy and innovative differentiation strategy. This study has included limited aspects of strategy measures as reflected in the typology. After pre-testing the instrument with Jordanian listed companies' accountants, two questions related to operational expenses over sales were used to reflect cost leadership strategy, and one question related to research and development expenses over sales was used to reflect the innovative differentiation strategy. Respondents were asked to indicate using a five-point scale the extent to which their companies' business strategies incline to one or other statements. The Cronbach's alpha statistic for overall scale of cost leadership strategy variable was 0.867, and generally accepted as representing high reliability (Hair et al, 2006). Results of this study indicate that both strategies influence the sophistication of AIS design. The instruments are validated and can be used in further studies in other developing countries.

5. 3.1.4 Validation of the Measurement of AIS Design

Many studies adopted Chenhall and Morris (1986) four dimensions instruments to measure AIS design in developed countries at large business context. However, the instruments used to measure AIS design in the context of developing countries such as Jordan are limited and often restricted to conventional financial statement frameworks. In addition, previous studies validated the Chenhall and Morris's instruments as four dimension; scope, aggregation, integration, and timeliness. This study tested and validated the 19 information characteristics as one concept (AIS design) not into four dimensions. The Cronbach's alpha statistic for overall scale of AIS design variable was 0.774 which is generally accepted and representing a high reliability (Hair et al., 2006). The instrument can be used in further studies in other large business context in developing countries.

5. 3.1.5 Validation of the Measurement of IT Benefits

A number of IS researchers have adopted DeLone and McLean's (1992) model to identify IS successes (Ballantine et al., 1996; Seddon, 1997; Myers et al., 1997). Ballantine et al. (1996) describe DeLone and McLean's model as 'one of the more complete and better known'. While other researchers have adopted the model on a piecemeal basis, Al-Mushayt (2000) represents the first attempt to validate DeLone and McLean's model as a summated measure for the overall IT success. The results of the study indicated that the model is valid, unidimensional, and reliable and can be summated. Following Al-Mushayt (2000), this study adopted and validated DeLone and McLean's model to represent perceived IT benefits among Jordanian listed companies which consider a methodological contribution for future studies. While the DeLone and McLean's model has been validated in developed countries, this study validated it developing context. In addition, future study can use the overall IT benefits as a unidimensional and reliable variable. The Cronbach's alpha statistic for overall IT benefits variable was 0.800, and generally accepted as representing high reliability (Hair et al, 2006). The instrument can be used in further studies in other developing countries.

5.3.2 Theoretical Contribution

This study has expanded on the following theoretical issues:

5.3.2.1 Contingency Theory and AIS Design

Many studies have examined the impact of contingency factors on the sophistication of IT or AIS design. However, very little is known about the relationship between IT and AIS design. According to information processing theory which originated from contingency theory, IT can be treated as a one of the contingency factors that can influence AIS design. The reason is that information requirements (represented by AIS design) must be aligned with information processing capacity (represented by IT) to have an impact on performance. Furthermore, previous studies have treated IT as a undimensional variable. This study fills in this gap by investigating simultaneously the impact of IT and other contingency factors on AIS design and its subsequent impact on IT benefits. The results suggest that all factors, except environmental conditions, influence the sophistication of AIS design. More importantly, cost leadership strategy appears to be the most important factor. Furthermore, managerial and informational IT sophistication appear more important than functional and technological IT sophistication in influencing AIS design. Future studies could test the model in other contexts or other cultures.

5.3.2.2 AIS Design and IT Benefits

Many previous studies have investigated the issues of AIS design and the extent of availability or extent of importance of these accounting information generated by computer-based IS. However, no attempt has been made to examine the impact of AIS design on the benefits of IT. This study has covered this gap by investigating the effects of the extent of availability of accounting information generated by computer-based IS on IT benefits. The argument is that sophisticated AIS design enables companies to generate various types of information to make a business decisions and thus enhance the benefits from IT implementation.

5.4 IMPLICATION FOR PRACTICE

5. 4.1 The Importance of IT Sophistication

This study has demonstrated that companies with sophisticated IT are more likely to generate better information characteristics such as scope, integration, timeliness, and aggregation for better decision making purposes. IT sophistication is divided into four dimensions namely technological support, informational content, functional support, managerial practices. Companies with a high variety of technologies, high and advanced computer applications, high level of participation between accountants to develop IS, and high level of planning are more likely to get many benefits especially in context of AIS design. Importantly, companies need to give priority to the managerial and informational aspects of IT implementation as they influence AIS design more than functional and technological aspects.

5.4.2 The Importance of Certainty Environmental Conditions

Unlike previous studies, this study did not find support for the relationships between environmental conditions and AIS design. This may be due to the fact that many Jordanian companies are quite sophisticated in their IT adoption. With sophisticated IT adoption companies are able to generate information irrespective of the conditions of the environment. Furthermore, those with less sophisticated IT may not be able to increase the sophistication of their AIS design in short term as it would require large IT investments.

5.4.3 The Importance of Advantageous Business Strategies

This study has demonstrated that companies pursuing either cost leadership or innovative differentiation strategies are more likely to obtain more sophisticated AIS design. The reason is probably due to the fact that both strategies require greater information for decision makers to make decisions. For example, costing information is important for those pursuing cost leadership strategy, while market information and product is important for those pursuing innovative differentiation strategy.

5.4.4 The Importance of Sophistication in AIS Design

This study has demonstrated that companies that achieved sophistication in AIS design are more likely to generate greater IT benefits. The reason is probably due to the fact that the various types of accounting information enhance the benefits from IT such as high levels of systems quality, high levels of information quality, useful information use, reaching to user satisfaction, positive individual impact and positive organizational impact. This then contributes to superior performance and supports decision making (El Louadi, 1998; Huber, 1990). In other words, companies with high level of availability in information characteristics are more likely to obtain greater IT benefits than those that are not. As asserted by Vaassen (2002), the role of AIS has been extended to the preparation of necessary reports to many users within the organization. Furthermore, Vaassen stated that the modern AIS nowadays allows all company users to present all types of information needed by different administrative levels in planning, control and management decisions which consider AIS as the fundamental system within the company (Vaassen, 2002). Normally, all administrative levels need comprehensive data and numerous data from different systems (Eldahrawi & Mohammed, 2000). Therefore, sophisticated AIS design can meet these requirements for the entire company users. In conclusion, AIS is considered an important factor in the accomplishment of greater performance especially in facilitating decision making process. Accordingly, these results may consider as a suggestion for Jordanian companies to take into account the greater effect of contingency factors on sophistication AIS design.

5.5 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

In evaluating the findings for this study, it is important to shed light upon the results with considering the following limitations.

There are number of limitations that need to be addressed in future research. Firstly, the sample is only from the Jordanian listed companies at Amman Stock Exchange (2008) and thus may not represent all of the companies working in Jordan. Furthermore, the sample of the study consists of 182 companies that responded to the survey, and this may affect the generalizability of the findings.. However, in this study, the response rate of 82.72 per cent obtained is relatively good for survey studies, and all observed findings are consistent with the results from previous studies involving larger-sized samples. Such consistency apparently suggests that validity and reliability of these findings are not adversely affected by the size of the sample, and hence there is no reason to believe that the generalization of these is seriously threatened. However, it is recommended that future researches should attempt to incorporate a larger sample size including those not listed at ASE to increase generalizability of the results. Furthermore, future studies may want to consider foreign companies working in Jordan which are not covered here. Furthermore, future studies could examine the relationship presented in this study to see if it is also applicable to the other developing countries.

Secondly, it is important to note that this study is correlational in nature. This means that causality should not be inferred. The study does not in any way suggest that for example AIS design is "caused" by managerial sophistication. Indeed, it is also possible that AIS design affects managerial sophistication. But since the time order of events has been established through the literature, the influence of managerial sophistication on AIS design is acceptable.

Thirdly, this study is cross-sectional in nature. This means that changes over time that occur in the process of designing and implementing AIS design is not captured. In order to understand the dynamics of change that take place when AIS is being designed and implemented, longitudinal studies may be adopted by future researchers intending to investigate the extent of IT benefits actually experienced by users in the organization.

Fourthly, this study only examines the relationships between contingency factors and AIS design and the subsequent effect on IT benefits. Future research should examine other factors that may affect the sophistication of AIS design such as organizational structure.

The fifth limitation related to potential "self-reporting bias". This is a common problem when collecting data from the companies regarding their assets or other confidential information such as business strategies, and IT-related matters that are of concern to them. It is also difficult to identify the level of appropriate and benefits of the IT. Furthermore, most of the existing literatures on IT are only confined to a specific technological sophistication not other disciplines. This limitation may have affected the findings since it is based on survey data and may be subject to disclosure desirability bias. However, disclosure desirability bias (consciously or unconsciously the respondent wishes to create a favourable impression), agreement bias (the respondent tends to agree with all questions), and deliberate falsification are common types of respondent error in survey studies (Zikmund, 2000).

The researcher considers that there is greater scope for further research in the issue of contingency factors on AIS design and its subsequent impact on IT benefits. Nevertheless, despite the limitations of single-period data and a relatively small sample, the researcher considers that the results of this study have provided useful insight into the evaluation of the relationship between contingency factors on AIS design and its subsequent impact on IT benefits in the Jordanian context and it provides a starting point for future research. Eventually, the understanding the importance of studying the relationships between contingency factors and AIS design, and the consequent effect on IT benefits, findings of this study along with its limitations paved the way for future research in IS and accounting areas. Considerable related issues are waiting for investigation.

Future research in the area of IS and accounting can be extended in a number of directions. Firstly, it can investigate other contingency factors that may affect the extent of availability of accounting information characteristics in Jordanian companies context and other countries as well. Secondly, it can investigate other factors that may affect IT benefits. Thirdly, it can investigate the direct impact of IT sophistication by its four dimensions on companies' performance both financial and non-financial in the context of Jordanian companies and other countries.,

Fourthly, it would be interesting to conduct the research using other approach such as qualitative as it may give better in depth knowledge of the issues discussed in this study. In addition, it would be interesting to conduct the research in other countries. Longitudinal approach is also important as the perception and management of benefits and constraints is likely to change over time. Alternatively, this study could be replicated in a few years' time to examine how AIS design and IT benefits have changed and are being managed in light of new or emerging technologies or new environmental conditions.

5.6 CONCLUDING REMARKS

This thesis has examined eight hypotheses concerning the relationship between contingency factors and AIS design, and the subsequent effect on IT benefits in the specific context of large companies in Jordan. It has made an important contribution by providing an increased understanding of AIS design in large size of companies and IT benefits, which has received little attention in the literature. It has used multiple regression to test the first seven hypotheses related to the relationship between contingency factors and AIS design, and linear to test the relationship between AIS design and IT benefits. It appears that there is a positive and significant relationship between technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy and AIS design. It further reveals a positive and significant relationship between the subsequent effects of AIS design on IT benefits. But the study did not find any significant relationship between environmental condition and AIS design.

Overall the evidence suggests that the major factors that influence AIS design among the sample companies are technological sophistication, informational sophistication, functional sophistication, managerial sophistication, cost leadership strategy, innovative differentiation strategy. Further AIS design seemed to be related to IT benefits. Even though the evidence has generally supported the hypotheses that the factors identified in the present study can influence AIS design (except environmental conditions) and that AIS design can affect IT benefits, more research needs to be carried out to examine other factors that can possibly have an effect on AIS design and subsequent IT benefits so that our understanding of the issue of AIS design and IT benefits can be further enhanced.

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APPENDIX A:

QUESTIONNAIER TO ACCOUNTANTS OF JORDANIAN LISTED COMPANIES

QUESTIONNAIRE

Contingency Factors, Accounting Information Systems Design and Information Benefits among Jordanian Companies

Dear sirs/madams,
This questionnaire was designed to investigate the relationship between contingency factors, accounting information systems design and information technology benefits among Jordanian companies in partial fulfilment of the requirements for the degree of doctoral of philosophy in accounting information systems at University Utara Malaysia (UUM). It is hope that the results will contribute to knowledge available to technical and accounting departments' mangers of those companies. Therefore, we would like you to spend a little time (approximately 20 minutes) answering questions related to mentioned title above. Your answers are very important to the accuracy of our study.

Would you like a copy of the summary of the results of this research?

☐ Yes ☐ No

If **YES**, please supply a name and address below (or attach a business card):

Name ....
Position ....
Address ....

INFORMATION GATHERED WILL BE KEPT STRICTLY CONFIDENTIAL

Please return the completed questionnaire using the self-addressed envelope enclosed at your earliest possible convenience.

Thank you for your help

Mahmoud Mohammad Ahmad Al-Eqab

E-mail: aleqab740@yahoo.com

SECTION A: COMPANY PROFILE

The researcher is seeking some information about your company. Thus, the researcher can understand your decisions related to information systems implementation and accounting systems design. ***(Please tick an appropriate box)***

1. In which industry does your company belong to?

- ☐ Financial Sector such as; Banks, insurance, Diversified Financial Services, Real Estate.

- ☐ Services Sector such as; Commercial Services, Utilities and Energy, Media, Technology and Communications, Transportation, Hotels and Tourism, Educational Services, Health Care Services.

- ☐ Industrial Sector such as; Pharmaceutical and Medical Industries, Glass and Ceramic Industries, Textiles, Leathers and Clothing, Electrical Industries, Engineering and Construction, Mining and Extraction Industries, Tobacco and Cigarettes, Food and Beverages, Printing and Packaging, Paper and Cartoon Industries, Chemical Industries.

2. In which year was the company established? ……….

3. Does your company use computers?

- ☐ Yes If your answer is **YES**, please move to the next section.
- ☐ No If your answer is **NO**, you may stop now and please return the questionnaire in the self addressed envelope.

SECTION B: IT SOPHISTICATION

We would like some information about your computer-based information systems so that we can understand better your decisions related to information systems implementation.

4. In what year did your company first implement a computer-based system? ....

5. Included below is a list of information technologies which can be found in your company. Please tick the technologies presently used by your company.
(You may tick one or more boxes if appropriate)

- ❑ **Office Support System**
  (These applications include word-processing, graphics, and presentation packages)

- ❑ **Decision Support System**
  (These applications include spreadsheets and similar)

- ❑ **Database System**
  (These applications include personnel and other non-accounting systems)

- ❑ **Accounting System**
  (These applications include payroll, receivables, payables, general ledger, order entry and billing)

- ❑ **Enterprise Resource Planning (ERP) System**
  (A system that integrates all data from various departments across an organization onto a single computer system that can serve all those departments particular needs. It includes Material requirement planning 'MRP' systems and financial requirement planning 'FRP')

- ❑ **Supply Chain Management (SCM) System**
  (A cross-functional inter-enterprise system that supports and manages the links between company's key business processes and those of its suppliers, customers, and business partners, including third-party logistic providers in order to effectively control and arrange the movement of materials and finish products)

- ❑ **Customer Relationship Management (CRM) System**
  (A system that capture, store and analyze customer information in order to provide the right products and services at the right time, in the right

combination, at the right price, and through the right channel in order to satisfy the customer)

- ❑ **Local Area Network (LAN)**
  (Communication system which interconnects computers within an organization, e.g local e-mail, application and data sharing)

6. among the following computer applications, please tick the applications presently implemented in your company. ***(You may tick one or more boxes if appropriate)***

❑ General ledger	❑ Cost accounting
❑ Accounts receivable	❑ Financial accounting
❑ Accounts payable	❑ Financial analysis
❑ Billing	❑ Budgeting
❑ Order entry	❑ Project management
❑ Purchasing	❑ Production variances
❑ Inventory	❑ Budget variance
❑ Production planning and control	❑ Modelling
❑ Payroll	❑ Personnel management
❑ Activity-based costing	❑ Balanced scorecard

7. Please indicate the level of your participation in the following stages of information systems development, using a five-point scale from 1 = no participation to 5 = high participation.

Participation in information systems planning	1	2	3	4	5
Participation in develop applications	1	2	3	4	5
Elaboration of development schedule	1	2	3	4	5

Elaboration of development budget	1	2	3	4	5
Participation as an active members of system development	1	2	3	4	5
Train new users on available systems	1	2	3	4	5

8. Please indicate the level of planning in the following stages of information systems development, using a five-point scale from 1 = no plan to 5 = highly planned.

Financial resources planning	1	2	3	4	5
Human resources planning (e.g. manpower and training)	1	2	3	4	5
Information requirement planning	1	2	3	4	5
Implementation planning (e.g. software development, installation and conversion)	1	2	3	4	5
Confirmatory with the company goals	1	2	3	4	5
Post implementation planning (e.g. operation, maintenance and future IT needs)	1	2	3	4	5

SECTION C: BUSNIESS STRATEGY

9. Please indicate, using the scales below, what is the position of your firm vis-à-vis your leading competitors over past five years, regarding:

a. Cost leadership

	Very high	High	same	low	Very low
Cost of good sold/sales	1	2	3	4	5
Selling, general, and administrative cost/sales	1	2	3	4	5

b. Innovative differentiation

	Very low	low	same	High	Very high
Research and development expenses/sales	1	2	3	4	5

SECTION D: ENVIRONMENTAL CONDITION

10. We are interested in your company's relationship to its external environment. Please rate the characteristics or behaviour of various sectors on the following 5-point scale.

	Unpredictable			Easy to predict	
The actions of your competitors are…	1	2	3	4	5
	Unpredictable			Easy to predict	
The demand for your product is…	1	2	3	4	5
	Very frequently			Very rarely	
To remain competitive, your firm must change its marketing practices…	1	2	3	4	5
	Very rapid			Very slow	
The rate of technological evolution in your industry is…	1	2	3	4	5
	Very dissatisfied			Very satisfied	
Your satisfaction about the number of new products and services has been marketed during the past 5 years in your company...	1	2	3	4	5
	Strongly disagree			Strongly agree	
The legal, economical, and political constraints surrounding your company have remained about the same…	1	2	3	4	5

SECTION E: ACCOUNTING INFORMATION SYSTEMS DESIGN

11. The following statements help us understand the availability of information in your organization. The scales attempt to measure the extent to which your computer-based systems provide each of the characteristics of information identified.

(Please circle an appropriate number on each side of the statement)

Information characteristics	**Not available**			**Extensively available**	
Information that relates to possible future events such as future trends in sales, profits, expenses, cash flow etc.	1	2	3	4	5
Non-economic information such as customer preferences, employee attitudes, attitudes of government and consumer bodies, competitive threats etc.	1	2	3	4	5
Information on broad factors external to your firm such as economic conditions, population growth, technological changes etc.	1	2	3	4	5
Non-financial information that relates to production information such as output rates, scrap levels, machine efficiency, employee absenteeism etc.	1	2	3	4	5
Non-financial information that relates to market information such as market size, growth share etc.	1	2	3	4	5
Sectional reports, information provided on the different sections or functional areas in your firm such as marketing and production, or sales, cost or profit centres.	1	2	3	4	5
Temporal reports, information on the effect of events on particular time periods such as monthly/quarterly/annual summaries, trends, comparisons etc.	1	2	3	4	5
Effects of events on functions, information that has been processed to show the influence of events on different functions, such as marketing or production associated with particular activities or tasks.	1	2	3	4	5
Decisional models, information in formats suitable for input into decision models such as discounted cash flow analysis, incremental or marginal analysis, inventory analysis, credit policy analysis etc.	1	2	3	4	5
Information in forms that enable you to conduct "what- if" analysis.	1	2	3	4	5
Summary reports-sections, information on the effect of different sections' activities on summary reports such as profit, cost, revenue reports for other sections.	1	2	3	4	5

Summary reports-organization, information on the effect of different sections' activities on summary reports such as profit, cost, revenue reports for the overall firm.	1	2	3	4	5
Sub-unit interaction, information on the impact that a decision will have throughout the firm, and the influence of other individuals' decisions on other area of responsibility.	1	2	3	4	5
Precise targets for the activities of all sections within the firm.	1	2	3	4	5
Organizational effect, information that relates to the impact that decisions have on the overall performance of the firm.	1	2	3	4	5
Speed of reporting, i.e. requested information to arrive immediately upon request.	1	2	3	4	5
Automatic receipt, i.e. information supplied automatically upon its receipt into information systems or as soon as processing is completed.	1	2	3	4	5
Frequency of reporting, i.e. reports are provided frequently on a systematic, regular basis such as daily reports, weekly reports etc.	1	2	3	4	5
Immediate reporting, i.e. there is no delay between an event occurring and relevant information being reported.	1	2	3	4	5

SECTION F: INFORMATION TECHNOLOGY BENEFITS

12. The following statements aim to assess the level of success of your computer-based systems. ***(Please circle the most appropriate number on the scale ranging from to 1= strongly Disagree to 5= strongly agree).***

Our computer-based system achieves………	**Strongly disagree**		**Neutral**	**Strongly agree**	
High levels of Systems Quality (e.g. system reliability, features and functions, response time)…	1	2	3	4	5
High levels of Information Quality (e.g. information clarity, completeness, usefulness, accuracy)…	1	2	3	4	5
High levels of Information Use (e.g. regularity of use, number of enquiries, duration of use, and frequency of	1	2	3	4	5

reports requests)…					
High levels of User Satisfaction (e.g. overall satisfaction, enjoyment, difference between information needed and received, software satisfaction)…	1	2	3	4	5
High degree of positive Individual Impact (e.g. design effectiveness, problem identification, improved individual productivity)…	1	2	3	4	5
High levels of positive Organizational Impact (e.g. contribution to achieving goals, cost/benefit ratio, overall productivity gains, and service effectiveness)…	1	2	3	4	5

SECTION G: PERSONAL INFORMATION

13. What is your current position in the company?

- ❑ Chief Executive Officer
- ❑ Senior manager
- ❑ Manager
- ❑ Accountants

14. How long have you been in this position? ………. Years

15. How long have you been with the company? ………. Years

16. Your gender:	❑ Male	❑ Female

17. Your age range is:

❑ 20-29 years	❑ 30-39 years
❑ 40-49 years	❑ 50 years and above

18. What is the highest level of education you have completed? Please make score around the right answer.

❑ Diploma	❑ Bachelor's degree
❑ Master degree	❑ Other (please specify) ………

Note: Please use the following space to write any comments you wish to add.

……………………………………………………………………………………………
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……………………..

Thank you for your precious time. Your contribution to this study is highly appreciated.

APPENDIX B:

TEST OF NON-RESPONSE BIAS

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
AIS_design	1.00	79	3.6882	1.08930	.12256
	2.00	101	3.4508	1.17307	.11672
IT_benefits	1.00	79	3.8460	1.14658	.12900
	2.00	101	3.5957	1.03584	.10307

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AIS design	Equal variances assumed	1.368	.244	1.390	178	.166	.23745	.17079	-.09959	.57449
	Equal variances not assumed			1.403	172.790	.162	.23745	.16925	-.09661	.57151
IT benefit	Equal variances assumed	.004	.950	1.535	178	.127	.25028	.16308	-.07153	.57210
	Equal variances not assumed			1.516	158.873	.132	.25028	.16512	-.07583	.57640

Independent Samples Test

APPENDIX C:

FACTOR ANALYSIS RESULTS

Factor Analysis for Functional sophistication

Correlation Matrix

		Q7.1	Q7.2	Q7.3	Q7.4	Q7.5	Q7.6
Correlation	Q7.1	1.000	.672	.520	.619	.559	.579
	Q7.2	.672	1.000	.755	.715	.671	.701
	Q7.3	.520	.755	1.000	.691	.652	.657
	Q7.4	.619	.715	.691	1.000	.619	.662
	Q7.5	.559	.671	.652	.619	1.000	.844
	Q7.6	.579	.701	.657	.662	.844	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.871
Bartlett's Test of Sphericity	Approx. Chi-Square	795.919
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Participation in information systems planning	1.000	.591
Participation in develop applications	1.000	.792
Elaboration of development schedule	1.000	.710
Elaboration of development budget	1.000	.717
Participation as active members of development practice	1.000	.735
Train new users on available systems	1.000	.769

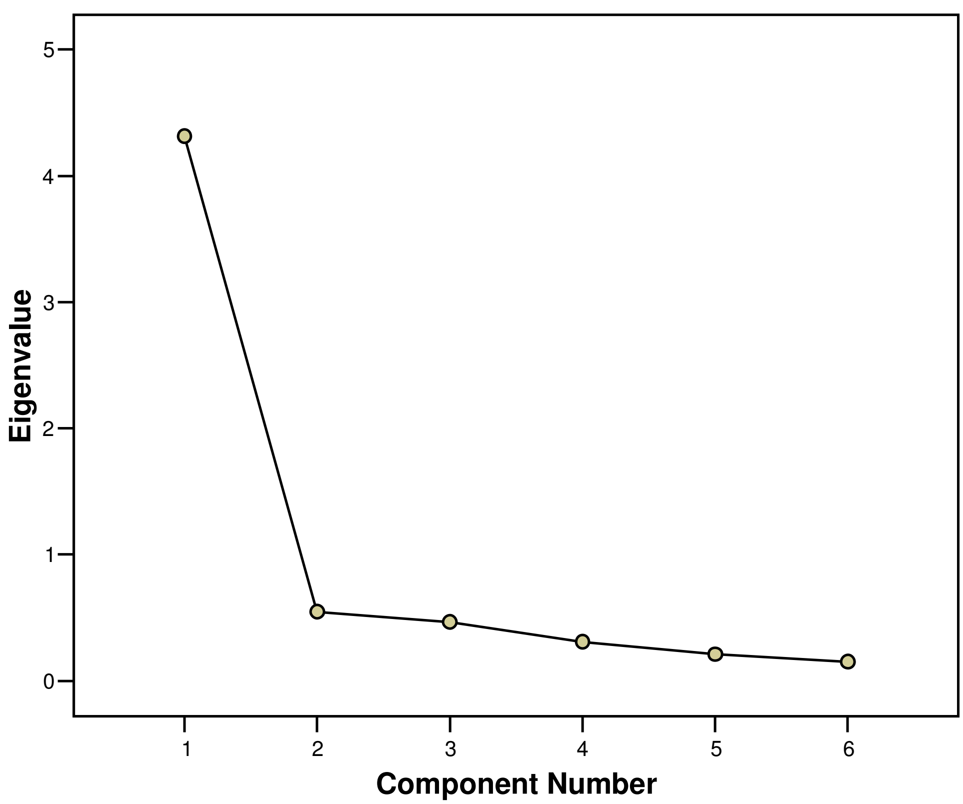
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.314	71.894	71.894	4.314	71.894	71.894
2	.547	9.124	81.018			
3	.467	7.782	88.800			
4	.309	5.153	93.953			
5	.211	3.524	97.477			
6	.151	2.523	100.000			

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix (a)

	Component
	1
Participation in develop applications	.890
Train new users on available systems	.877
Participation as active members of development practice	.857
Elaboration of development budget	.847
Elaboration of development schedule	.842
Participation in information systems planning	.769

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)
a Only one component was extracted. The solution cannot be rotated.

Factor Analysis for Managerial Sophistication

Correlation Matrix

		Q8.1	Q8.2	Q8.3	Q8.4	Q8.5	Q8.6
Correlation	Q8.1	1.000	.840	.822	.656	.636	.634
	Q8.2	.840	1.000	.756	.703	.587	.447
	Q8.3	.822	.756	1.000	.741	.634	.674
	Q8.4	.656	.703	.741	1.000	.737	.614
	Q8.5	.636	.587	.634	.737	1.000	.784
	Q8.6	.634	.447	.674	.614	.784	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.803
Bartlett's Test of Sphericity	Approx. Chi-Square	970.497
	df	15
	Sig.	.000

Communalities

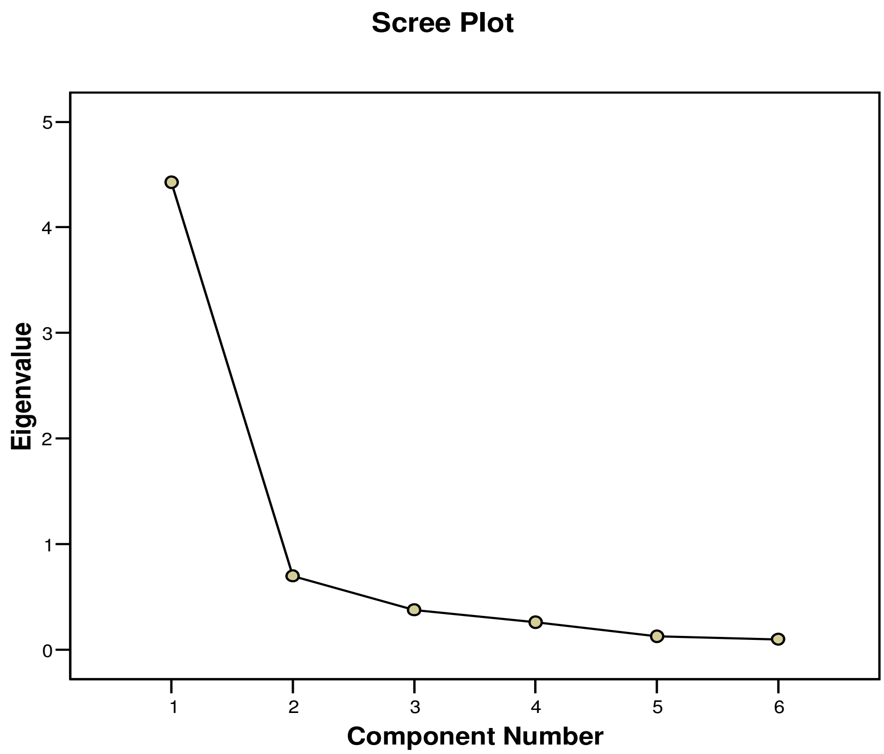
	Initial	Extraction
Financial resources planning	1.000	.798
Human resources planning	1.000	.713
Information requirement planning	1.000	.812
Implementation planning	1.000	.747
Confirmatory with the company goals	1.000	.716
Post implementation planning	1.000	.642

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.427	73.790	73.790	4.427	73.790	73.790
2	.700	11.673	85.463			
3	.380	6.325	91.788			
4	.262	4.365	96.153			
5	.129	2.146	98.299			
6	.102	1.701	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix (a)

	Component
	1
Information requirement planning	.864
Financial resources planning	.901
Implementation planning	.846
Confirmatory with the company goals	.844
Human resources planning	.893
Post implementation planning	.801

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)
a Only one component was extracted. The solution cannot be rotated.

Factor Analysis for Cost leadership strategy

Correlation Matrix

		Q9.a.1	Q9.a.2
Correlation	Q9.a.1	1.000	.920
	Q9.a.2	.920	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	332.445
	df	1
	Sig.	.000

Communalities

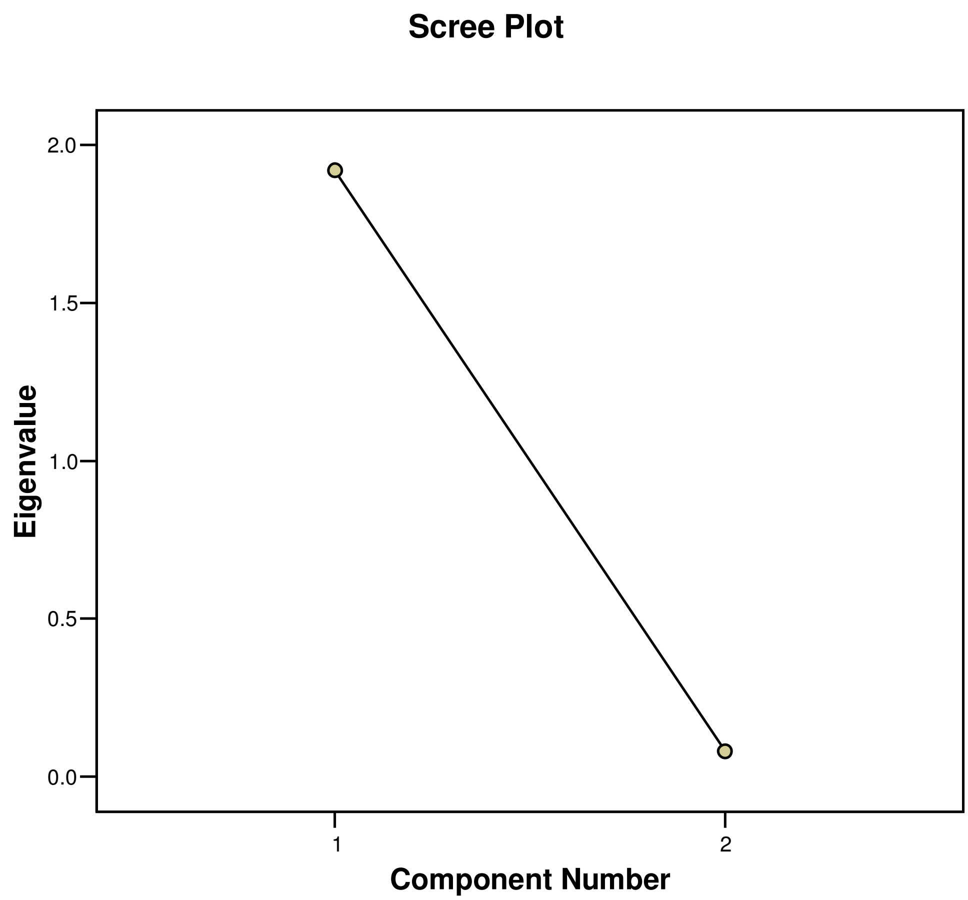
	Initial	Extraction
Cost of good sold/sales	1.000	.960
Selling, general, and administrative cost/sales	1.000	.960

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.920	95.998	95.998	1.920	95.998	95.998
2	.080	4.002	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix (a)

	Component
	1
Selling, general, and administrative cost/sales	.980
Cost of good sold/sales	.980

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)
a Only one component was extracted. The solution cannot be rotated.

Factor Analysis for Environmental Conditions

Correlation Matrix

		Q10.1	Q10.2	Q10.3	Q10.4	Q10.5	Q10.6
Correlation	Q10.1	1.000	.687	.504	.611	.535	.647
	Q10.2	.687	1.000	.638	.681	.700	.858
	Q10.3	.504	.638	1.000	.825	.761	.630
	Q10.4	.611	.681	.825	1.000	.864	.714
	Q10.5	.535	.700	.761	.864	1.000	.775
	Q10.6	.647	.858	.630	.714	.775	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.847
Bartlett's Test of Sphericity	Approx. Chi-Square	992.899
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Competitors actions	1.000	.573
Product demand	1.000	.775
Marketing practices	1.000	.709
Technological evolution	1.000	.826
Satisfaction about the number of new products	1.000	.809
legal, economical, and political constraints	1.000	.799

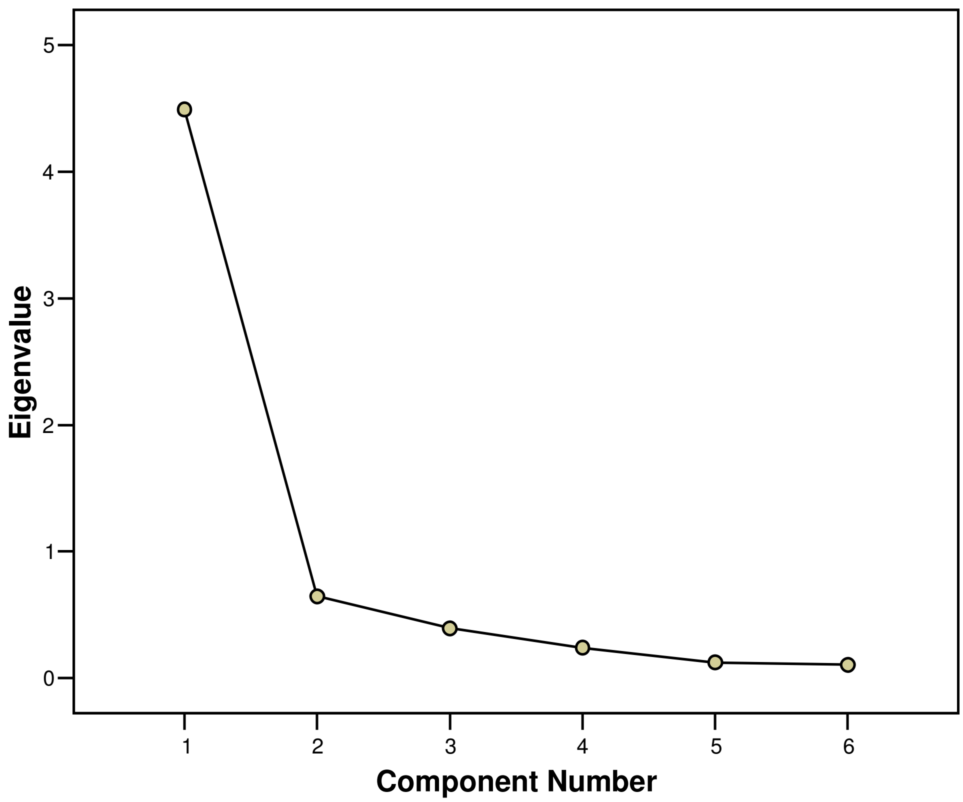
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.491	74.856	74.856	4.491	74.856	74.856
2	.647	10.776	85.632			
3	.393	6.551	92.182			
4	.240	4.004	96.186			
5	.123	2.058	98.244			
6	.105	1.756	100.000			

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix (a)

	Component 1
Technological evolution	.909
Satisfaction about the number of new products	.899
legal, economical, and political constraints	.894
Product demand	.880
Marketing practices	.842
Competitors actions	.757

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)

a Only one component was extracted. The solution cannot be rotated.

Factor Analysis for AIS design

		11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10	11-11	11-12	11-13	11-14	11-15	11-16	11-17	11-18	11-19
Correlation	11-1	1.000	.892	.861	.859	.847	.859	.796	.842	.800	.709	.770	.746	.697	.658	.725	.801	.804	.878	.796
	11-2	.892	1.000	.900	.857	.817	.868	.764	.863	.752	.738	.727	.717	.729	.697	.728	.782	.793	.854	.809
	11-3	.861	.900	1.000	.879	.839	.874	.825	.885	.793	.726	.721	.712	.693	.714	.741	.805	.774	.856	.741
	11-4	.859	.857	.879	1.000	.889	.912	.810	.853	.772	.723	.767	.746	.770	.780	.793	.853	.836	.918	.757
	11-5	.847	.817	.839	.889	1.000	.872	.761	.828	.780	.725	.756	.709	.730	.731	.747	.822	.766	.876	.723
	11-6	.859	.868	.874	.912	.872	1.000	.786	.898	.812	.807	.761	.728	.727	.780	.762	.786	.806	.872	.757
	11-7	.796	.764	.825	.810	.761	.786	1.000	.795	.839	.752	.810	.824	.745	.684	.761	.742	.799	.773	.745
	11-8	.842	.863	.885	.853	.828	.898	.795	1.000	.814	.797	.761	.732	.742	.747	.728	.765	.731	.808	.758
	11-9	.800	.752	.793	.772	.780	.812	.839	.814	1.000	.871	.901	.894	.836	.800	.840	.742	.841	.770	.773
	11-10	.709	.738	.726	.723	.725	.807	.752	.797	.871	1.000	.871	.830	.819	.812	.766	.647	.775	.716	.723
	11-11	.770	.727	.721	.767	.756	.761	.810	.761	.901	.871	1.000	.913	.842	.766	.824	.726	.823	.751	.745
	11-12	.746	.717	.712	.746	.709	.728	.824	.732	.894	.830	.913	1.000	.822	.780	.813	.759	.826	.758	.722
	11-13	.697	.729	.693	.770	.730	.727	.745	.742	.836	.819	.842	.822	1.000	.904	.861	.718	.817	.747	.787
	11-14	.658	.697	.714	.780	.731	.780	.684	.747	.800	.812	.766	.780	.904	1.000	.875	.756	.819	.776	.742
	11-15	.725	.728	.741	.793	.747	.762	.761	.728	.840	.766	.824	.813	.861	.875	1.000	.875	.918	.830	.782
	11-16	.801	.782	.805	.853	.822	.786	.742	.765	.742	.647	.726	.759	.718	.756	.875	1.000	.840	.904	.710
	11-17	.804	.793	.774	.836	.766	.806	.799	.731	.841	.775	.823	.826	.817	.819	.918	.840	1.000	.896	.838
	11-18	.878	.854	.856	.918	.876	.872	.773	.808	.770	.716	.751	.758	.747	.776	.830	.904	.896	1.000	.779
	11-19	.796	.809	.741	.757	.723	.757	.745	.758	.773	.723	.745	.722	.787	.742	.782	.710	.838	.779	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.940
Bartlett's Test of Sphericity	Approx. Chi-Square	5979.148
	df	171
	Sig.	.000

Communalities

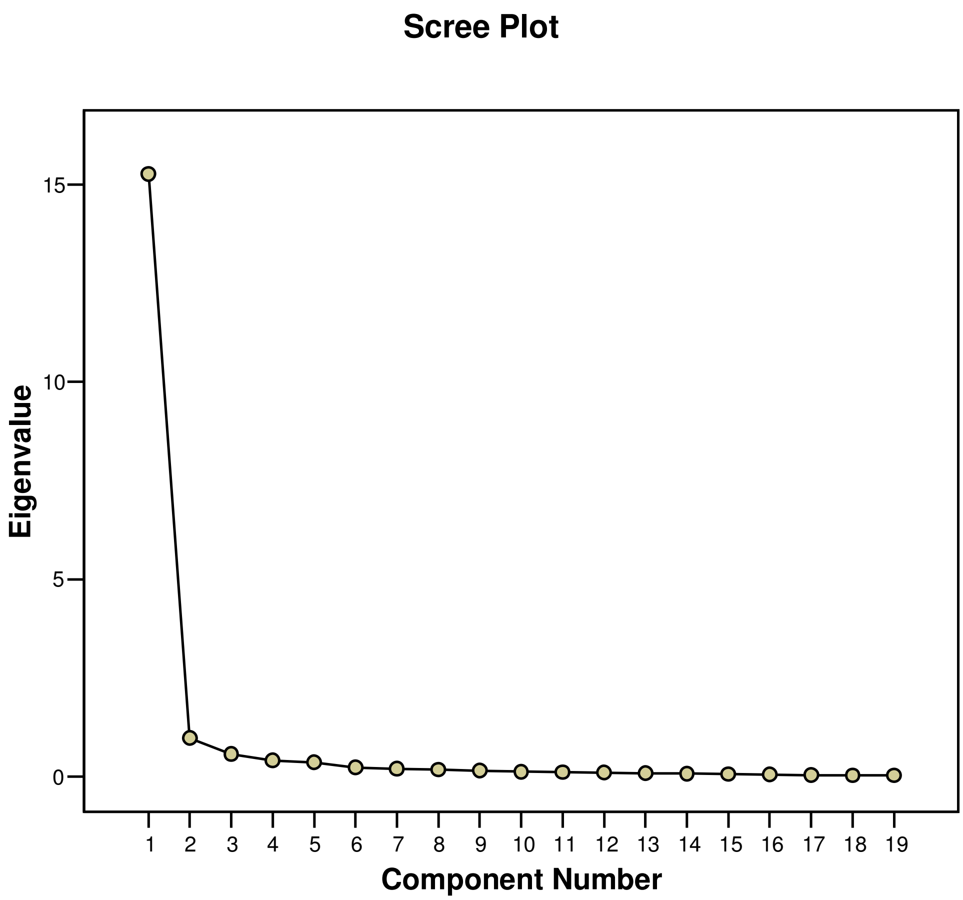
	Initial	Extraction
future events	1.000	.812
Non-economic information	1.000	.806
external Information	1.000	.812
Non-financial information that relates to production	1.000	.859
Non-financial information that relates to market	1.000	.800
Sectional reports	1.000	.847
Temporal reports	1.000	.777
Effects of events on functions	1.000	.812
Decisional models	1.000	.842
"what- if' analysis	1.000	.755
Summary reports-sections	1.000	.799
Summary reports-organization	1.000	.778
Sub-unit interaction	1.000	.772
Precise targets	1.000	.756
Organizational effect	1.000	.814
Speed of reporting	1.000	.780
Automatic receipt	1.000	.850
Frequency of reporting	1.000	.858
Immediate reporting	1.000	.743

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.272	80.381	80.381	15.272	80.381	80.381
2	.975	5.132	85.512			
3	.565	2.973	88.485			
4	.404	2.124	90.609			
5	.359	1.888	92.497			
6	.227	1.196	93.693			
7	.194	1.019	94.712			
8	.176	.926	95.638			
9	.151	.794	96.432			
10	.118	.622	97.055			
11	.109	.576	97.631			
12	.098	.518	98.149			
13	.084	.440	98.588			
14	.071	.371	98.960			
15	.061	.322	99.281			
16	.049	.256	99.538			
17	.035	.186	99.723			
18	.027	.144	99.868			
19	.025	.132	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix (a)

	Component
	1
Non-financial information that relates to production	.927
Frequency of reporting	.926
Automatic receipt	.922
Sectional reports	.921
Decisional models	.918
Organizational effect	.902
future events	.901
Effects of events on functions	.901
external Information	.901
Non-economic information	.898

Non-financial information that relates to market	.894
Summary reports-sections	.894
Speed of reporting	.883
Summary reports-organization	.882
Temporal reports	.881
Sub-unit interaction	.879
Precise targets	.870
"what- if' analysis	.869
Immediate reporting	.862

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)
a Only one component was extracted. The solution cannot be rotated.

Factor Analysis for IT benefits

Correlation Matrix

		Systems Quality	Information Quality	Information Use	User Satisfaction	Positive Individual Impact	Organizational Impact
Correlation	Systems Quality	1.000	.806	.802	.730	.746	.726
	Information Quality	.806	1.000	.794	.882	.869	.803
	Information Use	.802	.794	1.000	.789	.736	.792
	User Satisfaction	.730	.882	.789	1.000	.926	.794
	Positive Individual Impact	.746	.869	.736	.926	1.000	.823
	Organizational Impact	.726	.803	.792	.794	.823	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.864
Bartlett's Test of Sphericity	Approx. Chi-Square	1303.447
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Systems Quality	1.000	.766
Information Quality	1.000	.886
Information Use	1.000	.800
User Satisfaction	1.000	.877
Positive Individual Impact	1.000	.869
Organizational Impact	1.000	.811

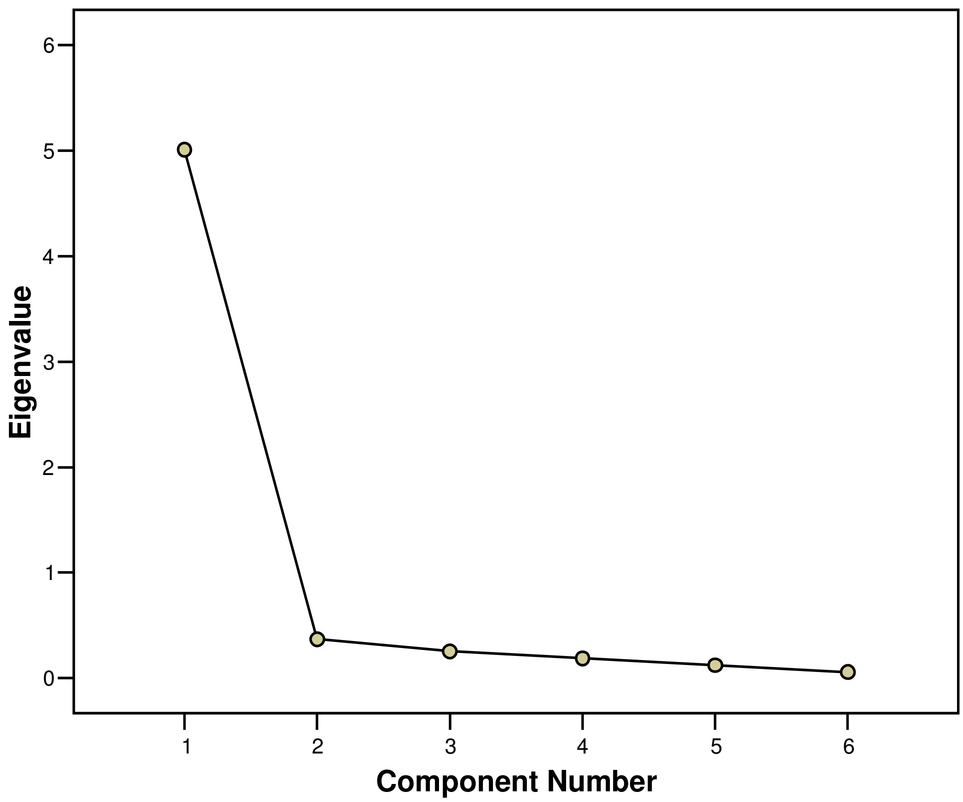
Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.009	83.487	83.487	5.009	83.487	83.487
2	.369	6.157	89.644			
3	.254	4.226	93.870			
4	.189	3.145	97.015			
5	.123	2.047	99.062			
6	.056	.938	100.000			

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix (a)

	Component
	1
Information Quality	.941
User Satisfaction	.936
Positive Individual Impact	.932
Organizational Impact	.900
Information Use	.895
Systems Quality	.875

Extraction Method: Principal Component Analysis.
a 1 components extracted.

Rotated Component Matrix (a)
a Only one component was extracted. The solution cannot be rotated.

APPENDIX D:

RELIBILITY RESULTS

Reliability scale for Functional Sophistication items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.823	6

Item Statistics

	Mean	Std. Deviation	N
Q7.1	4.06	1.058	180
Q7.2	3.18	1.434	180
Q7.3	2.90	1.658	180
Q7.4	2.75	1.513	180
Q7.5	3.78	1.211	180
Q7.6	3.88	1.180	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q7.1	16.49	26.765	.673	.785
Q7.2	17.37	22.537	.783	.750
Q7.3	17.65	24.352	.498	.823
Q7.4	17.80	24.206	.588	.796
Q7.5	16.77	25.442	.683	.778
Q7.6	16.67	28.791	.400	.830

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
20.55	35.254	5.938	6

Reliability scale for Managerial Sophistication items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.833	6

Item Statistics

	Mean	Std. Deviation	N
Q8.1	4.22	.941	180
Q8.2	3.23	1.419	180
Q8.3	3.16	1.688	180
Q8.4	3.23	1.419	180
Q8.5	3.74	.964	180
Q8.6	4.21	.938	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q8.1	17.58	24.994	.575	.816
Q8.2	18.56	20.035	.728	.779
Q8.3	18.63	18.032	.726	.784
Q8.4	18.56	20.035	.728	.779
Q8.5	18.05	26.942	.342	.849
Q8.6	17.59	24.702	.613	.810

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
21.79	31.293	5.594	6

Reliability scale for Cost leadership Strategy items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.867	2

Item Statistics

	Mean	Std. Deviation	N
Q9.a.1	3.16	1.695	180
Q9.a.2	2.62	1.688	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q9.a.1	2.62	2.851	.765	.(a)
Q9.a.2	3.16	2.873	.765	.(a)

a The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
5.78	10.104	3.179	2

Reliability scale for Environmental Conditions items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.860	6

Item Statistics

	Mean	Std. Deviation	N
Q10.1	2.64	1.448	180
Q10.2	1.86	1.540	180
Q10.3	2.72	1.518	180
Q10.4	2.11	1.194	180
Q10.5	2.64	1.417	180
Q10.6	2.75	1.546	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q10.1	12.07	28.514	.891	.790
Q10.2	12.86	38.471	.186	.918
Q10.3	11.99	28.207	.861	.794
Q10.4	12.61	38.743	.285	.890
Q10.5	12.07	29.068	.872	.795

Q10.6	11.96	27.177	.920	.781

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
14.71	44.397	6.663	6

Reliability scale for AIS design items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.774	19

Item Statistics

	Mean	Std. Deviation	N
q11b1	3.08	1.953	180
q11b2	4.19	1.370	180
q11b3	3.34	1.789	180
q11b4	3.43	1.870	180
q11b5	4.34	.898	180
q11b6	3.74	1.554	180
q11b7	4.34	.898	180
q11b8	4.51	1.044	180
q11b9	3.94	1.441	180
q11b10	3.31	1.880	180

q11b11	4.87	.453	180
q11b12	3.85	1.470	180
q11b13	4.25	1.218	180
q11b14	3.27	1.595	180
q11b15	2.87	1.892	180
q11b16	3.50	1.440	180
q11b17	4.19	1.582	180
q11b18	4.19	1.268	180
q11b19	3.03	1.696	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
q11b1	69.17	132.520	.480	.753
q11b2	68.05	149.355	.200	.773
q11b3	68.90	149.733	.114	.783
q11b4	68.82	141.581	.289	.770
q11b5	67.91	150.008	.323	.767
q11b6	68.50	147.670	.208	.774
q11b7	67.91	148.980	.371	.765
q11b8	67.74	143.803	.521	.756
q11b9	68.30	143.943	.345	.764
q11b10	68.93	139.828	.328	.766
q11b11	67.38	156.817	.080	.776
q11b12	68.39	141.190	.417	.759
q11b13	67.99	140.821	.540	.753
q11b14	68.97	131.826	.643	.741
q11b15	69.38	144.158	.224	.776
q11b16	68.74	140.973	.435	.758
q11b17	68.05	144.551	.286	.768
q11b18	68.06	141.818	.480	.756
q11b19	69.22	137.366	.445	.756

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
72.24	157.929	12.567	19

Reliability scale for IT benefits items

Case Processing Summary

		N	%
Cases	Valid	180	100.0
	Excluded (a)	0	.0
	Total	180	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.800	6

Item Statistics

	Mean	Std. Deviation	N
Systems Quality	5.00	.000	180
Information Quality	4.70	.460	180
Information USe	3.20	1.996	180
User Satisfaction	3.20	1.996	180
Positive Indivdual Impact	4.70	.460	180
Organizational Impact	4.70	.460	180

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Systems Quality	20.50	25.793	.000	.833
Information Quality	20.80	22.083	.810	.775
Information USe	22.30	9.865	.953	.665
User Satisfaction	22.30	9.865	.953	.665
Positive Indivdual Impact	20.80	22.083	.810	.775
Organizational Impact	20.80	22.083	.810	.775

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
25.50	25.793	5.079	6

APPENDIX E:

REGRESSION ANALYSIS RESULTS

Multiple Regression for the relationship between contingency factors and AIS design

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	Enviro_cond, Cost_leader, functional, Technology_soph, Managerial_soph, Informational_soph, Innovat_diff(a)	.	Enter

a All requested variables entered.
b Dependent Variable: AIS_design

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.857(a)	.734	.723	.60012

a Predictors: (Constant), Enviro_cond, Cost_leader, functional, Technology_soph, Managerial_soph, Informational_soph, Innovat_diff
b Dependent Variable: AIS_design

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	170.717	7	24.388	67.719	.000(a)
	Residual	61.944	172	.360		
	Total	232.661	179			

a Predictors: (Constant), Enviro_cond, Cost_leader, functional, Technology_soph, Managerial_soph, Informational_soph, Innovat_diff
b Dependent Variable: AIS_design

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.630	.236		-2.664	.008		
	Technological_soph	.441	.197	.108	2.233	.027	.660	1.514
	Informational_soph	.831	.220	.202	3.785	.000	.544	1.840
	Functional_soph	.165	.050	.141	3.270	.001	.832	1.202
	Managerial_soph	.250	.059	.213	4.254	.000	.620	1.613
	Cost_leader	.295	.049	.348	5.967	.000	.455	2.196
	Innovat_diff	.095	.044	.123	2.134	.034	.464	2.156
	Enviro_cond	.081	.042	.081	1.900	.059	.845	1.183

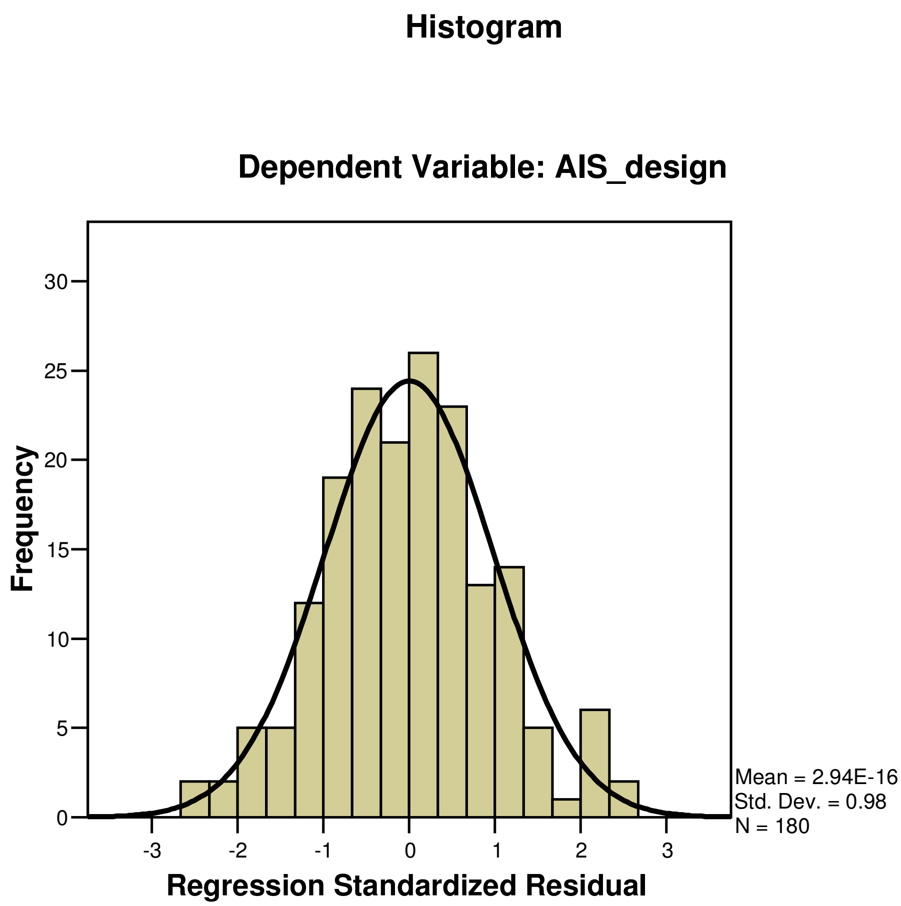
a Dependent Variable: AIS_design

Residuals Statistics (a)

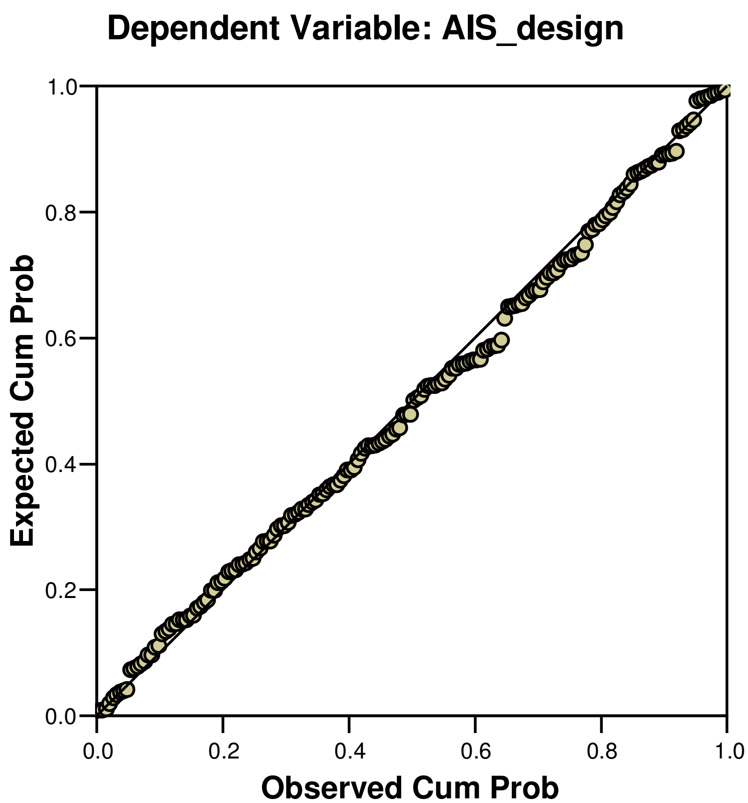
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.2305	4.9286	3.5550	.97659	180
Residual	-1.43440	1.50322	.00000	.58827	180
Std. Predicted Value	-2.380	1.407	.000	1.000	180
Std. Residual	-2.390	2.505	.000	.980	180

a Dependent Variable: AIS_design

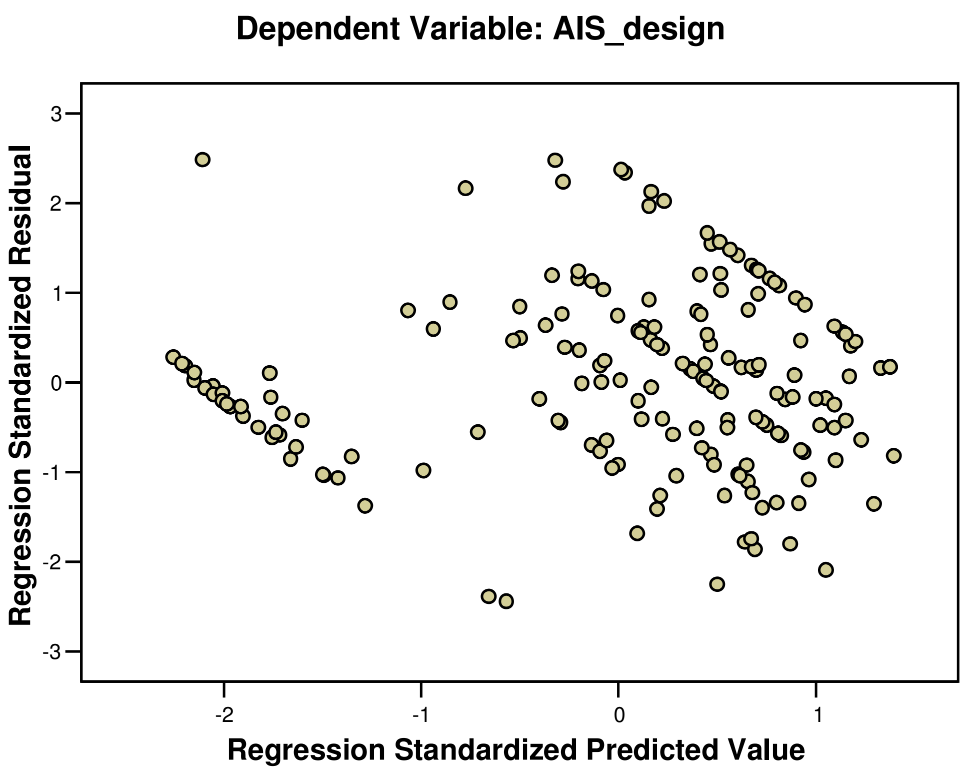
Charts


Histogram
Dependent Variable: AIS_design
Frequency
30
25
20
15
10
5
0
-3
-2
-1
0
1
2
3
Regression Standardized Residual
Mean = 2.94E-16
Std. Dev. = 0.98
N = 180

Normal P-P Plot of Regression Standardized Residual



Scatterplot



Linear Regression for the relationship between AIS design and IT benefits.

Variables Entered/Removed (b)

Model	Variables Entered	Variables Removed	Method
1	AIS_design(a)	.	Enter

a All requested variables entered.
b Dependent Variable: IT_benefits

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.798(a)	.637	.635	.65833	1.326

a Predictors: (Constant), AIS_design
b Dependent Variable: IT_benefits

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	135.472	1	135.472	312.583	.000(a)
	Residual	77.144	178	.433		
	Total	212.617	179			

a Predictors: (Constant), AIS_design
b Dependent Variable: IT_benefits

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.993	.161		6.164	.000
	AIS_design	.763	.043	.798	17.680	.000

a Dependent Variable: IT_benefits

Residuals Statistics (a)

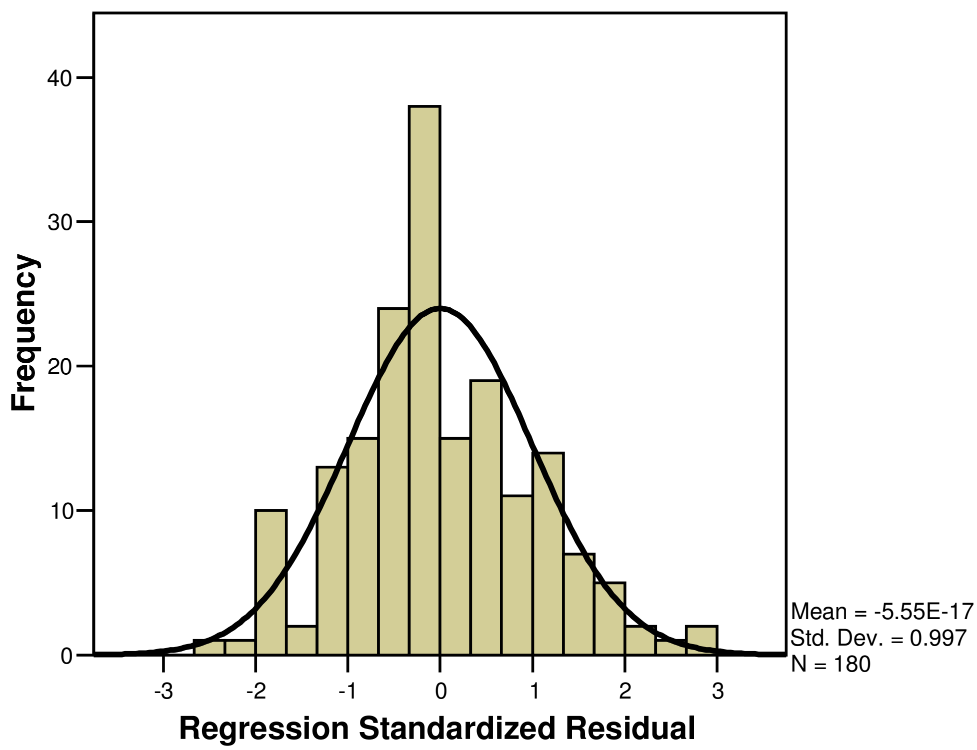
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0772	4.8082	3.7056	.86996	180
Residual	-1.68369	1.88261	.00000	.65649	180
Std. Predicted Value	-1.872	1.267	.000	1.000	180
Std. Residual	-2.558	2.860	.000	.997	180

a Dependent Variable: IT benefits

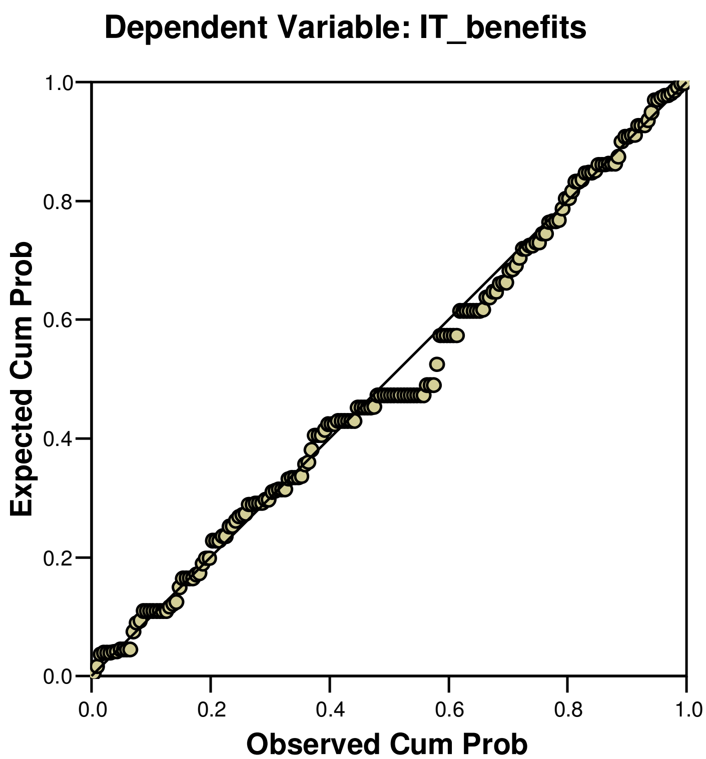
Charts

Histogram

Dependent Variable: IT_benefits



Normal P-P Plot of Regression Standardized Residual



Scatterplot