THE INTEGRATION OF INFORMATION TECHNOLOGY SKILLS IN ACCOUNTING CURRICULUM AT PUBLIC UNIVERSITIES IN EGYPT

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DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
January 2013

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By

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Thesis Submitted to
Othman Yeop Abdullah Graduate School of Business,
Universiti Utara Malaysia,
in Fulfillment of the Requirement for the Degree of Doctor of Philosophy

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ABSTRACT

Professional and academic accountants have debated the issue of integration of information technology (IT) skills in accounting during the past three decades. However, the majority of prior studies are very descriptive in nature and lack a theoretical background. Most of these studies investigated the issue of Required IT skills and Integrated IT skills in different settings. Prior studies also investigated the issue separately, either from the perspective of professional or academic accountants. Based on information processing theory and task-technology fit, this study investigated the alignment (IT Alignment) between Required IT skills and Integrated IT skills in a single setting. It also examined factors that influence IT Alignment. Data were collected from 249 accounting lecturers in public universities in Egypt, who were also practicing accountants. Survey was mailed out in March 2011, and response rate was 69.02%. Descriptive statistics indicated that the top 5 Required IT were generalized audit software, embedded audit modules/real-time modules, word-processing, small business accounting software, and electronic spreadsheets, while the top 5 Integrated IT were word processing, electronic spreadsheets, electronic presentations, database search and retrieval, and test data. Using a matching approach, the top 5 most aligned variables were word-processing, electronic spreadsheets, electronic presentations, internal network configurations, and database search and retrieval. Thirty-five hypotheses were then tested to examine factors that influenced IT Alignment. Results of multiple regressions suggested that market need played a major role in influencing the IT alignment. Other factors included financial resources, university/faculty support, interest and attitude toward the IT integration. This study has deepened current understanding of IT integration into accounting and has provided useful insights for Deans of Faculty of Accountancy in planning their IT integration. More importantly, the study also opens up possibilities for further study of IT integration, both in Egypt and around the globe.

Keywords: Required IT Skills, Integrated IT Skills, Accounting Education, IT Alignment

ABSTRAK

Isu menyepadukan kemahiran teknologi maklumat dalam bidang perakaunan telah dibahaskan oleh akauntan profesional dan akademik tiga dekad lalu. Bagaimanapun, kebanyakan kajian lalu berbentuk deskriptif dan terbatas dari segi asas teori. Kebanyakan kajian tersebut menyelidiki isu kemahiran IT Diperlukan dan kemahiran IT Bersepadu dalam persekitaran yang berbeza. Kajian lalu juga meneliti isu tersebut secara berasingan, sama ada dari perspektif akauntan profesional atau akauntan akademik. Berdasarkan teori pemprosesan maklumat dan padanan tugas-teknologi, kajian ini menyelidiki penjajaran (Penjajaran IT) antara kemahiran IT Diperlukan dengan kemahiran IT Bersepadu dalam persekitaran tunggal. Ia juga meneliti faktor-faktor yang mempengaruhi penjajaran IT. Data telah dikutip daripada 249 pensyarah perakaunan di universiti awam di Mesir, yang juga merupakan pengamal perakaunan. Tinjauan telah dihantar pada bulan Mac 2011, dan kadar respons yang diterima adalah 69.02%. Statistik deskriptif menunjukkan bahawa lima kemahiran utama IT Bersepadu ialah perisian audit umum, modul audit terbenam/modul masa nyata, pemprosesan kata, perisian perakaunan bagi perniagaan kecil, dan hamparan elektornik, manakala lima kemahiran utama IT Bersepadu ialah pemprosesan kata, hamparan elektronik, pembentangan elektronik, carian dan dapatan pangkalan data, dan pengujian data. Dengan menggunakan pendekatan pemadanan, lima pemboleh ubah yang paling terjajar ialah pemprosesan kata, hamparan elektronik, konfigurasi rangkaian dalaman, dan carian dan dapatan pangkalan data. Tiga puluh lima hipotesis diuji untuk menyelidik faktor-faktor yang mempengaruhi Penjajaran IT. Keputusan regresi berbilang menunjukkan bahawa kehendak pasaran memainkan peranan utama dalam mempengaruhi penjajaran IT. Faktor lain termasuk sumber kewangan, sokongan universiti/fakulti, minat dan sikap terhadap kesepaduan IT. Kajian ini meningkatkan kefahaman semasa tentang kesepaduan IT dalam perakaunan dan memberikan gambaran bagi Dekan-dekan Fakulti Perakaunan dalam perancangan mereka untuk menyepadukan IT. Lebih penting lagi, kajian ini membuka peluang bagi kajian-kajian kesepaduan IT, di Mesir dan di negara lain.

Kata kunci: Kemahiran IT Diperlukan, Kemahiran IT Bersepadu, Pendidikan Perakaunan, Kesejajaran IT

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and Most Merciful, I thank you for your nikmah and barakah to me, to complete my PhD. May peace and blessings of Allah be upon our Prophet Muhammad SAW, his family and sahabah.

First and foremost, my utmost gratitude goes to my supervisor, Professor Dr. Noor Azizi bin Ismail who has been patiently guided me throughout the duration of preparing this thesis. I am deeply indebted to Professor Dr. Noor Azizi bin Ismail who assisted me immensely in focusing my thinking and ideas towards the right direction and gave me his valuable ideas, insights, comments and suggestions towards understanding the empirical predicaments I have encountered.

My appreciation also goes to my wife, Walaa Ali Kotb, and my children, Mohand, Seif el Din, Mayada and Judy. Their endless and unconditional love, patience and support have given me the strength and inspiration to complete the study.

Finally, my appreciation goes to my father, Mohamed Sabry, Allahyarham, my mother, Fatema Gaber, my brother, Usama and my sister, Amany, for their supports and prayers.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

There have been rapid changes occurring in business environment over the last two decades due to the advancement of information technology (IT), concentration power in certain market investors, and globalization (Arnold & Sutton, 2007). These changes resulted in the decrease of the cost of information and the increase in the level of competition among businesses (Celik & Ecer, 2009). To some extent, the root of these three changes is IT, which driven the growth of productivity (Chang et al., 2011). The integration of IT in business operations helped the dissemination of information inexpensively. This relates directly to the second change, namely the market investors' demand for additional information. Reduction in time and effort to communicate globally through electronic commerce applications also facilitate the market to be global. In other words, IT helps the growth of globalization (Arnold & Sutton, 2007).

IT is defined as "hardware and software products, information system operations and management processes, as well as human resources and skills required to apply those products and processes to the task of information production and information system development, operation, management and control" (IFAC, 2009, p.30). IT knowledge refers to the ability to describe the conceptual or theoretical aspects of the technology, while IT skills refer to the ability to practice or apply the technology in the real world (IFAC, 2009). Skelton (2012) indicates that “knowledge is the most important building block for developing skills".

While knowledge and skills have been used interchangeably in the literature, Skelton (2012) argues that those with skills should also possess the necessary knowledge but not vice versa. Therefore, this study uses IT skills to represent both IT knowledge and IT skills.

IT revolution has changed not only the way business people do businesses but many aspects of accounting practices, which have resulted in greater demand for IT-literate accountants. IT is now considered as one of the core competencies of professional accountants and requires special attention due to its explosive growth and rapid rate of change (IFAC, 2001).

The growth and change in IT environment have created a number of challenges that the accountants must address. First, IT is affecting the way in which organizations are structured, managed and operated. Second, IT is changing the competitive environment in which professional accountants participate. Third, IT is changing the nature and economics of accounting activities. Finally, IT changes have also created many new opportunities for accountants in areas such as information development and information system design, information system management and control, and information system evaluation (IFAC, 2003). The challenges facing organizations now require a special kind of accountant that can understand how to use IT and when (and when not) to use it (Nance & Straub, 1996). Therefore, accounting graduates without sufficient IT skills may loss many job opportunities such as a designer, developer, manger, and evaluator of information systems (IFAC, 2009).

The revolution of IT has not only changed the role of accountants but accounting as a profession. Members of the accounting profession are now facing more challenges than ever before. As the consequence of the changes is significant, it becomes a necessity to redesign the curriculum of accounting education as well (Celik & Ecer, 2009). The curriculum of business school in general, and accounting in particular, need to be in tandem with the changes that have been taking place in the business environment (IFAC, 2009).

All modern businesses use IT to manage and control their business. Therefore, they need to employ graduates not only with the skills to use but also to manage, develop and/or evaluate IT (IFAC, 2006). If graduates don't have these skills, employer will have train them on these skills, which would cost them not only money but also time. Therefore, it is important to design and develop accounting curriculum based on the market needs instead of the interest of faculty members (Nioku et al., 2010).

Lin et al. (2005), for example, argued that the traditional accounting curriculum becomes irrelevant or provides non-value added to the practice of modern accounting. Thus, accounting curriculum should be redesigned to develop IT skills that can meet the needs of modern professional accountants (Mohamed & Lashine, 2003; Uyar & Gungormus, 2011). Earlier, Albrecht (2002) and Howieson (2003) argued that the current state of accounting education has had some problems. First, accounting curriculum is often outdated and irrelevant because it is driven by the interests of faculty and not by the demands of the market. Secondly, the teaching of accounting models lacks creativity where it generally depends too much on lecturer and textbooks. Thirdly, accounting lecturers are often isolated from their peers in other business school disciplines. Fourthly, the emphasis remains on technology as a book-keeping system rather than on how technology can be leveraged to make business decisions. Fifthly, accounting schools have failed to strategize plans for the changes in their environment and as such, have lost ground to other disciplines and other education providers. Finally, financial resources have a large impact on the quality of accounting education. Although a good education facilities may not guarantee a good output from the education system, but poor facilities certainly affect the quality of output from the education system.

IT is generally the main factor that influences accounting education. For example, the accounting curriculum is affected by IT because accounting lecturers should emphasize the use of IT and explain how it had changed the work of an accountant (Lu et al., 2012). Lecturers play a very important role in the education process (Albrecht & Sack, 2000). They are responsible in designing the program and course syllabuses. The programs designed are often based on their interest and attitude towards certain skills (Ismail et al., 2005). The appearance of many modern teaching methods that rely on IT such as the PowerPoint presentations, and the distance education that affected the methods of teaching accounting, require accounting lecturers to have a good knowledge of IT teaching aids. Therefore lecturers without sufficient IT skills will fail to provide the required technologies for the students. The strategy and financial resources should be able to provide the necessary facilities to help the students to learn current technologies such as spreadsheet, word-processing, World Wide Web (WWW), presentation, database, e-commerce, communication, information systems planning and strategy, in addition to the accounting packages (Mohamed & Lashine, 2003; Paisey & Paisey, 2010).

Recognizing the importance of IT in the accounting profession, the International Federation of Accountants (IFAC) has issued International Education Guideline (IEG) 11 called "Information Technology in the Accounting Curriculum" in December 1995. This guideline was revised several times and finally renamed as International Education Practice Statement (IEPS) 2.1" Information Technology for Professional Accountants" in August 2006. IEPS 2.1 outlined sets of IT requirements for professional accountants. Included in the guideline are lists of general IT education requirements, users, designers, managers and evaluators role requirements. The argument is that, professional accountants, besides using various types of IT, also play important roles in the management, evaluation, and development of various technologies by organizations of all types and sizes (Ismail & Abidin, 2009).

Despite the importance of IT to the accounting profession, Bortize (1999) and Albrecht (2002) argued that academic accountants did not move fast enough to develop sufficient pre-qualification competencies at the university level. Several studies support this argument. Theuri and Gunn (1998) examined the practices in the design and teaching of accounting information system (AIS) course at an undergraduate level in colleges and universities in the United State of America (USA). Findings of the study suggested that only 23% of respondents perceived their graduates at an above average level in terms of IT skills, while the remaining 77% at under average level of IT skills.

Coenenber et al. (1999) reported that accounting education in German lags behind the IFAC guidelines in terms of the broadness and depth of competence which accounting education should provide. Mohamed and Lashine (2003) suggested that the accounting education and the skill levels of accountants are not in line with what is required in the dynamic environment of global business, hence a knowledge gap has been created that needs to be bridged by the business schools. Ismail et al. (2005) reported that most academic accountants in Malaysia recognized the importance of IT skills in enhancing the future of accounting profession. However, many of them felt that the extent of IT skills being integrated into the accounting curriculum is still insufficient. Chandra et al. (2006) indicated that accounting students are not being taught the IT skills required by the business world. Arnold and Sutton (2007) reported that the education required of students entering the job market with a degree in accounting should be very different from the education provided 25 or more years ago, whereby at the time a world is driven by manual processes or computerized systems which simply automated the manual processes.

Other important study that investigates the issue of IT, accounting practice and education is Sutton (2000). He highlighted the conflict that exists between the traditional accounting models and the users' needs in the IT-based environment. Greenstein and McKee (2004) reported that on one side, there is a low level of sophisticated IT skills among accounting lecturers and practitioners such as e-commerce and audit automation applications. On the other side, there is a relatively high level of less sophisticated IT skills such as office automation and accounting firm office automation applications. This phenomenon creates a learning gap between accounting lecturers and practitioners. Shaikh (2005) discussed how auditors could use some of the computer-assisted auditing techniques (CAATs) more effectively with the support of modern IT. Brazel and Agoglia (2007) argued that auditors must be sensitive to the issue of information systems auditing. In an AIS setting indicative of increased risk, auditors with higher AIS expertise assessed control risk better than those with lower expertise.

Following this, several studies have attempted to investigate factors that may affect the integration of IT skills into the accounting curriculum. Howieson (2003) indicated that one of the significant preventions to the changes in accounting education in the United Kingdom (UK) is the lack of financial resources. Chang and Hang (2003) argued that accounting lecturers face certain difficulties in integrating many IT topics into the accounting curriculum. They may be prevented by overcrowded programs or by the lack of support from university and faculty administration. Ismail et al. (2005) argued that lecturer's perception towards the IT skills is important to develop effective AIS curriculum. They also suggested that accounting lecturers should have IT-related experience to help them develop accounting curriculum. Lin (2008) indicated that accountants should posses multiple skills to deal with varied demands of information processing and to analyze rapidly changing business environment.

The above discussions indicate that there is a gap between IT skills given to students, and the IT skills required by the actual business practices. Several studies have attempted to address this important issue. However, most of previous studies have investigated the issue of accounting education and IT, and accounting practice and IT separately. With the exception of Greenstein and McKee (2004) and Ismail et al. (2005), none of prior studies had attempted to investigate the gap between the required IT skills and the level of IT skills being integrated into the accounting curriculum in a single setting. While some studies have explored the perception of accounting professionals towards the importance of IT skills (e.g. Greenstein et al., 2008, Janvrin et al., 2008; Rai et al., 2010), other studies have explored the perception of accounting lecturers towards either the importance or integration of IT skills into the accounting curriculum (e.g. Ahmed, 2003, Ismail et al., 2005 and Senik & Broad, 2008). Therefore, results from these studies failed to compare the perception of accounting professionals and accounting educators toward IT skills. Similarly, results from prior studies also failed to compare the perception of accounting professionals towards the importance, hence the relevance of IT skills and the actual IT skills being taught by in business schools by accounting educators. More importantly, none had attempted to examine the factors that may influence the alignment between the two important variables. Furthermore, most of prior studies that have attempted to investigate this issue were conducted in developed countries, with very few of them have been conducted in developing countries such as China (Lin, 2008), Turkey (Celik & Ecer, 2009) and Malaysia (Ismail et al., 2005).

This issue is particularly important in the context of Egyptian education as the integration of IT in the accounting curriculum is claimed to be lagging behind those of developed and even some developing countries (Mohamed & Lashine, 2003). Furthermore, IT sophistication levels are dissimilar in different countries. Therefore, findings from studies in advanced countries and even some developing countries like China, Turkey and Malaysia might not be applicable in the context of Egypt. A more recent report by Egyptian Ministry of Communications and Information Technology (2009) indicated that the sophistication of IT adoption among businesses in Egypt is still lagging of those in developed countries and some of developing countries. Therefore, it is expected that the level of IT skills required by businesses in Egypt is also lower compared to those countries. Technologies that are relevant in developed countries may not be relevant in Egypt and vice versa. This argument is in tandem with the information processing theory which postulates that IT is more likely to be useful if there is a match between the requirement and the capacity of the technologies adopted (Galbraith, 1974).

Egypt is a country that has grown rapidly towards IT environment. The Ministry of Communications and Information Technology (2009) reported that the percentage of enterprises that use the internet is 83%, while the percentage of enterprises that have websites is 65%. In the education sector, the percentage of government-owned universities/colleges using computers in education is 86%, while the percentage is slightly higher in private-owned universities/colleges with 91%. On the other hand, the percentage of government-owned universities/colleges using internet in education is 60%, while in private universities/colleges the percentage is 78%. Despite the high percentage of computer and internet usage in education, IT skills are not being sufficiently integrated into the accounting curriculum, thus the lack of IT skills amongst the students. Furthermore, while most universities in Egypt have computer labs, the ratio of computers to the number of students is very high (Dahawy & Kamel, 2006).

Generally, the state of accounting education in Egypt needs more developments. Accounting education is still mainly dependent on a face-to-face teaching, with minor dependency on common overhead projectors. The instructor in the classroom is basically a lecturer who delivers his lecture through a one-way communication from his end to the recipients. Moreover, due to cultural elements, students are not used to being interactive in the classroom (Dahawy & Kamel, 2006).

Tertiary accounting education in Egypt is characterized by the high ratio of lecturers to students. The average ratio in accounting department of public universities is about one lecturer for every one thousand students. This high ratio of student-lecturer leads to the difficulties in communication between students and lecturers and hinder effective teaching and learning processes (Rahman et al., 2002). Rahman et al. (2002) further argued that the undergraduate-level accounting and auditing courses lack the appropriate textbooks and educational materials in international accounting and auditing standards Furthermore, it just provides a description of IT in general, not how to use it in accounting. Accounting curriculum has not changed for many years and needs to be updated

(Dahawy et al., 2011). However, the quality of accounting education at the postgraduate level is better because the curriculum includes international accounting and auditing standards, besides its emphasis on empirical research (Rahman et al., 2002).

In terms of IT, while the percentage of general usage including internet facilities at universities in Egypt has increased over the last decade, the sophistication of IT adopted is still lagging behind developed and most developing countries. Most universities are still lacking appropriate hardware and software to be integrated into the business curriculum including accounting (Ministry of Communications and Information Technology, 2009). The technological advancement in accounting education among the public universities is hindered by the lack of financial resources and basic infrastructures. Hence, the status of adoption and integration of IT skills in accounting curriculum is still weak at those universities (Dahawy et al., 2005). The high ratio of lecturers to students and the lack of IT facilities have worsen the self-learning process (Gerjets & Hesse, 2004). In order to ensure the accounting curriculum in Egypt is updated with the current trends of business practices and the accounting students are exposed to the latest IT development, the government and in particular the universities has to find ways to upgrade the current IT facilities. This is important for the future development of accounting profession in Egypt (Mohamed & Lashine, 2003). In a nutshell, the issue of accounting and IT education is crucial for the development of accounting profession not only in Egypt but also other developing countries and needs to be explored further.

1.2 RESEARCH QUESTIONS

From the previous section, it has become clear that despite the efforts of many researchers to bridge the gap between the IT skills integrated into the accounting curriculum, and the IT skills required by business environment, further studies are still needed to explore this issue, especially in some developing countries like Egypt. The research problem that is envisaged in this study is especially focused on the following:

What is the relationship between required IT skills and the integration level of required IT skills into the accounting curriculum, and what are the factors that influence the alignment between the two variables?

The research problem is the subdivided into the following research questions:

- What are the IT skills required for accounting students as perceived by accounting lecturers?
- To what extent do the required IT skills are integrated into the accounting curriculum?
- To what extent do the required IT skills match the IT skills integrated into the accounting curriculum?
- What are the factors that influence the alignment between required IT skills and the integration level of required IT skills into the accounting curriculum?

1.3 RESEARCH OBJECTIVES

The main objective of this study is:

To explore the relationship between required IT skills and the integration level of required IT skills into the accounting curriculum and to identify the factors that influence the alignment between the two variables.

The specific objectives are as follows:

- To identify the IT skills required for accounting students as perceived by accounting lecturers.
- To examine the extent of required IT skills integrated into the accounting curriculum.
- To examine the alignment between required IT skills and the integration of required IT skills into the accounting curriculum.
- To identify the factors that influence the alignment between required IT skills and the integration level of required IT skills into the accounting curriculum.

1.4 CONTEXT OF THE STUDY

This study explores the gap between the required IT skills and the level of integration of those IT skills into the accounting curriculum in the specific context of Egyptian universities. Using a questionnaire survey approach, this study explores the gap between the two variables in a single setting, hence provides meaningful findings to the status of alignment between the types of IT skills required by the industry and the types of IT skills being taught at the universities. This is possible due to the unique character of accounting lecturers in Egypt. Unlike many countries in the world, most of accounting lecturers in Egypt are not only holding a Doctorate degree and teaching at universities but are also professional accountants and practicing accounting. Therefore, accounting lecturers represent both accounting educators and accounting practitioners. Second, unlike previous studies, the domain of required and integrated IT skills is explored based on IEPS 2.1 (IFAC, 2006). This is particularly important as the list of IT skills listed in IEPS 2.1 is based on years of research by IFAC. There are several other reasons to further justify the selection of Egyptian universities for this research. First, Egypt is one of the developing countries that has put significant efforts toward IT development (Dahawy et al., 2011). Second, IT and accounting education studies are very rare in developing countries especially in this part of the world. Therefore, findings from this study would provide interesting insights into the accounting education sophistication, and can also be used to compare with those carried out in other parts of the world.

1.5 SIGNIFICANCE OF THE STUDY

One of the distinctive contributions of this study to the field of accounting and IT is the exploration of the gap or alignment between the required IT skills, and the integration of those IT skills into the accounting curriculum. More importantly, this study is conducted in a single setting due to the unique feature of accounting lecturers in Egypt who are not only teaching but also practicing accounting. Hence, they are capable of answering both questions related to the required IT skills and the level of integration of those into the accounting curriculum. Most previous studies have investigated the issue separately either from the perspective of accounting professionals or the perspective of accounting educators. The exceptions are Greenstein and McKee (2004) and Ismail et al. (2005). However, respondents in those studies are not in a position to answer both different but related questions like respondents in this study.

Another important contribution of this study is the identification of factors that influence the alignment between the two important variables. Most previous studies that have attempted to investigate the issue of IT and accounting practice, and IT and accounting education are very descriptive in nature, thus failed to apply appropriate theories to explain the phenomenon. This study adopts information processing perspective as a theoretical foundation to develop the research model. Addressing the issue of IT and accounting education from the fit perspective is significant for two reasons. First, lack of fit between IT skills required by the industry and the level of integration of the required IT skills into the accounting curriculum would results in ineffective future accountants. For example, to effectively work in an IT-based business environment, it is important for accountants to possess sufficient IT skills. On the other hand, accountants with high IT skills would be useless if they work in a manual or less sophisticated IT-based business environment. Secondly, the "misfit" issue between required IT skills and the integration of required IT skills may be worsen in developing nations like Egypt. While many businesses in these countries move towards sophisticated IT-based environment, accountants' readiness and progress toward the environment seems to be slow (Greenstein & McKee, 2004 ; Hatton, 2011).

Findings from this study would also extend the current understanding of how IT skills affect the accounting curriculum. Such findings are necessary to develop the accounting curriculum, not only in Egypt, but also in other parts of the world. Furthermore, while there have been few studies on IT and accounting education conducted in developing countries, such studies are relatively rare in the Middle East and in particular Egypt. Most studies were previously conducted in developed countries such as the USA (Theuri & Gunn, 1998; Greenstein & McKee, 2004; Merhout & Buchman, 2007), the UK (Helliar et al., 2009) and German (Coenenber et al., 1999). Tan (1997) suggested that the practice of IT in various countries is diverse, and such, the use of IT also varies in these countries.

Finally, findings of this study might be of interest to relevant education agencies in Egypt such as the National Authority for Quality Assurance and Accreditation of Education (NAQAAE). The information provided might assist the policy makers in formulating education strategies in Egypt. Therefore, findings from this study can be used by accountants, accounting lecturers, accounting and audit firms, and professional accounting bodies as a benchmark to evaluate accountants IT skills not only in Egypt but also other developing countries with similar IT development.

1.6 ORGANIZATION OF THE THESIS

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

Chapter two reviews the literature related to IT and accounting education and is divided into two sections. The first section is devoted to the accounting education and practice in Egypt. The second section is devoted to the literature related to IT skills and accounting by the authoritative bodies and the researchers. Chapter three describes how the theoretical framework and hence research hypotheses are developed to answer the research questions based on the extensive review of literature and problem statement. Overview of the description of the research strategies and sampling procedures is also provided. The final part of this chapter describes the process of questionnaire development as well as data collection methods and procedures. This chapter also discusses results of the pre-test and the pilot. 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' profile, and followed by analysis to the importance and integration of IT skills and the alignment between them. Finally it presents the results of multiple regressions. Chapter five discusses and concludes the present study. It starts with the summary and contribution of research findings and then followed by discussion of the limitations of the present study and explains implications of research findings to future research and practice.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Many studies have discussed the issue of what should be the skills components of today's accounting education programs that can satisfy the skills required by the new business environment. The aim of this study is to explore the relationship between the IT skills required by the new business environment and the IT skills integrated in the accounting curriculum in the specific context of Egypt. Based on that, this chapter discusses literature relating to the integration of IT skills in accounting education. It also provides an overview of accounting education and accounting practice in Egypt.

2.2 ACCOUNTING EDUCATION AND PRACTICES IN EGYPT

Egypt has a long history in the field of accounting. During the 1960s, with the movement toward central economic management, nationalization, and expansion of the public sector, the Central Auditing Organization became responsible for auditing the public sector. In the mid-1970s, the Egyptian government had followed an open-door policy to liberalize the national economy, and had initiated several improvements in the accounting and auditing standards and practices (Wahdan et al., 2005).

2.2.1 Legal Status

The main law governing professional accountants and auditors in Egypt, especially in the private sector, is the Accounting Practice Law 133 issued in 1951 and its amendments. This law limited the practice of the accounting profession only for those who obtained a bachelor degree in accounting or equivalent and spent a minimum three years in training with auditor without any qualifying examination for entry (Egyptian Gazette Newspaper, 1951). In addition, the central audit organization is an independent public organization which affiliated to the People's Assembly (Parliament) controls the government funds and helps the People's Assembly to control and monitor the financial performance, following up the implementation of the plan and legal control of decisions issued on financial irregularities. It is responsible for the audit of state-owned enterprises (Wahdan et al., 2005).

In 1981, the president of the republic issued Act 159 (Company Law). The act requires all companies to keep sound accounting records and prepare annual audited financial statements (Egyptian Gazette Newspaper, 1981). Also, the Capital Market Law 95/1992 requires all listed companies to publish annual and quarterly audited statement in two widely spread newspaper with the capital market authority and the Cairo and Alexandria Stock Exchange (Egyptian Gazette Newspaper, 1992). The Ministry Decree 503/1997 is considered the first Egyptian accounting standards to be issued. In 2002, Egypt had twenty-two accounting standards and six auditing standards (Dahawy et al., 2011).

In 2006, the Ministry of Investment issued the Egyptian accounting standards which contain 39 accounting standards based on the international standards from IFAC (The Ministry of Investment, 2006). Capital Market Authority (CMA) issued in 2007 code of ethics for the registered professional accountants and auditors. This code of ethics follows the ethical standards issued by IFAC (CMA, 2007). In 2008, the Ministry of Investment issued Decree 166/2008, the Egyptian standards of auditing and limited testing and assurance. The 38 standards listed by the decree is a translated copy of the international standards issued by IFAC (CMA, 2008).

2.2.2 Professional Status

The association responsible to develop the educational and professional standards is The Egyptian Society of Accountants and Auditors (ESAA). ESAA is a member of IFAC. However, the society does not function as a self-regulating body in line with the recommendations of IFAC, as exemplified by its lack of a disciplinary committee with power to ensure its members comply with the rules of professional conduct. According to existing law, the registration committee for accounting and auditors in the Ministry of Finance is responsible for registering professional accountants and auditors (Rahman et al., 2002).

2.2.3 Education Status

The state of accounting education in Egypt is imperfect. Accounting education is still mainly dependent on face-to-face teaching, with minor dependency on common overhead projectors. Most universities have computer labs, but the ratio of computers to the number of students is minimal. The instructor in the classroom is basically a lecturer who delivers his lecture through a one-way communication from his end to the recipients. Due to the large number of students in the classroom, ranging between 3,000 and 6,000, the possibility of individual interaction between the instructor and students is virtually impossible. Moreover, due to cultural elements, students are not used to being interactive in the classroom (Dahawy, & Kamel, 2006).

Generally, educational quality in Egypt suffers from a lack of modern curriculum and too few teachers for too many students. According to Rahman et al. (2002), the teacher–student ratio in accounting department of public universities is about 1 to 1,000, which hinders instructional quality and constrains essential teacher-student communication. Undergraduate-level accounting and auditing courses focus on primary topics and application of standards, but do not include international standards and practices. Furthermore, while accounting lecturers were educated in America and Europe, they lack appropriate textbooks and educational materials in international accounting and auditing standards. At the postgraduate level, the quality of accounting education is better because the curriculum includes international accounting and auditing standards and encourages empirical research, furthermore curriculum has not changed for many years and needs to be updated (Rahman et al., 2002).

In 2006, Presidential Decree establishes the National Authority for Quality Assurance and Accreditation of Education (NAQAAE). Its mission is to upgrade the quality of education in accordance with international standards. In an effort to promote accounting education, NAQAAE issued in April 2009 the lecturers and national standards for the faculties of commerce and business. The standards determine the general specifications of the faculty of commerce graduate and the general concepts and knowledge that should be obtained in each program (accounting and auditing, business, insurance and economic).

2.2.4 IT Development

Egypt grows rapidly toward IT environment. During the last few decades, investment in information and communication technology has witnessed major steps especially with the establishment of the ministry of communications and information technology in 1999. In July 2008, the percentage of businesses that used the internet in enterprise is 82.58%, medium 52.71% and small 20.29%. The percentage of businesses with website (or web presence) in enterprise is 65.16%, medium 33.13% and small 10.01%. In university education sector, the percentage proportion of faculties/institutions that used computer in education among government universities/colleges is 86.18%, and 91.43% among the private universities/colleges. The percentage of universities/colleges that are connected to the internet among government faculties/institutions is 82.11% and 92.00% among private faculties/institutions 92.00%, while the percentage of faculties/institutions that used internet in education among government universities/colleges is 59.89%, and 77.71% among private universities/colleges 77.71% (The Ministry of Communications and Information Technology, 2009).

2.3 IT SKILLS AND ACCOUNTING

This section discusses the extant literature relating to IT skills required and the IT skills integrated into accounting curriculum. It is divided into two sections. The first section discusses the efforts of authoritative bodies, while the second section discusses the efforts of researchers.

2.3.1 PROFESSIONAL BODIES

In response to the rapid use of IT in business environment, the auditing profession requires new updated guidance for auditing conducted in IT environment. Various professional **and** authoritative bodies, such as the IFAC, American Institute of Certified Public Accountant (AICPA), and the Information System Audit and Control Association (ISACA), have issued standards in this area.

2.3.1.1 IFAC

IFAC issued International Education Guideline 11 (IEG 11) named "Information Technology in the Accounting Curriculum" in December 1995. This guideline was first revised in June 1998, then in December 2002, and finally August 2006. IEG 11 was renamed as International Education Practice Statement 2.1 (IEPS 2.1), entitled "Information Technology for Professional Accountants". The document is intended to assist member bodies to prepare professional accountants to use IT and to work in the IT environment, describing the knowledge and competences required. It also assists IFAC member bodies in the implementation of generally accepted standards in education and the development of professional accountants by providing advice or guidance on how to achieve best practice (IFAC, 2006).

Considering the significant impact of IT on accounting practices and its influence on accounting education, IFAC stated in 1995 that "…competence in IT is imperative for the professional accountant…". IFAC also stated that "…IT changes have created many new opportunities for professional accountants in areas such as information development, information system management, business advisory services, and system evaluation." Since some of these areas are not commonly associated with the accounting profession, professional accounting bodies throughout the world are urged to address these changes through their educational processes by including IT concepts and skills in their educational programs.

IEPS 2.1 divided IT education requirements for professional accountants under five main categories: (1) general IT education requirements; (2) accountants as users; (3) accountants as managers; (4) accountants as designers; and (5) accountants as evaluators of organizational computerized information systems. IFAC also distinguishes between the pre-qualification and post-qualification IT related education requirements.

During the prequalification stage, accountants must obtain the general IT skills which are summarized into five categories: (1) IT concepts for business systems; (2) internal control in computer-based business systems; (3) development standards and practices for business systems; (4) management of IT adoption, implementation, and use; and (5) evaluation of computer-based business systems.

As a user of IT, accountant must know certain fundamental skills such as abilities to use a word processing package, spreadsheet package, database package, and at least one basic accounting package. As a manager of IT, accountant needs to have effective practical skills in planning and coordinating, organizing and staffing, directing, leading, monitoring and controlling of business information systems. As a designer of IT, accountant should be familiar with the concepts relating to the major phases of system development and the specific tasks required in each phase. Finally, as an evaluator of IT, accountant should have the ability to plan, execute and communicate the results by using at least audit software and test data programs.

In contrast to the pre-qualification requirements, the post-qualification stage focuses on higher levels of knowledge and addresses more specialized skill sets. So Continuing Professional Education (CPE) is necessary for the professional accountants to maintain their skill levels either as a user, a manager, a designer, or evaluator of business information systems. In 1996, IFAC distributed the AICPA Discussion Paper which highlighted the implications of the previous guideline (IEG 11) on the domains of education, work, continuing professional education and the licensing and regulation domain.

First, in the education domain, the discussion paper stated that there are four issues that need to be addressed. First, students should learn that technology, when improperly managed, is a risk or problem, rather than a useful resource. Accountants should control the technology, rather than vice-versa. Secondly, students should be made aware that IT personal productivity skills are essential for today's professional. These include proficiency in using tools such as spreadsheets, word processors, presentation graphics, and databases, to enhance personal efficiency and effectiveness. Thirdly, students should be encouraged to study IT from the perspective of its usefulness, application, and impact. Finally, to some extent, the study of technology should be integrated with the study of accounting. In other words, IT and accounting should not be treated as two separate disciplines.

Second, the discussion paper stated that the working domain is intended to include accountants working in the industry, public practice, and public sector. The following management responsibilities are critical ingredients for the successful integration of IT into the work domain: (1) leadership and visionary skills. Leadership in the technology field has developed a culture of rapid decision making and action, due to the rapid changes made in the technology environment. Visionary skills are critical. These skills can either be outsourced or acquired from within, depending upon the size of the organization and internal talent. (2) Technical support. Technical and training skills are required beside the visionary skills. However, since one person could not acquire all necessary skills, a team approach is required. (3) Training. IT trainers should have knowledge of accounting and technology, in addition to training skills like oral and written communication skills. (4) Written three-year plan. Three years is considered ideal because a shorter time span does not allow enough time for implementation, and more than three years does not allow the plan to be sufficiently specific. The planning process should involve everyone. Executive education and participation ensure success. Group sessions should be held to provide executive education, information about alternatives, peer experiences, and a briefing on future technology. Participants should be given the opportunity to define requirements and identify priorities. (5) Three-year budget. The advancement and rapid development of technology require separate budgeting process, as a component of the organization's overall strategic plan. (6) Accountability and outcome assessment. Organizations should budget and account for technology expenditures for the entire organization. These numbers can be compared to industry benchmarks.

Third, the discussion paper stated that CPE providers need to design correlated programs to aid the professional in qualifying for IT proficiency. Finally, the discussion paper stated that organizations play a part in the licensing and regulation of accounting professionals should implement the requirements listed below:

a. The AICPA should develop an IT Specialist designation including qualification exam and separate CPE requirements, and update the national CPE curriculum to reflect IT content.
b. All state boards of accountancy should allow IT courses to meet general CPE requirements. The Board of Examiners should gradually add IT content to the CPA exam by integrating it into various sections. Bodies that accredit accounting and business programs should add IT content to evaluation criteria of academic programs. The peer review process should assess the sufficiency of addressing IT issues in the attest function of the firm.

2.3.1.2 ISACA

One of the goals of ISACA is to advance globally applicable auditing standards to meet its vision. The development and dissemination of the IT Audit and Assurance Standards is a cornerstone of the ISACA professional contribution to the audit and assurance community. Therefore, it provides multiple standards, guidelines, tools and techniques in IT audit and assurance area (ISACA, 2009) , which are summarized in the following Tables.

Table 2.1 illustrates ISACA standards for auditing in IT environment. Table 2.2 provides IT audit and Assurance guidelines, while Table 2.3 provides the IT audit and assurance tools and techniques.

Table 2.1
ISACA Standards

Title	Standard	Effective Date
S1 Audit Charter	▪ The purpose, responsibility, authority and accountability of the information systems audit function or information systems audit assignments should be appropriately documented in an audit charter or engagement letter. ▪ The audit charter or engagement letter should be agreed and approved at an appropriate level with in the organization(s).	1 January 2005
S2 Independence	➢ Professional Independence ▪ In all matters related to the audit, the IS auditor should be independent of the auditee in both attitude and appearance. ➢ Organizational Independence ▪ The IS audit function should be independent of the area or activity being reviewed to permit objective completion of the audit assignment	1 January 2005
S3 Professional Ethics and Standards	▪ The IS auditor should adhere to the ISACA Code of Professional Ethics in conducting audit assignments. ▪ The IS auditor should exercise due professional care, including observance of applicable professional auditing standards, in conducting the audit assignments	1 January 2005

Table 2.1 (Continued)

Title	Standard	Effective Date
S4 Competence	▪ The IS auditor should be professionally competent, having the skills to conduct the audit assignment. ▪ The IS auditor should maintain professional competence through appropriate continuing professional education and training.	1 January 2005
S5 Planning	▪ The IS auditor should plan the information systems audit coverage to address the audit objectives and comply with applicable laws and professional auditing standards. ▪ The IS auditor should develop and document a risk-based audit approach. ▪ The IS auditor should develop and document an audit plan that lists the audit detailing the nature and objectives, timing and extent, objectives and resources required. ▪ The IS auditor should develop an audit program and/or plan and detailing the nature, timing and extent of the audit procedures required to complete the audit.	1 January 2005

Table 2.1(Continued)

Title	**Standard**	**Effective Date**
S6 Performance of Audit Work	▪ Supervision— IS audit staff should be supervised to provide reasonable assurance that audit objectives are accomplished and applicable professional auditing standards are met. ▪ Evidence— during the course of the audit, the IS auditor should obtain sufficient, reliable and relevant evidence to achieve the audit objectives. The audit findings and conclusions are to be supported by appropriate analysis and interpretation of this evidence. ▪ Documentation— The audit process should be documented, describing the audit work performed and the audit evidence that supports the IS auditor's findings and conclusions	1 January 2005

Table 2.1 (Continued)

Title	Standard	Effective Date
S7 Reporting	▪ The IS auditor should provide a report, in an appropriate form, up on completion of the audit. The report should identify the organization, the intended recipients and any restrictions on circulation. ▪ The audit report should state the scope, objectives, period of coverage and the nature, timing and extent of the audit work performed. ▪ The report should state the findings, conclusions and recommendations and any reservations, qualifications or limitations in scope that the IS auditor has with respect to the audit. ▪ The IS auditor should have sufficient and appropriate audit evidence to support the results reported. ▪ When issued, the IS auditor's report should be signed, dated and distributed according to the terms of the audit charter or engagement letter	1 January 2005
S8 Follow-Up Activities	▪ After the reporting of findings and recommendations, the IS auditor should request and evaluate relevant information to conclude whether appropriate action has been taken by management in a timely manner	1 January 2005

Table 2.1 (Continued)

Title	Standard	Effective Date
S9 Irregularities and Illegal Acts	▪ In planning and performing the audit to reduce audit risk to a low level, the IS auditor should consider the risk of irregularities and illegal acts. ▪ If the IS auditor encounters exceptional circumstances that affect the IS auditor's ability to continue performing the audit because of a material misstatement or illegal act, the IS auditor should consider the legal and professional responsibilities applicable in the circumstances, including whether there is a requirement for the IS auditor to report to those who entered in to the engagement or in some cases those charged with governance or regulatory authorities or consider withdrawing from the engagement. ▪ The IS auditor should document all communications, planning, results, evaluations and conclusions relating to material irregularities and illegal acts that have been reported to management	1 September 2005

Table 2.1 (Continued)

Title	Standard	Effective Date
S10 IT Governance	▪ The IS auditor should review and assess whether the IS function aligns with the organization's mission, vision, values, objectives and strategies. ▪ The IS auditor should review whether the IS function has a clear statement about the performance expected by the business (effectiveness and efficiency) and assess its achievement. ▪ The IS auditor should review and assess the effectiveness of IS resource and performance management processes. ▪ The IS auditor should review and assess compliance with legal, environmental and information quality, and fiduciary and security requirements. ▪ A risk based approach should be used by the IS auditor to evaluate the IS function. ▪ The IS auditor should review and assess the control environment of the organization. ▪ The IS auditor should review and assess the risks that may adversely affect the IS environment.	1 September 2005

Table 2.1 (Continued)

Title	Standard	Effective Date
S11 Use of Risk Assessment in Audit Planning	▪ The IS auditor should use an appropriate risk assessment technique or approach in developing the overall IS audit plan and in determining priorities or the effective allocation of IS audit resources. ▪ When planning individual reviews, the IS auditor should identify and assess risks relevant to the area under review	1 November 2005
S12 Audit Materiality	▪ The IS auditor should consider audit materiality and its relationship to audit risk while determining the nature, timing and extent of audit procedures ▪ The report of the IS auditor should disclose in effective controls or absence of controls and the significance of the controlled efficiencies and possibility of these weaknesses resulting in a significant deficiency or material weakness.	1 July 2006

Table 2.1 (Continued)

Title	Standard	Effective Date
S13 Using the Work of Other Experts	▪ The IS auditor should assess and be satisfied with the professional qualifications, competencies, relevant experience, resources, independence and quality control processes of other experts, prior to engagement. ▪ The IS auditor should apply additional test procedures to gain sufficient and appropriate audit evidence in circumstances where the work of other experts does not provide sufficient and appropriate audit evidence. ▪ The IS auditor should provide appropriate audit opinion and include scope limitation where required evidence is not obtained through additional test procedures	1 July 2006
S14 Audit Evidence	▪ The IS auditor should obtain sufficient and appropriate audit evidence to draw reasonable conclusions on which to base the audit results. ▪ The IS auditor should evaluate the sufficiency of audit evidence obtained during the audit	1 July 2006

Table 2.1 (Continued)

Title	Standard	Effective Date
S15 IT Controls	▪ The IS auditor should evaluate and monitor IT controls that are an integral part of the internal control environment of the organization. ▪ The IS auditor should assist management by providing advice regarding the design, implementation, operation and improvement of IT controls.	1 February 2008
S16 E-commerce	▪ The IS auditor should evaluate applicable controls and assess risk when reviewing e-commerce environments to ensure that e-commerce transactions are properly controlled.	1 February 2008

Source: ISACA, 2009

Table 2.2
ISACA Guidelines

IT Audit and Assurance Guidelines	**Effective Date**
G1 Using the Work of Other Auditors	1 March 2008
G2 Audit Evidence Requirement	1 May 2008
G3 Use of Computer Assisted Audit Techniques (CAATs)	1 March 2008
G4 Outsourcing of IS Activities to Other Organizations	1 May 2008
G5 Audit Charter	1 February 2008
G6 Materiality Concepts for Auditing Information Systems	1 May 2008
G7 Due Professional Care	1 March 2008
G8 Audit Documentation	1 March 2008
G9 Audit Considerations for Irregularities and Illegal Acts	1 September 2008
G10 Audit Sampling	1 August 2008
G11 Effect to Pervasive IS Controls	1 August 2008
G12 Organizational Relationship and Independence	1 August 2008
G13 Use of Risk Assessment in Audit Planning	1 August 2008
G14 Application Systems Review	1 October 2008
G15 Planning Revised	1 March 2002
G 16 Effect of Third Parties on an Organization's IT Controls	1 March 2002
G 17 Effect of Nonaudit Role on the IT Audit and Assurance Professional's Independence	15 June 2009
G 18 IT Governance	1 July 2002
G 20 Reporting	1 January 2003
G21 Enterprise Resource Planning (ERP) Systems	1 August 2003
G22 Business-to-consumer (B2C) E-commerce	1 October 2008

Table 2.2 (Continued)

IT Audit and Assurance Guidelines	Effective Date
G 23 System Development Lifecycycle (SDLC) Review Reviews	1 August 2003
G24 Internet Banking	1 August 2003
G25 Review of Virtual Private Networks	1 July 2004
G26 Business Process Reengineering (BPR) Project Reviews	1 July 2004
G27 Mobile Computing	1 September 2004
G28 Computer Forensics	1 September 2004
G29 Post-implementation Review	1 January 2005
G30 Competence	1 June 2005
G31 Privacy	1 June 2005
G32 Business Continuity Plan (BCP) Review From IT perspective	1 September 2005
G33 General Considerations on the Use of the Internet	1 March 2006
G34 Responsibility, Authority and Accountability	1 March 2006
G35 Follow-up Activities	1 March 2006
G36 Biometric Controls	1 February 2007
G37 Configuration Management Process	1 November 2007
G38 Access Controls	1 February 2008
G39 IT Organization	1 May 2008
G40 Review of Security Management Practices	1 October 2008

Source: ISACA 2009

Table 2.3
ISACA Tools and Techniques

IT Audit and Assurance Tools and Techniques	**Effective Date**
P1 IS Risk Assessment	1 July 2002
P2 Digital Signatures	1 July 2002
P3 Intrusion Detection	1 August 2003
P4 Viruses and other Malicious Code	1 August 2003
P5 Control Risk Self-assessment	1 August 2003
P6 Firewalls	1 August 2003
P7 Irregularities and Illegal Acts	1 November 2003
P8 Security Assessment—Penetration Testing and Vulnerability Analysis	1 September 2004
P9 Evaluation of Management Controls Over Encryption Methodologies	1 January 2005
P10 Business Application Change Control	1 October 2006
P 11 Electronic Funds Transfer (EFT)	1 May 2007

Source: ISACA 2009

2.3.1.4 AICPA

Statements on Audit Standards (SASs) are issued by the Audit Standards Board (ASB). ASB issued standards related directly to an IT audit. These SASs are SAS NO.3 (1974), SAS NO.48 (1984) and SAS NO. 94 (2001) (Yang & Guan, 2004).

SAS NO.3, "The effects of EDP on the auditor's study and evaluation of internal control", describes the effect of the use of electronic data processing (EDP) on the various characteristics of accounting control and the auditor's responsibility for reviewing those controls. It also provides a framework for the development of further guidance concerning auditing procedures in examining financial statement of entities that use EDP in accounting applications (Jancura & Lilly, 1977).

SAS NO.48, "The effects of computer processing on the examination of financial statements", stated that the auditor must decide whether he or she has the necessary skills to determine the effect of IT on the audit function. If a specialist is needed, the auditor can choose a computer specialist who is a member of the auditor team. This means that the auditor must have enough level of computer skills in order to communicate his or her objectives to the specialist and to evaluate the results (Yang & Guan, 2004).

SAS NO.94, "The effect of IT on the auditor's consideration of internal control in a financial statement audit", provides guidance on the effect of IT on internal control and on the auditor's understanding of internal control and assessment of control risk. It also looks at the benefits provided by IT as well as the risks to an internal control in any entity (Tucher, 2001).

SAS NO.94 provides specific guidance when a significant amount of financial information supporting one or more financial statement assertions is automated by complex electronic IT. In these situations, the auditor must assess control risk by performing tests of controls, regardless of firm size (Cerullo & Cerullo, 2003).

2.3.2 ACADEMIC RESEARCH

Standards issued by the professional and authoritative bodies such as IFAC, ISACA and AICPA require audit practitioners and lecturers to understand the variety of technologies used in business environment (Merhout & Buchman, 2007). Therefore, many studies have been conducted to explore and investigate these standards. Next sub sections discuss briefly these studies into three categories: IT and accounting education, IT and accounting curriculum and IT and auditing.

2.3.2.1 IT and Accounting Education

Coenenber et al. (1999) compared between the current accounting education system in German and the standards and guidelines issued by IFAC. They concluded that accounting education system in German comply in most aspects of the IFAC guidelines. The current accounting education system only lags behind those guidelines in terms of the broadness and depth of competence which accounting education should provide. The areas which are underrepresented are mathematics, statistics, behavioral science and IT.

Mohamed and Lashine (2003) highlighted the challenges facing accounting education in providing students with the skills that raise their competency level to meet that required by the market. They argued that the current accounting education and the skill levels of accountants are not in line with what is required in the dynamic environment of global business. Therefore, a knowledge gap has been created that needs to be closed by the business schools.

Burnett (2003) examined the skills that are important for new graduate students and the educational innovations that are effective for teaching accounting students? He pointed out that several important skills should be considered in the improvement process for any accounting program. These skills include professional skills, technology skills, academic professional interaction methods and outside the classroom learning activities.

Chang and Hwang (2003) examined what has been done in US colleges by pooling auditors' perceptions to investigate whether US accounting firms provide their auditors with more information on current IT topics than colleges do. The study also surveyed accounting lecturers to find out what they are planning to do in college's courses to ensure that accounting graduates acquire necessary IT skills. The results suggested that accounting lecturers have responded to the calls from various organizations by integrating the most important IT topics into the accounting curriculum. However, while accounting lecturers recognized the importance of IT topics, only few IT topics can be covered in the accounting curriculum.

Howieson (2003) suggested that public accounting firms are working hard to transform themselves into finance professionals and professional services firms including information systems audit and assurance. It is now the accounting education’s turn to transform itself and educate future accountants with the skills required by the industry.

Lin et al. (2005) surveyed the required skills and pedagogy for accounting education as perceived by accounting practitioners, lecturers and students in China. Results revealed the respondents generally agreed on the number of IT skills subjects that should be developed in China accounting education, although some variance exists among respondents regarding the perceived importance of those IT skills. The results also revealed that the respondents believed that the current state of accounting education in China could not satisfy the development of the needed IT skills.

Chandra et al. (2006) surveyed about the gap between IT skills demanded of management accountants and those supplied by higher education. The results suggested that accounting students are not being taught the IT skills required by the business world.

Arnold and Sutton (2007) highlighted the specific failures of contemporary accounting education in providing the skills required to succeed in new business environment. They argued that the education required of students entering the job market today with a degree in accounting should be very different from the education provided 25 or more years ago in a world driven by manual processes or computerized systems that simply automated the manual processes. They then proposed a framework for revolutionary accounting education change.

Lin (2008) identified, using factor analysis, latent constructs underlying those skill items that have been generally accepted by various stakeholders of accounting education in many countries such as UK and USA. Through factor extraction from 37 skill items derived from prior studies, he identified 6 inherent constructs i.e., business/management skills, business/management knowledge, core accounting knowledge, personal characteristics, general knowledge and basic techniques.

Celik and Ecer (2009) investigated the efficiency of undergraduate accounting programs of Turkish universities. The survey comprised four groups: students, academicians, programs and financial resources. It was also divided into two levels: the faculty level and the department level. They found that the universities have problems in the faculty and departmental levels. The most important problem is the lack of efficiency in the use of resources. They suggested that Turkish universities should use their resources in an efficient way to produce competitive and well-educated accounting professionals.

Lupasc et al. (2011) highlighted the importance and benefits of smart technologies to the financial accounting domain especially in the context of speedier and more accurate decision making process. They also stressed the importance of integrating such IT skills into the accounting curriculum.

Obaidat and Alqatamin (2011) investigated accounting students' perceptions toward IT usage in the learning process in Jordan. Four IT tools were used: Internet, Email, MS PowerPoint, and MS Excel. The results showed that accounting students had positive perceptions toward the use of the four tools of IT in the learning process, and these perceptions were affected by the students' gender, access to Internet, and the average hours using the Internet.

2.3.2.2 IT and Accounting Curriculum

Theuri and Gunn (1998) examined the current practices in the design and teaching of AIS courses at undergraduate level in colleges and universities in USA. These practices were analyzed by relating them to the accounting graduate employers' IT skills expectations. Only 23% of respondents perceived their graduates/entry-level hires at an above average level in IT skills preparedness.

Hermanson et al. (1999) examined the integration level of IT in the undergraduate accounting programs across the curriculum in the US universities. Results indicated that integrating IT into the accounting curriculum is important, while few departments have an IT policy, coverage of IT topics is minor to moderate, and students' usage of computer applications is fairly low.

Montano et al. (2001) highlighted the importance that the employers of management accountants gave to a specified set of vocational skills and capabilities and the level of ability of these skills exhibited by students. An integrated analysis of the two attributes importance and exhibited level, is enabled by the use of strategic mapping. The results suggested that the employers perceived deficiencies in several capabilities that they have identified as being quite important. These deficiencies existed, in the employers' opinion, both prior to recruitment and on professional qualification. The results also suggested that, in the opinion of the employers, the development of these skills should be a central concern for universities and professional bodies.

Ahmed (2003) surveyed what IT skills and knowledge accountant should possess, which skills and knowledge employers expect them to have, and which skills and knowledge employers prefer them to have. The study also investigated the level of IT skills integrated in accounting education in UK universities. The results suggested that accounting education did not equip the students with sufficient IT skills for their potential role in their employment. In addition, there is a gap between the IT skills that student currently learn in accounting education at the university level and what accountant practice in the real world.

Ismail et al. (2005) investigated the perception of accounting lecturers toward the IT integration into the accounting curriculum in Malaysian universities. They found that most of accounting lecturers in Malaysian universities recognized the importance of IT skills in enhancing the future of the accounting profession. However, they were dissatisfied on several technical aspects such as adequacy of application software, network services, technical support, and allocation of IT-related training. Furthermore, whilst a majority of the respondents felt that IT should be integrated into all major areas of accounting, many of them felt that the extent of IT skills being integrated into the accounting curriculum is insufficient.

Senik and Broad (2008) investigated the process of developing and enhancing IT skills for accounting graduates through interpretive approach using grounded theory analysis. Results suggested that factors such as university policy, employers' expectation and other universities' practices are strong external factors influenced IT skills development. For internal factors, highly motivated and interested lecturers were the most influential factors.

Harrast et al. (2010) analyze the technology skills of undergraduate accounting students to determine their technological strengths and weaknesses. They found that a large fraction of students are not proficient in requisite technologies even after completing the majority of their undergraduate accounting course work. This supports the argument that the accounting curriculum would benefit from an increase in technology training. Furthermore the technologies students were most interested in learning were tax software, small business accounting, generalized audit software and spreadsheets.

2.3.2.2 IT and Auditing

This section discusses the extant literature that related to the IT and auditing.

Greenstein and McKee (2004) surveyed the auditing lecturers and audit practitioners' knowledge about 36 technologies. . Results indicated that there is low level of knowledge between lecturers and practitioners for e-commerce, advanced technologies and audit automation constructs. On the other side, there is a relatively high level of knowledge for office automation and accounting firm office automation constructs. Greenstein and McKee (2004) contended that there is a learning gap between lecturers and practitioners.

Similarly, Merhout and Buchman (2007) investigated the skills needed by employers for IT audit jobs. The skills were divided into three categories: technical skills/abilities, organizational skills/business knowledge, and audit and technical knowledge. Results indicated that IT auditors must have interpersonal skills to interact with multiple levels of personal and technical skills to understand the variety of technologies used in organization.

Shaikh (2005) discussed how auditors could use some of the computer-assisted auditing techniques (CAATs) more effectively with support of the modern IT. He then proposed a new audit approach called Electronic Auditing (EA) which performs audit tasks electronically and automatically over the internet.

Brazel and Agoglia (2007) investigated the effects of Computer Assurance Specialist (CAS) competence and Auditor Accounting Information System (AIS) expertise on auditor planning judgments in a complex AIS environment. Results indicated that auditors were sensitive to the competence of computer assurance specialist and assessed control risk higher when provided with positive control testing evidence from a CAS with low (versus high) competence. The results also suggested that, in an AIS setting indicative of increased risk, auditors with higher AIS expertise assessed control risk as higher than those with lower expertise.

Greenstein et al. (2008) surveyed IT knowledge level among US and German auditors. Results indicated that there is a different knowledge level between the two countries. German auditors had higher knowledge for the construct of networking and data transfer. US auditors had higher knowledge for three constructs: ecommerce, general office automation, and audit automation technologies.

Janvrin et al. (2008) examined the use and perceive importance of IT audit in the current audit environment. Results indicated that some audit applications such as analytical procedures, audit report writing, electronic work papers, internet search tools and sampling were used by responding auditors. However, auditors did not use more sophisticated applications such as digital analyses, expert systems, test of line transaction, database modeling and continues transaction monitoring. In addition, auditors indicated that several audit applications were important, although they did not use them extensively (e.g., audit planning, client acceptance, client relationship management, fraud review, internal control evaluation and risk assessment). Results also suggested that usage and perception of the importance of IT audit vary by firm size.

Helliar et al. (2009) examined which skills that practitioners, lecturers and students think are important for trainee auditors to possess for successful audit career. The skills can be initially developed during a university accounting degree. Findings indicated that the essential skills are discussions, presentations, interviewing and work group. All of these skills are being encouraged on university courses, in addition accounting lecturer should recognize that these softer skills are as essential as the technical skills which are often the major part of university study.

Ismail and Abidin (2009) investigate the alignment between the level of IT knowledge and IT importance among the auditors in Malaysia. The results suggested that IT knowledge level among the auditors in Malaysia is lower than their perception toward the importance of the technologies. Furthermore, results indicated that auditors in Malaysia have perceived the highest knowledge in general office automation and accounting automation skills, while knowledge in system development and installation were low.

Rai et al. (2010) examine the alignment between the perceptions of IT importance and knowledge level among the auditors in Australia. The results indicated that IT knowledge level among Australian auditors is lower than the perception towards the importance of technologies. Furthermore, results indicated that auditors in Australia have a high IT knowledge in email and communication software, and electronic spreadsheets, while knowledge in system development and programming tools ids low.

Lu et al. (2012) surveyed the barriers of IT adoption in accounting education in China. The first challenge is the low IT cognition among the students and also incompetent faculty members. The second barrier is limited access to the hardware and software including accounting packages. They suggested universities in China must overcome these two barriers to successfully integrate IT skills in to accounting curriculum.

Stoel et al. (2012) refined the factors related to IT audit quality and evaluated their relative importance. This study found 13 factors to be associated with IT audit quality, and independence and business process knowledge are among the highest rated factors for impact on IT audit quality.

The academic researches are summarized as follows in Table 2.4 below.

Table 2.4
Summary of Literature

Author(s)	Year	Conclusions
IT and Accounting Education		
Coenenber et al.	1999	The accounting education system in German integrated in many aspects with the IFAC guidelines. Furthermore, the current accounting education only lags behind those guidelines in mathematics, statistics, behavioral science and IT.

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Mohamed and Lashine	2003	The current accounting education and the skill levels of accountants lag behind the requirements of the global business.
Burnett	2003	The important skills should be considered in improvement of accounting education system are professional skills, technological skills, academic professional interaction methods and outside the classroom learning activities.
Chang and Hwang	2003	The accounting lecturers in US recognized the importance of IT topics but few topics can be integrated into the accounting curriculum.
Howieson	2003	Public accounting firms can help in the education of the future accountants with the skills required by the industry.
Lin et al.	2005	The current state of accounting education in China is not in line with the needed IT skills.
Chandra et al.	2006	There is a gap between IT skills required by the industry and what is taught to the accounting students.
Arnold and Sutton	2007	The current accounting education fails to provide the IT skills required by the new business environment.

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Lin	2008	The skills items that have a general accepted by various stakeholders of accounting in UK and USA are business/management skills, business/management knowledge, core accounting knowledge, personal characteristics, general knowledge and basic techniques.
Celik and Ecer	2009	Turkish universities have a problem in the efficiency in the use of resources. Therefore universities should use the resources in an efficient way to produce competitive and well-educated accounting professionals.
Lupasc et al.	2011	It is important that research in IT and accounting should be continue and give further supported by the scientific community in the field of accounting and finance.
Obaidat and Alqatamin	2011	The results showed that accounting students had positive perceptions toward the use of the four tools of IT in the learning process, and these perceptions were affected by the students' gender, access to Internet, and the average hours using the Internet.
IT and The Accounting Curriculum		
Theuri and Gunn	1998	AIS courses at undergraduate level in colleges and universities in USA are not included what is required by the employers.

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Hermanson et al.	1999	IT integration into the accounting curriculum is important, while few departments have an IT policy, coverage of IT topics is minor to moderate, and students' usage of computer applications is fairly low.
Montano et al.	2001	Employers perceive deficiencies in the graduates' level of vocational skills and capabilities. The development of these skills should be a central concern for universities and professional bodies.
Ahmed	2003	There is a gap between the IT skills currently learn to the students in accounting education at the university level in UK and what is needed to practice accountant in the real world.
Ismail et al.	2005	Accounting lecturers in Malaysian universities recognized the importance of IT skills to develop the accounting education. However, they were dissatisfied on adequacy of application software, network services, technical support, and allocation of IT-related training. Most of them felt that the integration of IT in accounting curriculum is insufficient.

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Senik and Broad	2008	External factors that influence the IT skills development in accounting education are university policy and employers' expectation. Furthermore, the internal factors are motivations and interests of lecturers.
Harrast et al.	2010	Large fraction of students is not proficient in requisite technologies even after completing the majority of their undergraduate accounting course work. Furthermore the technologies students were most interested in learning were tax software, small business accounting, generalized audit software and spreadsheets.
IT and Auditing		
Greenstein and McKee	2004	There is low level of knowledge between lecturers and practitioners for e-commerce, advanced technologies and audit automation constructs and high level of knowledge for office automation and accounting firm office automation constructs.
Merhout and Buchman	2007	IT auditors must have interpersonal skills and technological skills to understand the technologies used in the business environment.
Shaikh	2005	Proposed a new audit approach called electronic auditing which performs audit tasks electronically and automatically over the internet.

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Brazel and Agoglia	2007	Auditors were sensitive to the competence of computer assurance specialist and assessed control risk higher when provided with positive control testing evidence from a CAS with low (versus high) competence.
Greenstein et al.	2008	There is different knowledge level among US and German auditors. German auditors had higher knowledge for networking and data transfer. US auditors had higher knowledge for ecommerce, general office automation, and audit automation technologies.
Janvrin et al.	2008	Auditors did not use many applications such as digital analyses, expert systems, test of line transaction, database modeling and continues transaction monitoring.
Helliar et al.	2009	The skills can be initially developed during a university accounting degree are discussions, presentations, interviewing and work group.
Ismail and Abidin	2009	IT knowledge level among the auditors in Malaysia is lower than their perception toward the importance of the technologies.
Rai et al.	2010	IT knowledge level among Australian auditors is lower than the perception towards the importance of technologies

Table 2.4 (Continued)

Author(s)	Year	Conclusions
Lu et al.	2012	This study found two barriers to IT integration in accounting education in China. First is low perception of the importance of IT among the students and incompetent faculty members. Second is limited access to hardware and software facilities.
Stoel et al.	2012	This study found Planning, Methodology, and Business Process Knowledge as the three important factors affecting IT audit quality.

The above Table can be illustrated as follow:

The first group of studies investigates the relationship between IT and accounting education by comparing between the Skills provided by the accounting education and those currently required by the business environment in German, UK, USA and China. Results suggest that accounting education is not inline with what is required by the business world.

The second group surveyed the relationship between IT and the accounting curriculum by investigate which IT skills accountant should possess and which skills employers expect them to have. In addition, investigated the perception of accounting lecturers toward IT integrated into the accounting curriculum in UK, USA, and Malaysia.

The last group discussed the literature related to the IT and auditing. These studies examine which skills that practitioners, lecturers, and employers thinking are important for auditors to possess for successful audit career. Results indicated that technical skills, general office automation and audit automation technology are important for auditors.

From the above discussion it is clear that previous studies failed to find a comprehensive model linked the IT skills required, the level of integration of required IT skills into accounting curriculum, the alignment between them, and the factors that influence the alignment. Furthermore most of studies were conducted in developed countries such as the USA, the UK and Germany.

Therefore, the present study attempt to find a comprehensive model linked the IT skills required, the level of integration of required IT skills into accounting curriculum, the alignment between them, and the factors that influence the alignment and it conducted in Egypt.

2.4 OVERVIEW OF THE THEORIES APPLIED

This study applied two theories, information processing theory and task-technology fit theory. Next sub-sections illustrate each of these theories.

2.4.1 Information Processing Theory

The framework of this study was developed around Galbraith's (1973) information-processing theory (IPT), which is classified as contingency theory. The term contingency as used in the theory is similar in its use in direct practice. Contingency is a relationship between two phenomena, if one phenomenon exists, then a conclusion can be drawn about another phenomenon (Schoech, 2006).

Contingency theory was initially developed as a means of explaining observed differences in the structure of organizations (Mitchell et al., 2000). The theory is based on the conclusions: (1) there is not best way to organize, and (2) any way of organizing is not equally effective (Galbraith, 1973). Therefore, there is no universally appropriate accounting system that can be applied equally in all organizations in all circumstances, and the appropriate accounting system will depend upon the specific circumstances in which an organization finds itself (Haldma & Laats, 2002) .

Galbraith's (1974) information processing theory suggests that each organization should build an organizational structure which can handle and process the different uncertainties, unpredictability and complexity that the organization is facing (Rhee, 2001). Furthermore, the tasks of organizations will also create different needs for the processing of information, while different kinds of organizational tasks will require different needs for the processing of information.

Building upon information-processing arguments, each organization should match its information-processing capacity with the organization's needs for handling and processing information. An organization will have a greater need for information processing when the tasks of the organization and surrounding environment are uncertain in nature. Thus, the organizational structure should reflect the information-processing needs of the organization, so that the organization can remain efficient and viable (Bollingtoft et al., 2009). If the information-processing capacity is too small, the organization will not be efficient, and will not be able to preplan or to make viable decisions. However, if the information-processing capacity is too great, the organization will waste its resources on information-processing capabilities that are not needed to process the uncertainties which an organization is facing.

The central idea of the present research is based on Galbraith’s (1973) information-processing theory, which asserts that organizations would respond to the increasing of information demand by increasing or reducing their information-processing capabilities. The challenges that organizations face now require a special kind of accountant that can understand how to use IT and when (and when not) to use it (Nance & Straub, 1996). Accountants play important roles in the management, evaluation, development and usage of various modern technologies. As suggested by IFAC, accountant can be a user, designer, manager or evaluator of organizational information systems (Ismail, 2009). Based on this idea, the present study proposes a better fit between the IT skills required and integrated into the accounting curriculum that will result in professional accountants know how to use and work in an IT-based environment.

2.4.2 Task-Technology Fit Theory

The core of Task-Technology Fit (TTF) theory is a match of capabilities of the technology to the demands of the task or the ability of IT to support of a task. The theory suggests that IT is more likely to have a positive impact on individual performance if the capabilities of the IT match the tasks that the user must perform (Goodhue & Thompson, 1995). TTF have four key constructs, Task Characteristics, Technology Characteristics, which together affect the third construct Task-Technology Fit that in turn affects the outcome variable, either Performance or Utilization. TTF posits that IT will be used if, and only if, the functions are available to the user fit the activities of the user (Dishaw et al., 2002).

According to Goodhue and Thompson (1995), the level of task-technology fit would decrease if a technology does not meet the user's requirements. For example, a user could become 'disappointed' when he or she is at the stage of identifying information, and the technology tools do not provide the right information, the right level of information detail, confusing information, and if the location of the information is not clear (Davenport & Beers, 1995).

Rationally, TTF assumes that users, who are more experienced in IT and well trained in IT skills, will be able to choose those tools and methods that enable them to complete the task with the greatest net benefit (D'Ambar & Wilson, 2004). The TTF perspective suggests that a better fit between technology functionalities, task requirements and individual abilities will lead to better performance. Based on this idea, the present study proposes that better fit between individual abilities (IT skills integrated) and task requirements (IT skills required) will lead to better performance.

2.5 SUMMARY

This chapter provides an overview of accounting education and accounting practice in Egypt. It also discusses literature relating to IT skills required and accounting education and IT skills and accounting practice. These discussions are divided into two sections. The first section discusses the efforts of authoritative bodies, while the second section discusses the efforts of researchers, which contains literatures relating to IT and accounting education, IT and the accounting curriculum, and IT and auditing. Last section discusses an overview of the theories applied. The review also reveals many of the issues that were addressed by researchers, which are issued to develop the theoretical framework of this study and discussed in the next chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter has reviewed the literature related to accounting education in general and the impact of IT on accounting practices and education. This chapter presents a research framework to determine the relationship between the research variables. The main research variables are required IT skills (hereafter referred to as Required IT), the level of integration of the required IT skills into the accounting curriculum (hereafter referred to as Integrated IT), and the alignment between the two variables (hereafter referred to as IT Alignment). Other research variables explored are financial resources, university and faculty support, educator's perception towards IT skills, and employers' requirement towards IT skills. The development of research hypotheses is also discussed.

3.2 RESEARCH FRAMEWORK

Reviews of literature discussed in chapter two failed to find a comprehensive model that linked Required IT, Integrated IT, the alignment between the two variables (IT Alignment), and the factors that influence the alignment. As discussed earlier in chapter one, majority of previous studies investigated the issues separately. Some studies investigated the importance of IT skills in accounting education from either the perspective of accounting professionals or accounting educators (i.e. Mohamed & Lashine, 2003; Burnett, 2003; Howieson, 2003; Chandra et al., 2006; Lin, 2008).

Other studies investigated the impact of IT on accounting practices (i.e. Greenstein & McKee, 2004; Merhout & Buchman, 2007; Janvrin et al., 2008; Helliar et al., 2009).

There are only few attempts made to investigate the alignment between required IT skills and the level of integration of IT skills into the accounting curriculum (e.g. Theuri & Gunn, 1998; Montano et al., 2001; Ismail et al., 2005). However, respondents of these studies do not represent those in a position to answer the two different but related questions. Ismail et al. (2005), for example, asked AIS and audit lecturers in Malaysia to measure the importance (relevance) of 19 technologies in audit work and the level of integration of those technologies in AIS and audit subjects. While the respondents (lecturers) may correctly answer questions related to the level of integration into the curriculum, they may not have sufficient knowledge to answer correctly questions related to the importance (relevance) of those technologies in practice.

More importantly, there is no attempt made to investigate the potential factors that influence the alignment between the two variables. Furthermore, most of studies relating to IT and accounting education were conducted in developed countries such as the USA (Theuri & Gunn, 1998; Greenstein & McKee, 2004; Merhout & Buchman, 2007), the UK (Helliar et al., 2009) and Germany (Coenenber et al., 1999). To the researcher's best knowledge, this study represents the first attempt to: (1) investigate the alignment between Required IT and Integrated IT into the accounting curriculum; (2) identify factors that influence the IT alignment especially in the context of Egyptian universities.

3.2.1 Underpinning Theory

Various types of theories have been used in the accounting education research. For example, Broad et al. (2004) used Learning Styles theory to investigate the adoption of new technologies, such as the Internet as a new pedagogy aids to more effective learning and teaching for accounting students and lecturers in the UK. Learning Styles theory is based on research on learning styles and strategies. Furthermore it proposes that different people learn in different ways and that it is good to know one's own preferred learning style. In summary, this theory concentrates in pedagogy and learning methods, not in curriculum.

Curtis (2011) used Cognitive Learning theory to discuss how Formative Assessment (FA) improves accounting learning. Cognitive learning theory provides a model of how students can engage with the learning tasks to achieve meaningful understanding of fundamental concepts like the financial accounting elements. This theory concerns with the learning of fundamental concepts by the students not the skills required.

Liaw et al. (2006) used Activity theory to investigate learners' attitude factors toward e-learning systems. Activity theory is a cross-disciplinary framework for studying different forms of human practices, factoring in the processes of context as developmental process, both at the individual and social levels at the same time, including the use of artifacts. This theory concerns with forms of human practice, which is more appropriate for researchers in pedagogy.

Senik and Broad (2008) used Grounded theory to understand the process of developing and enhancing IT skills for accounting graduates through interpretive approach. Grounded theory used to discovery of theory from data systematically obtained from social research.

The framework for this study was developed around Galbraith's (1973) information processing theory (IPT). This theory is one of several theories that can be classified as contingency theory (Bolon, 1998). Contingency theory was initially developed as a means of explaining observed differences in the structure of organization (Mitchell et al., 2000). The central theme is that there is no unique or best structure that fits all organizations under all circumstances (Abdel-Kader & Luther, 2008). It is based on the conclusions that (1) there is no best way to organize, and (2) any way of organizing is not equally effective (Galbraith, 1973).

When taking an information processing perspective on firms, an organization can be defined as an entity that uses information in order to coordinate and control its activities (Galbraith, 1974). Building on information processing arguments, organization is well designed when its information processing capacity matches its information-processing load. If an organization’s information-processing load is higher than the organizational information processing capacity, the organization will unable to reach organizational goals. On the other hand, if information-processing capacity exceeds information-processing load, the organization will consume extra resources and be inefficient (Bollingtoft et al., 2009).

According to Galbraith (1974) as well as Daft and Lengel (1986), the information-processing load imposed on organizational coordination can be conceptualized in terms of uncertainty and equivocality. Uncertainty relates to the difference between the amount of information required and the amount possessed by the organization (Rhee, 2001). Environment is characterized by uncertainty, unpredictability and complexity. This external uncertainty will result in an internal task uncertainty, which then increases the need for information processing among decision-makers. Organization can be aided by advancements in IT, which must be viewed in terms of problem analyzability and task variability (Burton et al., 2008).

Similarly, task-technology fit theory (TTF) postulates that IT is more likely to have a positive impact on individual performance and will be useful if the capability of the IT match the task that the user must performance. TTF is the correspondence between task requirements, individual ability and the functionality of technology (Goodhue& Thompson, 1995).

Both IPT and TTF are relevant in addressing the issue of this study. For example, lack of fit between Required IT and Integrated IT into the accounting curriculum would result in a mismatch between the technologies required by the industry and the skills taught by the universities. To work effectively in an IT-based business environment, it is important for accountants to possess sufficient IT skills. On the other hand, accountants with high IT skills would be useless if they work in a manual or less sophisticated IT-based business environment. Therefore, it is important to understand the two variables and its alignment in a specific context of a country as the level of IT sophistication among countries are dissimilar. While most businesses in developed countries have adopted sophisticated IT, those in developing and less developed countries may have different level of IT sophistication, hence the demand for accountants with the required skills (Greenstein & McKee, 2004).

The challenges facing organizations now require a special kind of accountant that can understand how to use IT and when (and when not) to use it (Nance & Straub, 1996). Accountants can play important roles in the management, evaluation, development and usage of various modern technologies. As suggested by IFAC, accountant can be a user, designer, manager or evaluator of organizational information systems (Ismail, 2009). TTF assumes that individuals who are more experienced in IT and better trained in IT skills will be able to successfully identify access and interpret needed information in any information system (D'Ambra & Wilson, 2004). For that purpose, professional accountants are expected to know how to use and work in an IT-based environment (IFAC, 2006).

IPT asserts that information requirements (required IT skills) must be aligned with information processing capacity (integrated IT skills) to have an impact on accountant performance. Similarly, TTF assumes that IT skills is more likely to have a positive impact on individual performance and will be useful if capability of the IT skills (integrated IT skills) matches with the task that the user must perform (required IT skills) (Goodhue& Thompson, 1995).

However, results from many studies (e.g. Ahmed, 2003; Senik & Broad, 2008; Lin, 2008) revealed that accounting education did not equip the students with sufficient IT skills for employment purposes. A gap exists between the IT skills that students learned in accounting education at university level and what accountant practices in the real world. Therefore, attention must be given to the integration of appropriate IT skills into the accounting curriculum to equip students with the necessary skills required by employers (Ahmed, 2003).

The issue discussed above has motivated this study. This study aims to achieve several objectives. First, it aims to identify required IT skills from the perspective of accounting lecturers (Required IT). Secondly, it aims to identify the level of integration of the required IT skills into the accounting curriculum (Integrated IT). As discussed earlier in chapter one, most of accounting lecturers in Egypt are also accounting practitioners. Therefore, unlike respondents in previous studies, they are in a position to answer correctly both question one and question two. Thirdly, it aims to explore the alignment between the Required IT and Integrated IT into the accounting curriculum. Finally, this study aims to identify the factors that influence the alignment between Required IT and Integrated IT into the accounting curriculum. Previous studies have identified several factors that influenced the integration of IT skills into accounting curriculum. Among the factors are motivation of lecturers (Lin et al., 2005; Phillips, 2005; Senik & Broad, 2008), university policy and management (Ismail & Salim, 2005; Kavanagh & Drennan, 2007) employers' expectation or market needs (Weligamage and Siengthai, 2003; Chandra et al., 2006; Merhout and Buchman, 2007), and financial resources (Chang & Hwang, 2003; Chandra et al., 2006; Celik & Ecer, 2009).

Mohamed and Lashin (2003), for example, argued that accounting lecturers must have sufficient skills including IT to design and deliver subjects that reflect the real situation of business environments, and this effort require strong support from the university management. Celik and Ecer (2009) suggested that university management must provide sufficient fund to improve the quality of accounting education. They argued that while good education facilities may not guarantee good outputs from the education system, but poor facilities certainly affect the quality of outputs from the system.

Albrecht and Sack (2000) argued that curriculum should be driven by the market demand. In order to become relevant and to reduce gap between accounting curriculum and requirements of the employers, Montano et al. (2001) argued that curriculum must be designed to meet the industry needs rather than the interest of the faculty members. Ismail et al. (2005) argued that it is crucial for accounting lecturer to perceive the importance of IT skills for accounting graduates for them to develop an effective accounting curriculum. They also suggested that accounting lecturers should have relevant IT-related work experience to enable them to integrate effectively IT skills into the accounting curriculum (Ismail et al., 2005). From the above discussions, we can conclude that there are many factors that can influence the integration of IT skills into the accounting curriculum, hence the alignment between required and integrated IT skills. Figure 3.1 presents an outline of the research model.

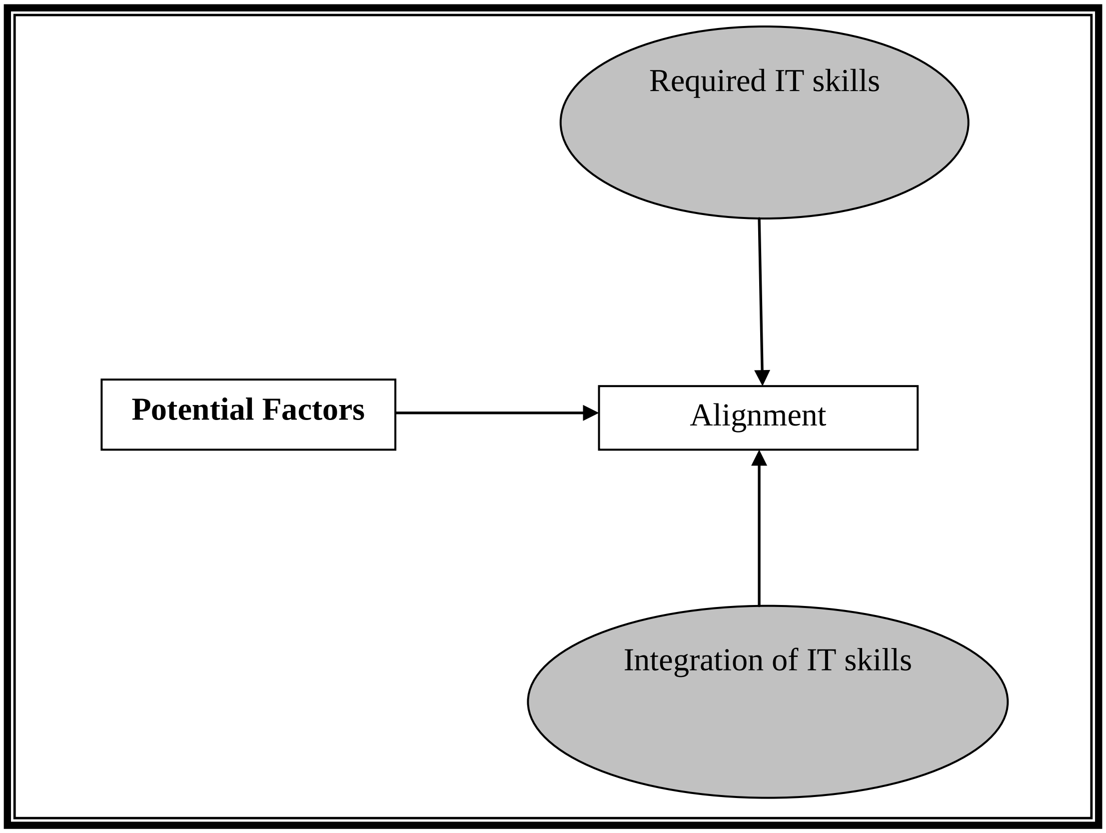

Figure 3.1
Outline Research Model

3.3 MAJOR VARIABLES

There are two major motivations for this research. First, this study aims to explore the alignment between Required IT and Integrated IT. Second, it aims to identify factors that influences IT Alignment. Hence, the emphasis of this study is on the variables of Required IT, Integrated IT, alignment between Required IT and Integrated IT (IT Alignment), and factors that influence IT alignment. A greater understanding of these variables could assist accounting lecturers, faculties or departments with many decisions related to IT and accounting curriculum.

3.3.1 IT Skills

There are many definitions of IT. However, the definition accepted by most studies is the one defined by IFAC. IFAC defined IT as "hardware and software products, information system operations and management processes, and the human resources and skills required to apply those products and processes to the task of information production and information system development, operation, management and control" (IFAC, 2009, p. 30).

As discussed earlier in chapter two, IEPS 2.1 divides the relationship between accountants and IT into five categories as follows: (IFAC, 2006)

- General IT knowledge;
- Accountants as users of IT;
- Accountants as managers of IT;
- Accountants as designers of business systems; and
- Accountants as evaluators of information systems.

Reviews of literature indicate that previous studies have used more than one way to identify required IT skills. Albrecht and Sack (2000) used a list of technologies and skills identified by the Institution of Internal Auditors in 1995 and 1999 to identify the required IT skills from fresh accounting graduates by asking faculty members and practitioners to rank the level of skills required from 1 (not important) to 3 (critical). The study found spreadsheet and word-processing as the two highest ranked technologies. Burnett (2003) got a list of the most- recent firm interviewing on campus from the career service office in West Texas University to identify the IT skills required by the employers. Furthermore, he surveyed accounting departments of private corporations, accounting and professional service firms, governmental and non-profit institutions, educational institutions, and accounting departments of public corporations to identify important IT skills among new accounting employees. Top four IT skills identified in order of importance were spreadsheet, windows operating system, word-processing and the Internet. Chang and Hwang (2003) used the list of IT topics identified by AICPA Technology Committee to investigate whether IT topics have been incorporated into the accounting curriculum and firms' training programs.

Greenstein and Mckee (2004), Greenstein et al. (2008), and Ismail and Abidin (2009) identified appropriate technologies for professors and practitioners based on their comprehensive reviews of literature, and AICPA and IFAC publications. Greenstein et al. (2008) identified 36 critical technologies but Ismail and Abidin (2009) study identified 35 technologies. They grouped two technologies (Embedded audit modules and Real-time audit modules) in one item because both are a model of continuous audit. These 35 technologies grouped into five categories: e-commerce and advanced technologies, office automation, audit automation, database, and accounting firm office automation. Following Ismail and Abidin's (2009) study, this study adapted 35 technologies listed by the latest IFAC and AICPA publications. The reason is those technologies were already investigated and tested by IFAC, AICPA, and previous researchers. These 35 technologies are listed and briefly defined in Table 3.1. They are grouped into five categories as follows: general office automation, accounting firm office automation, audit automation, ecommerce technologies, and system design and implementation (Ismail & Abidin, 2009).

Table 3.1
ITs Definitions

Term	Technology	Description
General Office Automation:		
1	Word processing	Computer program that facilitates entry and preparation of documents such as letters or reports. (e.g. Microsoft word.)
2	Electronic spreadsheets	Software that allows the auditor to enter either alphanumeric or numeric data and manipulate it either via standard functions or auditor programmed functions (e.g. Microsoft Excel).
3	E-mail	Exchange of mail messages via Intranets and/or the Internet (e.g. Microsoft Outlook).
4	Internet search and retrieval	Permits user to search text that is in electronic format and retrieve, view, and print desired text (e.g. Google.com).

Table 3.1 (Continued)

Term	Technology	Description
5	Image processing	Conversion of paper documents into electronic form through scanning and the subsequent storage and retrieval of the electronic image (Document Management software).
6	Electronic presentations	Software that facilitates the organization and use of text, voice, and/or images to communicate concepts (e.g. Microsoft PowerPoint).
7	Groupware	Software that permits auditors to categorize, store, and share data among themselves as well as communicate with each other about that data, preferably in a real-time mode(e.g. Lotus Notes)
Accounting Firm Office Automation:		
8	Small business accounting software	Accounting software package used to record transactions, maintain general and subsidiary ledgers, and generate financial statements (e.g. Peachtree Accounting Software)

Table 3.1 (Continued)

Term	**Technology**	**Description**
9	Tax return preparation software	Software, perhaps incorporating expert knowledge, that assists the accountant/auditor in identifying relevant information, capturing and recording it in a manner that can be filed with tax authorities. (e.g. Turbo Tax by Quicken)
10	Time management and billing systems	Computer program that assists in capturing, managing, billing, and reporting time spent on professional activities.
Audit Automation :		
11	Electronic working papers	Software that generates a trial balance, lead schedules, and other schedules useful for the recording of evidence in an audit or assurance engagement.
12	Generalized audit software	Computer program that helps the auditor access client computer data files, extract relevant data, and perform some audit function such as addition or comparison (e.g. Audit Command Language (ACL)).

Table 3.1 (Continued)

Term	Technology	Description
13	Embedded audit modules / Real-time audit modules	Programmed routines incorporated into application programs, which are designed to perform an audit function (e.g. as400 audit program).
14	Expert systems	Computer software that provides relevant information and/or decision models to assist a human in making a decision or accomplishing some task.
E-Commerce Technologies :		
15	Firewall software/ hardware)	Part of ‘‘security technology’’ that enforces an access control policy between two networks
16	External network configurations	Intranet, extranet, and Internet access devices than enable users physically separated from the server to access it.
17	User authentication systems	Devices used to verify that a system user is who he/she claims to be (e.g. Pluggable Authentication Modules(PAM))

Table 3.1 (Continued)

Term	Technology	Description
18	Internal network configurations	Linkage of individuals and data through hardware and Software systems that permit the exchange of various types of data
19	Intrusion detection and monitoring	Part of ‘‘security technology’’ that identifies unauthorized requests for services (e.g. NetIQ Security Manager).
20	Wireless communications	The ability to transfer digital data without the use of cables, twisted-pair, or fiber optics
21	Digital communications	Bandwidth–telecommunications devices used to facilitate the rapid and unfettered transfer of data (e.g. video conferencing).
22	Encryption software	Changing data using some type of encoding/decoding algorithm so that unauthorized persons who can access the encrypted data will not be able to read it or use it.
23	EDI—traditional	Transfer of data or payments electronically between computers using software that may, or may not, require human intervention to affect the transfer

Table 3.1 (Continued)

Term	Technology	Description
24	EDI—web based	The extension to XML-based EDI(e.g. Electronic Commerce)
35	Agent technologies	Programmed modules that are given certain levels of authority and autonomy to act on behalf of their ‘‘supervisor’’, such as to decide whether to order more inventory and from which supplier
System Design and Implementation:		
26	Database search and retrieval	Software that uses relational structures between data files and facilitates varying data retrieval and use (e.g. Microsoft Access)
27	Simulation software	Abstraction of some aspect of real system via software. Auditor may use model to evaluate the reliability of information from real world sources. This may be thought of as a very high-level analytical review of a company’s data.
28	Flowcharting/data modeling	Software using the source code version of programs to produce flowcharts of program logic (e.g. Microsoft Visio).

Table 3.1 (Continued)

Term	**Technology**	**Description**
29	Computer-aided systems (CASE) engineering tools	Integrated package of computer tools that automate important aspects of the software development process to increase software development effectiveness in terms of productivity of systems development and quality of developed systems.
30	Cooperative client/ server environment	Distribution of processing functions between two or more computers as in a local area network. This also includes end-user computing where users on the network also process and store data on their personal computers.
31	Workflow technology	Software and hardware that facilitates the capture of data in the work place to improve management of the business. For example, using an electronic scanner to record the movement of materials in a warehouse based on the barcodes on the materials.
32	Database design and installation	Software that permits the creation and use of relational structures between data files (e.g. Microsoft Access).

Table 3.1 (Continued)

Term	Technology	Description
33	Test data	A set of transactions processed by the auditor to test the programmed or procedural operations of a computer application (e.g. SPSS).
34	Enterprise resource planning	Business-wide information systems that cross boundaries (e.g. SAP).
35	Application service providers	Companies that host (provide hardware, software and connectivity) for specific business applications.

Source: Ismail and Abidin (2009)

3.3.2 IT Alignment

In this study, the alignment between Required IT and Integrated IT is explored as a derived construct. The concept of alignment (sometimes referred to as fit) has been debated in the literature and a number of approaches have been developed to operationalize the concept. Venkatraman (1989) provided six different perspectives from which alignment could be defined and studied. The six perspectives are moderation, matching, mediation, profile deviation, gestalts, and covariation. Bergeron et al. (2001) argued that different approaches require different mathematical models and had different theoretical implications. The moderation and matching approaches were the most popular perspectives used by researchers in accounting and information systems literature (Ismail & Abidin, 2009). Other approaches were still in their exploratory stages and not easily interpretable (livari, 1992), thus require further development (Cragg et al. 2002; Nori, 2011).

This study explored the matching approach to measure the fit between Required IT and Integrated IT into the accounting curriculum. Venkatraman (1989) and Nori (2011) argued that matching perspective, as opposed to moderation perspective, is specified without a reference to the criterion variable. Therefore, matching approach is considered appropriate to the theoretical background discussed in the preceding sections. Fit as matching is based on the level of similarity between each of two pairs of related items (Chan et al., 1997), which in this case is the level of similarity between each of the Required IT and related Integrated into the accounting curriculum. For each of the 35 items, the absolute difference between the score of the two variables was formed. This represented the alignment on that particular characteristic of technology and together provided 35 alignment scores for each lecturer.

A low value for the difference indicated that the alignment between the two variables was high, while a high value for the difference implies that there was a high degree of misalignment. The mean difference for each type of technology is calculated by summing up the absolute difference for all responses and divided by the number of responses. A mathematical representation of the above is as follow:

Mean Difference = Σ ABS (Required IT rating – Integrated IT rating) / N (Equation 3.1)

Where: ABS = Sum of absolute values

3.3.3 Factors Influence the Alignment

The importance and role of developing better curriculum is significant in bridging the gap between the rapid changing technology and employers' needs (Kelegai & Middleton, 2002). Several factors have been identified by prior studies to influence the level of IT integration into the accounting curriculum. Among others, the factors are: support from policy makers (IFAC, 1995), interest and attitude of academics toward IT integration (Albrecht & Sack, 2000; Kelegai & Middleton, 2002; Lynch & Szorenyi, 2005; Ismail et al., 2005; Lin et al., 2005), limited resources both in terms of staff and infrastructure (Bortiz, 1999; Howieson, 2003; Celik & Ecer, 2009; Helliar et al., 2009), and employer requirements (Albrecht & Sack, 2000; Chandra et al., 2006; Lin, 2008).

Based on the above discussions, four important factors identified to potentially influence the alignment between Required IT and Integrated IT into the accounting curriculum are financial resources, university and faculty support, interest and attitude of lecturers toward IT integration, and market needs. The following sections discuss each of the factors.

3.3.3.1 Financial Resources

Financial resources have a large impact on the quality of educational system (Celik & Ecer, 2009). However, despite the importance of financial resources to the IT integration effort in accounting curriculum, there seems to be a difficulty for the researchers to define and measure financial resources. Different approaches have been used to measure financial resources.

Celik and Ecer (2009), for example, measured financial resources in terms of the total investment resources allocated to IT. Total IT investment resources were calculated based on the percentage of investment on IT expenditures compared to the total annual budget. Boritz (1999), Chang and Hwang (2003) and Chandra et al. (2006) measured financial resources by measuring IT facilities provided for students and the funds allocated to keep these IT facilities up to date. Howieson (2003), Senik and Broad (2008) and Helliar et al. (2009) measured financial resources based on the amount of funds allocated for effective innovation in teaching and learning such as e-learning facilities. Similar to Boritz (1999) and Chang and Hwang (2003), Ismail and Salim (2005) measured financial resources based on two dimensions, adequacy of hardware and software facilities and IT services satisfactory level. The rationale behind this indirect approach is that the amount of financial resources allocated for IT-related expenditure is often reflected by the quality of IT facilities provided by the universities for teaching and learning processes. Following Ismail and Salim (2005), this study measures financial resources based on two dimensions, the adequacy of hardware and software facilities and IT services satisfactory level.

3.3.3.2 University and Faculty Support

Lecturers must be able to design and deliver subjects that can reflect the real business environment. To achieve this, universities need to be flexible and hire lecturers that are able to follow the current industry trends and needs of the employers (Mohamed & Lashin, 2003). According to Chang and Hwang (2003), university support refers to the reward and appreciation given by the management to the lecturers involved in initiating the integration of IT skills into the curriculum. Similarly, faculty support refers to the appreciation given by head of departments, colleagues, and students to the lecturers involved in initiating the integration of IT skills into the curriculum. Ismail and Salim (2005) adapted the instrument used by Chang and Hwang (2003) in measuring university and faculty support based on the appreciation and support given to the lecturers by the head of department, colleagues and students. On the other hand, Kavanagh and Drennan (2007) measured university/faculty support in based on the ability of accounting lecturers to prepare effectively graduates with sufficient IT skills for practice. Following Ismail and Salim (2005) and Kavanagh and Drennan (2007), this study measures university/faculty support in terms of the appreciation and support given by the head of department, colleagues and students to the efforts of accounting lecturers to integrate IT into the accounting curriculum and the university policy to improve this efforts.

3.3.3.3 Interest and Attitude of Academics toward IT Integration

Interest and attitude of academics became one of the major motivating factors toward integrating IT in teaching (Senik & Broad, 2008). Ismail and Salim (2005) measured interest and attitude of academics toward IT integration by examining the perception of academics toward the importance of IT in accounting and whether they are apprehensive to learn the IT skills. Lin et al. (2005) measured the interest and attitude of academics toward IT integration using the perception of the importance of the needed skills and the actual delivery through current accounting education programs.

Phillips (2005) used individual beliefs about teaching and learning technology held by academic staff and educational designers who develop e-learning projects to understand the academics interest and attitude toward IT integration. Senik and Broad (2008) measured the academics interest and attitude toward IT integration by their motivation to incorporate IT in their teaching.

Academic interest and attitude are defined as a person's relatively stable or enduring predisposition, positive effective orientation, and tendency to persevere when working on certain specific academic content or task domains (McGrew, 2007). Theoretically, interests are often defined as the focused interaction between individuals (lecturers) and an object (IT integration) that results in an enduring effective disposition or orientation towards the object (McGrew, 2007). In other words, the best measure of interest and attitude of academics toward IT integration is by measuring the importance and apprehensiveness of accounting academics to learn IT, similar to the one adopted by Ismail and Salim (2005).

3.3.3.4 Market needs

It is important to design and develop accounting curriculum based on the market needs instead of the interest of faculty members. This approach will ensure the relevance of accounting education and thus reduce the gap between accounting education and accounting practices (Albrecht & Sack, 2000; Nioku et al., 2010).

Theuri and Gunn (1998), Weligamage and Siengthai (2003), Senik and Broad (2008), and Kavanagh and Drennan (2007) measured market needs by asking employers about their expectation for the skills of accounting graduate to possess at entry level. On the other hand, Merhout and Buchman (2007) measured market needs by analyzing online advertisements for IT audit jobs. Their analysis compiled a list of career skills for which students, lecturers, and practicing audit professionals need to focus in order to ensure their relevance and success in a fast changing business environment.

Chandra et al. (2006) measured market needs based on the feedbacks obtained from employers in regards to maintaining the relevance of management accounting curriculum. Kavanagh and Drennan (2007) used the requirements by accounting practitioners to prepare graduates for practice and the ability of lecturers to promote change in accounting education to express the needs of employers. This study adapts the instrument developed by Kavanagh and Drennan (2007) to measure the market needs by measure the lecturers recognized about the importance of IT skills to the graduates to work and have a good salary. That is because our respondents are the accounting lecturers not the employers.

Table 3.2 illustrates the measurement of the four factors adopted in this study.

Table 3.2
Measurement of Variables

Factor	How to measure
Financial resources	**Adequacy of Hardware and Software** • Hardware facilities, i.e. number of PCs for accounting lecturers to acquire IT skills are adequate • Hardware facilities, i.e. number of PCs for accounting students to acquire IT skills are adequate • Application/ software required to integrate IT in accounting is adequate **IT Services Satisfactory** • Application/ software required to integrate IT in accounting is updated regularly • Network services are satisfactory • Support for computing services from technical staff is satisfactory • Hardware facilities are upgraded regularly

Table 3.2 (Continued)

Factor	How to measure
University / faculty support	**Appreciation and Support** Your efforts toward integrating IT into accounting curriculum: • Appreciated by head of department • Fully supported by head of department • Appreciated by colleagues • Fully supported by colleagues • Appreciated by students • Fully supported by students **University policy** • The efforts for teaching IS/AIS are not adequately rewarded by my university • My university has insufficient budgets to improve the interface between practice and education • Training for staff to acquire skills in IT is sufficient • Training for AIS is always given a higher priority than other areas of accounting

Table 3.2 (Continued)

Factor	How to measure
Interest and attitude of academics toward IT integration	• Accounting academicians are aware of the importance of IT in accounting • Accounting academicians are aware that IT knowledge and skills are crucial for the enhancement of accounting profession • Accounting academicians are receptive to learn new IT skills • Accounting academicians are apprehensive to learn new IT skills
Market needs	• IT skills are important for accounting graduates to work in industry • IT skills are important for accounting graduates to work in government agencies • Graduates with good IT skills would get jobs easier than those without • Graduates with good IT skills would have salary better than those without • Graduates with good IT skills would be more successful in their career than those without

Based on the above discussions, the outline research model presented in Figure 3-1 can now be modified to incorporate all the specified dimensions and variables. The enhanced research model is now presented in Figure 3.2.

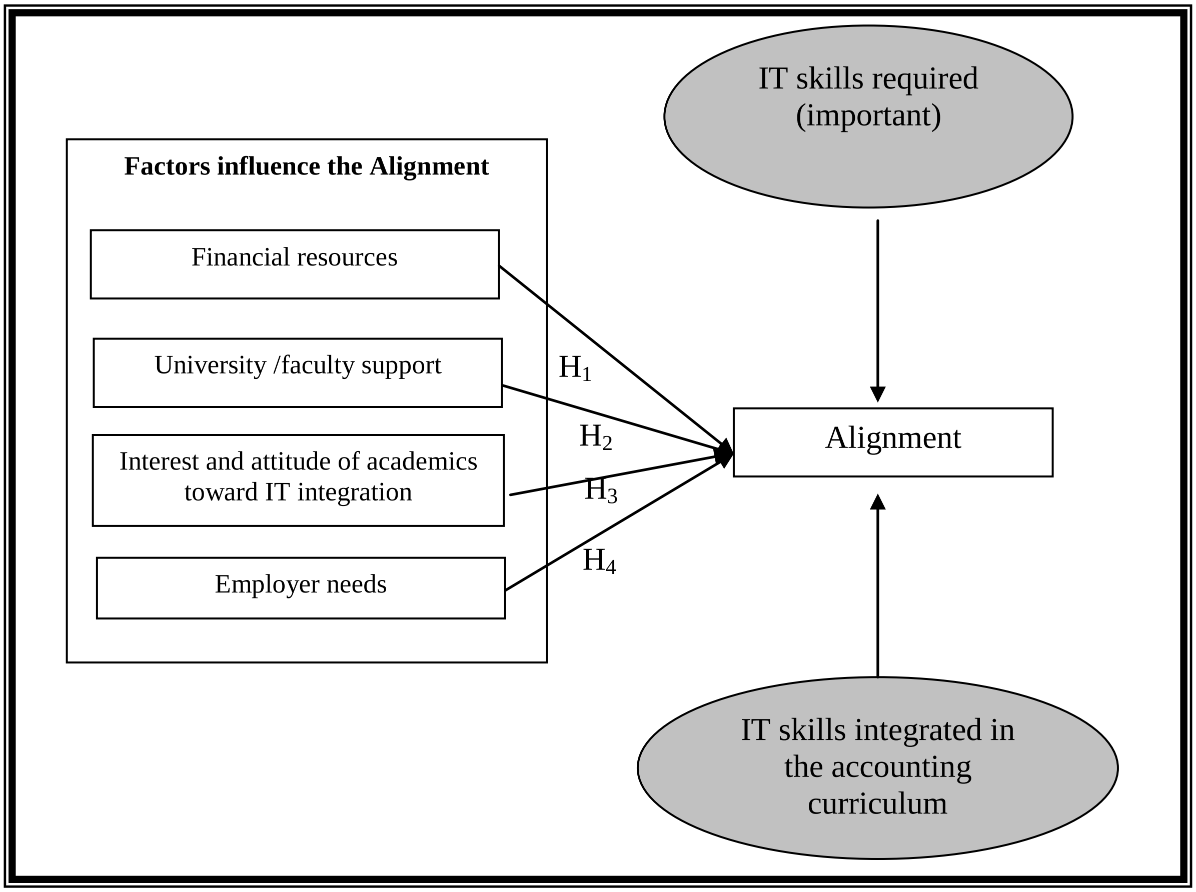

Figure 3.2
The Enhanced Research Model

3.4 RESEARCH HYPOTHESES

Figure 3-2 presents the model of this research. The right side of the model represents the alignment between Required IT and Integrated IT into the accounting curriculum. The left side of the model represents the factors that influence the alignment between the two variables. The following sections discuss the development of the hypotheses.

3.4.1 Financial Resources and IT Alignment

Financial resources have a large impact on the quality of education delivered in the higher education institutions. Bortiz (1999) suggested that sufficient financial resources are crucial for accounting educators to integrate effectively IT skills into the accounting curriculum to match the current needs of the employers. Among the applications integrated into the accounting curriculum, include accounting, taxation, audit, and statistical packages. Integrating IT into curriculum requires huge investment not only on the software but also on the hardware and networking. Further, it is not a one-off type of investment, as institutions need to update regularly both the hardware and the software to keep up with the latest IT development.

Celik and Ecer (2009), however, revealed that the main problem faced by many Turkish universities is the lack of efficiency in the usage of resources. Howieson (2003) indicated that most accounting departments in UK have insufficient financial resources available to allow educators implement effective innovation in teaching. Helliar et al. (2009) confirmed that many accounting lecturers in the UK universities depended on formal lecturing as the main teaching method because of lack of materials and other resources. Dahawy et al. (2005) argued that integration of IT skills in teaching and learning of accounting in Egypt is hindered by lack of resources and infrastructure.

Based on the above discussions, it is expected that institutions with sufficient financial resources would achieve better alignment between Required IT and Integrated IT. Thus, the first hypothesis can stated as follows.

Hypothesis 1:

There is a positive relationship between the availability of financial resources and IT alignment at universities in Egypt.

3.4.2 University/Faculty Support and IT Alignment

Ismail (2009) argued that the burden to integrate IT into the accounting curriculum is often shouldered by few junior lecturers. Most of them do it without expecting financial reward from the university management. Despite that, supports in the form of appreciation from the management and colleagues can play a big motivating factor to their effort (Mohamed & Lashin, 2003). This is important as most of the efforts are done on a voluntary basis. Chandra et al. (2006) suggested that the major constraint in an effort to integrate IT into the management accounting curriculum is the support provided from university and faculty. Some senior lecturers are often reluctant to spent time to learn new technologies and become resistance to the effort of integrating IT into the curriculum (Ismail, 2009).

Chang and Hang (2003) revealed that accounting lecturers often faced difficulties in integrating IT into the accounting curriculum because of the lack of support received from university and faculty members. However, Ismail et al. (2005) revealed that accounting lecturers in Malaysian universities received adequate supports from their heads of department and colleagues, which enable them to integrate effectively IT skills into their accounting curriculum.

Based on the above discussions, it is expected that accounting lecturers that received adequate supports from their universities and colleagues would achieve better alignment between Required IT and Integrated IT. Thus, the second hypothesis can stated as follows:

Hypothesis 2:

There is a positive relationship between university/faculty supports and IT alignment at universities in Egypt.

3.4.3 Interest and Attitude of Lecturers toward IT Integration

Lecturers play a very important role in the education process (Albrecht & Sack, 2000). They are responsible in designing the program and course syllabuses. The programs designed are often based on their interest and attitude towards certain skills. Ismail et al. (2005) emphasized that accounting educators' perception towards the importance of IT skills are important in our effort to integrate IT skills into the accounting curriculum.

Greenstein and McKee (2004) investigated auditing lecturers and audit practitioners' perception towards IT skills. The results, however, revealed a low level of knowledge for sophisticated IT applications among the lecturers compared to the level of knowledge among practitioners, which may influence the level of integration of the technologies into the audit subject. Lin et al. (2005) found a low level of IT skills among lecturers in China and suggested that the accounting curriculum should be redesigned to meet the needs of the current businesses. Dahawy et al. (2006) argued that several lecturers in Egypt envision that the future accounting classroom will use advanced technology.

Based on the above discussions, it is expected that accounting lecturers with a positive interest and attitude toward IT skills would achieve better alignment between Required IT and Integrated IT into the accounting curriculum. Thus, the third hypothesis can be stated as follows:

Hypothesis 3:

There is a positive relationship between lecturers' attitude and interest towards IT and IT alignment at universities in Egypt.

3.4.4 Market needs

Designing an AIS course that meets the needs of employers is a difficult task (Theuri & Gunn, 1998). Albrecht and Sack (2000) suggested that, in order to reduce the gap between higher education programs and the requirements of employers, accounting curriculum should be designed based on the market demand, not based on the interest of the faculty members. Chandra et al. (2006) suggested that lack of systematic feedbacks from employer could be one reason for the gap between the IT skills provided by accounting programs and those needed by employers. Therefore, accounting departments need to seek regular feedbacks from the employers to ensure that the curriculum designed is in tandem with the market needs (Lin, 2008). Hassabelnaby et al. (2003) found a strong relationship between employer or market environment and accounting development in Egypt.

Based on the above discussions, it is expected that positive inputs from employers regarding IT skills would help achieve better alignment between Required IT and Integrated into the accounting curriculum. Thus, the fourth hypothesis can stated as follows:

Hypothesis 4:

There is a positive relationship between market needs and IT alignment at universities in Egypt.

3.5 RESEARCH METHODOLOGY

3.5.1 Research Strategies

This section provides a guide to the research design and methodology employed in this study. Various types of research methods have been used in the accounting and IS disciplines. For example, Orlikowaski and Baroudi (1991) examine 155 IS research articles published from 1983 to 1988 and found that three primary research designs that emerged from this analysis are case studies (13.5%), laboratory experiments (27.1%) and surveys (49.1%). These three designs account for almost 90% of the studies. However, surveys were the dominant research method.

Galliers (1992) discussed eight major research strategies being undertaken in the IS field. These strategies are Laboratory Experiments, Field Experiments, Simulation, Subjective/Argumentative Research, Forecasting and Futures Research, Case Studies, Action Research and Surveys (Ismail, 2004).

Mingers (2003) reviewed all IS related papers published during 1993-2000. The study results indicate that there is a relatively high proportion of empirical papers in IS journals (about 66%) but only about 20% use a combination of methods. Of these, the vast majority of combinations only use the traditional methods of surveys, case studies, interviews, and observation. Alternatively, only 15% used nontraditional methods like participant observation, grounded theory and soft system methodology. Mingers (2003) discussed major research strategies being undertaken in the IS field. Each of these strategies reviewed to assess its applicability to the present study as follows:

Observation: Observation is one of the most important methods of data collection. It entails being present in a situation and making a record of one's impressions of what takes place. In observation, the primary research instrument is the self, consciously gathering sensory data through sight, hearing, taste, smell and touch. By various means of record keeping, traces of those impressions are stored for careful scrutiny and analysis after the event (Somekh &Lewin, 2005).

Survey or questionnaire: includes all forms of data production involving the circulation of a prestructured set of questions no matter how administered. The recipients viewed as sample of a wider population (Mingers, 2003).

Surveys can be divided into two broad categories: the questionnaire and the interview. 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, 2001).

Survey gives the researcher more control over the research process. Its weakness is that it requires a lot of time and effort to spend in designing and piloting the questionnaire. Pinsonneault and Kraemer (1993) determine three different characteristics of a survey approach. First, the purpose of the survey is to produce quantitative descriptions of some aspects of the 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.

Experiment: includes both laboratory and field experiments. Experiments (which can be conducted either in laboratory or field settings) include those observational studies in which data are collected under conditions where behavioral choices are limited or in some way constrained by the controlled manipulation of variables and measures selected by the researcher. Experimental methods are particularly useful to determine the Causal relations. It is also ideally suited to determine the methodology relations between groups of variables are isolated and under strict control (Crano & Brewer, 2008).

Case study: Case study research may be either qualitative or quantitative, or both, depending upon the sort of within-case evidence that is available and relevant to the question at hand (Gerring, 2007: p. 36). Case study research often includes other methods such as interviews and questionnaires (Mingers, 2003).

Simulation: simulations are intended to preserve many of the advantages of controlled laboratory experiments while approaching conditions that are more generalizable to the real world. The treatment conditions of a simulation study are inevitably more complex and multidimensional than those of the basic laboratory experiment (Crano & Brewer, 2008).

Interviews: The research interview is a data collection method in which participants provide information about their behavior, thoughts, or feelings in response to questions posed by an interviewer. It is important to consider the circumstances under which an interview approach is most appropriate. Probably the most important basis for choosing the interview occurs when the nature of the research issue demands a personal, interactive, method of data collection (Crano & Brewer, 2008) the interviewer has the opportunity to probe or ask follow-up questions, and interviews are generally easier for the respondent. Interviews can be time consuming and they are resource intensive. The interviewer is considered a part of the measurement instrument and interviewers have to be well trained to respond to any contingency (Trochim, 2001)

3.5.2 Selection of Research Strategies:

After reviewing the various types of research strategies discussed above, survey approach is thought to be the most appropriate research strategy in the IS area (Mingers, 2001; Orlikowaski & Baroudi, 1991). Similarly, Choudrie and Dwivedi (2005) examine range of methods used for studying technology adoption issues. They found that most studies 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 technology adoption research.

There are various technique of collecting information in survey research that are regularly used in social research such as, questionnaires, interviews, observations and content analysis. The questionnaire is the most widely used data collection technique in survey research (De Vaus, 2002). Therefore, this study will adopt the questionnaire method to obtain data from a large number of accounting lectures in Egypt.

There are many different ways in which the questionnaire can be administered: face-to-face interviews, telephone interviews**,** postal surveys and internet-based surveys (De Vaus, 2002**;** Brace, 2004; Crano & Brewer, 2008 and Sapsford & Jupp**,** 2006).

a. Face-to-face interviews in these method interviewers administer the questionnaire personally to a respondent. Moreover, the interviewer records and codes answer as the interview proceeds. The major advantage for this method is that the interviewer is on the spot they can answer respondent questions, clarify misunderstandings and probe answers to open-ended questions. The major disadvantages are geographical limitations, which consume time, and cost (De Vaus, 2002).

b. Telephone interviews alternative to the face-to-face interview. Using structured questions and conducted to respondents by the telephone. The major advantages for this methods is an increasingly common choice of data collection method because of its speed and inexpensive. The disadvantages are the interaction between interviewer and respondent are missing (Sapsford & Jupp, 2006 and Brace, 2004).

c. Postal surveys rely on respondents understanding and answering the questionnaire, therefore, it must be easy to follow and the meaning of questions should be self-explanatory (De Vaus, 2002). The major advantages for these methods are that respondents have the time to read and digest questions before giving their responses. The disadvantages are it is impossible to stop respondents from reading through all of the questions before responding. Frequently the question sequence is carefully chosen by the questionnaire writer in order to reveal certain pieces of information at a specific point in the interview. In addition, this method takes more time to consider answers (Brace, 2004).

d. Internet-based surveys used three main ways: with emails, via web pages and a combination of email and the web (De Vaus, 2002). Which mean that individuals can be contacted by e-mail or through the World Wide Web and directed to a web site where they can complete a survey instrument online (Crano & Brewer, 2008). This method has the same strength of Postal surveys and Telephone interviews. In addition, Web-based questionnaires presented in the sequence that the researcher wants them to be. A major disadvantage for these methods is not having an interviewer on hand to clarify questions or to repair misunderstandings (Brace, 2004).

Based on the above discussion, Internet-based questionnaire with emails approach was thought to be the most appropriate data collection method. Besides allowing for data collection from widely dispersed locations, this method is less time consuming and less costly than others are and people who have Internet access are likely to be more affluent, have higher education (Crano & Brewer, 2008). Because of our respondents are accounting lecturers in Egypt so this method is suitable for this study.

3.5.3 The Sampling Process

Sampling is the process of select elements in some way from a population. The aim of sampling is to save time and effort, but also to obtain consistent and fair estimates of the population status in terms of whatever is being researched (Sapsford & Jupp, 2006). The objective of sampling is to obtain a sample that correctly reflects the population it is designed to represent (De Vaus, 2002). Six steps procedures can be used as guideline to the sampling process in this study (Ismail, 2004).

1) Defining the population to be sampled. The population is a total collection of elements actually available for sampling, and it can be a group of people, events or things of interests that the researchers wish to investigate (Sapsford & Jupp, 2006). This study investigates the gap between the IT skills integrated into the accounting curriculum, and the IT skills required by business environment. Therefore, the population of this study is the accounting lecturers in the Egyptian universities. Accounting lecturers in Egypt have the knowledge of what the employers' need because most of them are also engaged in accounting and auditing profession, whether through their private offices or as advisers to public or private companies. The Accounting Practice Law 133 allows accounting lecturers with more than three years teaching experience also to practice accountant. Due to the difficulty to get the number of lecturers engaged in accounting and auditing profession, there are currently 554 accounting lecturers in seventeenth public universities in Egypt, which considered being the population of this study (Egyptian universities web sites in 22/7/2010).

2) Identify the sampling frame. Sampling frame is the list of elements from which the sample may be taken. An example of a sampling frame might be a list of all members of an institute or workers in a company or a particular type of company (Adams et al., 2007). Since it is very difficult to determine lecturers who also practicing accountants, this study would include all 554 lecturers in the sample frame.

3) Select a sample procedure. The next step after identify the sample frame is decide how the sample itself will be selected**.** Choose a sampling method depends largely on what the researcher can develop for the sampling frame (Sapsford & Jupp**,** 2006). However, considering the limited number of accounting lecturers in Egypt, and the difficulty to obtaining the number of lecturers who also practicing accountants, the present research includes all accounting lecturers engaged in accounting and auditing profession in Egypt. They will be selected by answering question about their experience as a professional accountant.

4) Determine the sample size. Sample size refers to the number of units that need to be surveyed by the researcher. Considering the small population of accounting lecturers in Egypt (554 lecturer) and response rates of survey questionnaires may be limited because it cannot have contact with all members of the sample. In addition, some might be drop out from the sample during the analysis (Trochim, 2001).the sample size is the total population (554 lecturer).

5) Select the sample elements. The accounting lecturers engaged in accounting and auditing profession are the appropriate elements for the present study.

6) Collect the data from the designated elements. The questionnaire survey used to collecting data and it will distributed by email to the accounting lecturers in Egypt.

3.6 QUESTIONNAIRE DESIGN

The measures used in this study were adopted from previous studies such as Ismail and Abidin (2009), Ismail and Salim (2005), Chang and Hwang (2003) and Kavanagh and Drennan (2007).

Sekaran and Bougie (2010) suggest that the language of the questionnaire should approximate the level of understanding of the respondents. Thus, it is essential to word the questions in a way that can be understood by the respondents. Therefore, to get a high response rate, the questionnaire was translated from English language to Arabic language. It was expected that it would encourage the respondents to respond the questionnaire if the questionnaire were posed in Arabic language because it would be easier for them to understand the questionnaire.

The questions were structured for ease of answering. Clear and consistent instructions are maintained through the questionnaire. The respondents were asked to tick the relevant answer for the multiple-choice questions and to type the most appropriate number for questions using a 5-point Likert scale. Finally, space left at the end of the questionnaire for respondents to make comments.

3.6.1 The Structure of the Questionnaire

The sequence of questions in the questionnaire was designed based on principles suggested by Sekaran and Bougie (2010). Sekaran and Bougie (2010) suggested that the sequence of questions should be such that the respondents is led from questions of general nature to those that are more specific, and from questions that are relatively easy to answer to that are progressively more difficult. Consequently, questionnaire was structured into three main sections, each including a different theme as follows. Table 3.3 summarizes the different sections representing each theme in the questionnaire.

Table 3.3
Sections of the Questionnaire

Section	**Theme**
A	Respondent profile
B	Potential factors influence the level of IT integration in accounting curriculum.
B_1	Financial resources
B_2	University /Faculty support
B_3	Interest and attitude of academics toward IT integration.
B_4	Market needs
C	The importance and the integration level of IT skills

3.7 INSTRUMENT VALIDATION AND RELIABILITY

3.7.1 Instrument Validity

Validity of instrument tests how well the instrument measures the particular concept it supposed to measure and not something else (Sekaran & Bougie, 2010). The validity of the questionnaire used in this study was validated in two stages first, the questionnaire was pre-tested by five academicians in the accounting department in Universiti Utara Malaysia. Second, the questionnaire was translated into Arabic language and then pre-tested with five academicians in accounting department in Egypt. Generally, they all agreed with the importance and contribution of the study to the accounting education in Egypt. Based on their comments, some modifications were made on the original questionnaire. For example, additional questions were added like; indicate the level of expertise on some applications to reflect the current technology experience and years of experience as a professional accountant and as an academic staff to reflect the current academic and professional experience. Finally, a total 70 items were used for data collection.

3.7.2 Instrument Reliability

The reliability of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps to assess the goodness of a measure (Sekaran & Bougie, 2010). The reliability of a measure is established by testing for both consistency and stability. Cronbach's alpha is a reliability coefficient that measures the consistency.

To confirm the questionnaire instruments' reliability, the researcher conducted a pilot study. The questionnaire was distributed to 50 lecturers in Egypt. Out of 50 questionnaires distributed, only 34 were returned and used for reliability test. According to Hair et al. (2010), cronbach's alpha above 0.7 or higher suggests a good reliability. However, reliability between 0.6 and 0.7 may be acceptable. Table 3.4 below shows the cronbach's alpha value of the variables used in this study.

Table 3.4
Cronbach's Coefficient Alpha

Variables	N of items	Cronbach's Alpha
Financial resources	7	.892
University /Faculty support	10	.738
Interest and attitude of academics toward IT integration	4	.724
Market needs	5	.748
Importance of IT skills and knowledge(overall)	35	.849
General Office Automation	7	.766
Accounting Firm Office Automation	3	.736
Audit Automation	4	.810
E-Commerce Technologies	11	.741
System Design and Implementation	10	.752
Integration of IT skills and knowledge(overall)	35	.941
General Office Automation	7	.738
Accounting Firm Office Automation	3	.803
Audit Automation	4	.883

Table 3.4 (Continued)

Variables	N of items	Cronbach's Alpha
E-Commerce Technologies	11	.894
System Design and Implementation	10	.762

Table 3.4 shows that Cronbach's coefficient Alpha values indicate a good reliability for all variables. All variables have value over than 0.7. So the questionnaire was distributed to the remaining 504 lecturers in Egypt.

3.8 SUMMARY

This chapter has discussed the research framework, the research variables and the research hypotheses. After a discussion on the advantages and disadvantages of different research strategies, this study has finally chosen to employ the survey approach as the main research strategy. Furthermore, this chapter discusses the population and sample size, which decided to be the same size of the population 554 accounting lecturers in Egypt. Before the questionnaires were distributed, validation of the instrument used to measure the main variables was carried out. In particularly, the reliability of the measure used was checked out and it was found that the instrument was reliable because Cronbach's coefficient Alpha values for all variables were higher than 0.7.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This chapter presents the research findings based on the data collected from accounting lecturers in Egypt. First, the data were analyzed using descriptive statistics to understand the characteristics of the accounting lecturers participated in the survey. Second, a matching approach was adopted to examine the alignment between the IT skills integrated in the accounting curriculum and IT skills required by the business environment. Third, multiply regression was conducted to examine the factors that influence the alignment between the two variables. Finally, cluster analysis was conducted to classify a sample into groups with similar types or profiles.

4.2 DATA COLLECTION

The final questionnaire was emailed to 504 accounting lecturers in Egypt. The lecturers were chosen to be the respondents of this study because they were more likely to have the knowledge about the IT skills integrated in the accounting curriculum. In addition, they have known the IT skills required by employers, because most of them are also practitioners.

The questionnaires were formatted with Microsoft Word program and were then sent as an email attachment during the second week of March 2011. The first page of the questionnaire was the cover letter that clearly disclosed the identity of the researcher, conveyed the purpose of the survey, and motivated the respondents to respond to the questions (Sekaran & Bougre, 2010). In addition, a brief introduction was included in each section of the questionnaire to illustrate its purpose. Following De Vaus (2002), a second email to all respondents was made after one week of the first email. This reminder served as both a thank you to those who had replied to the questionnaire and as a friendly reminder to those who had not. After three weeks, a second reminder was sent to the respondents who did not reply. For this group, a new cover letter to motivate them to answer the questionnaire was included together with the questionnaire. Appendix A-2 reproduced the new cover letter. No third reminder was sent because a relatively satisfactory response had already been achieved. Table 4.1 shows that the adjusted sample size is 468 after deducting the respondents without email address and the failed emails. Only 327 questionnaires were returned after duration of about three months, representing a response rate of 69.87%. After incomplete questionnaires were discarded, the adjusted response rate is 69.02%. According to Sekaran and Bougle (2010), 32% response rate for emailed questionnaires is considered acceptable (Dillman, 2007).

Table 4.1
Sample Size and Response Rate

	Respondents
Sample size	504
Respondents without email address	19
Emails bounced	17
Adjusted sample size	468
Gross response	327
Gross response rate (%)	69.87
Incomplete questionnaires	4
Completed questionnaires	323
Adjusted response rate (%)	69.02

As mentioned early in chapter three, the sample of the current study includes all accounting lecturers engaged in accounting and auditing profession in Egypt. Results indicate that 249 (77%) respondents were professional accountants while the remaining 74 (23%) respondents were non-professional. In order to find out if there is a significant difference between the two groups, Mann -Whitney test was used. However, when t-test was used, the significance level of the Levene statistic is small (p <.05) for about 50% of items. Therefore, the test could not be used (Robert, 2006). Results from this test in Appendix B show significant differences between the two groups at 5% significance level (p<.05), of which about 16% of the responses were found to be significantly different (questions in section B and C of the questionnaire). This shows that the assumption of no difference between groups was rejected. Therefore, further analysis was carried out on 249 responses.

4.3 PROFILE OF RESPONDENTS

This section provides background information about the accounting lecturers who responded to the questionnaires. The characteristics examined include academic position, gender, age, experience as an academic staff member or as a professional accountant and level of expertise on word processing application, electronic spreadsheets application, and electronic presentations application, accounting application, and tax return preparation application.

4.3.1 Academic Position

Results in Table 4.2 provide the current position of the respondents. It is observed that 39.8% of the respondents were professors, 35.7% lecturers, and 24.5% assistant professors.

Table 4.2
Academic Position

Current position	**Frequency**	**Percent**
Professor	99	39.8
Assistant Professor	61	24.5
Lecturer	89	35.7
Total	**249**	**100.0**

4.3.2 Gender

Table 4.3 shows the breakdown of the respondents by gender. Table 4.3 shows that 90% of the respondents were male and 10% female.

Table 4.3
Gender

Gender	**Frequency**	**Percent**
Male	224	90.0
Female	10	10.0
Total	**249**	**100.0**

4.3.3 Age

Table 4.4 shows that most of the respondents were over 45 years old (73.5%), 26.1% were between 35 and 45 years old, and the remaining 0.4% below 35 years old. This indicates that the majority of the respondents had considerable work experience.

Table 4.4
Age

Age	**Frequency**	**Percent**
Less than 35 years	1	0.4
35-45 years	65	26.1
46 years and over	183	73.5
Total	**249**	**100.0**

4.3.4 Doctoral Degree

All lecturers in Egypt are required to have a doctoral degree. Therefore we asked the respondents where they obtained their doctoral degree from. Table

4.5 shows that 77.1% had a doctoral degree from Egypt, 13.7% from the UK, 7.6% from the USA, and the remaining 1.6% from other countries.

Table 4.5
Doctoral Degree

Country obtained	**Frequency**	**Percent**
Egypt	192	77.1
UK	34	13.7
USA	19	7.6
Others	4	1.6
Total	**249**	**100.0**

4.3.5 Academic Experience

Table 4.6 shows that 90% of the respondents had academic working experience more than 15 years. This is because most of the respondents were over 45 years old, 8.8% had academic working experience between 10 and 15 years, and the remaining 1.2% had below 10 years.

Table 4.6
Length of Academic Experience

Length of academic experience	**Frequency**	**Percent**
Less than 10 years	3	1.2
10-15 years	22	8.8
16 years and over	224	90.0
Total	**249**	**100.0**

4.3.6 Professional Experience

As shown in Table 4.7, most of the respondents (71.9%) had work experience as an accountant over 10 years, 26.5% between 5 and 10 years, and the remaining 1.6 % less than 5 years.

Table 4.7
Length of Professional Experience

Years	**Frequency**	**Percent**
Less than 5 years	4	1.6
5-10 years	66	26.5
11 years and over	179	71.9
Total	**249**	**100.0**

4.3.7 Professional Qualification

Table 4.8 shows that 3.6% of the respondents did not have any professional accounting qualification, 5.6% had qualification from the Association of Chartered Certified Accountants (ACCA), 25.3% had qualification from the Egyptian Society of Accountants and Auditors (ESAA), and 64.7% from other agencies like the Egyptian International Society of Taxation, and the Egyptian Society for Information Systems and Computer Technology.

Table 4.8
Professional Accounting Qualification

Agency	**Frequency**	**Percent**
None	9	3.6
ACCA	14	5.6
CIMA	2	0.8
ESAA	63	25.3
Others	161	64.7
Total	**249**	**100.0**

4.3.8 AIS Subjects

Table 4.9 shows that all universities offer AIS or IT related subject(s) such as accounting information system, advanced accounting, computer science, and advanced auditing.

Table 4.9
AIS Subjects

	Frequency	**Percent**
Already have AIS subjects	249	100.0

4.3.9 IT Experience

This study concentrates on IT skills. Therefore, we asked the respondents about their experience on five technologies (word processing application, electronic spreadsheets application, electronic presentations application, accounting application, and tax return preparation application) commonly used for accountants to determine the level of their IT experience. Table 4.10 shows the results of IT level of experience of the respondents. Almost all respondents (89.6%) were expert users of word processing application, and only 9.2% were professional users of word processing application.

Table 4.10

IT Level of Experience

Technology	**Novice**		**Beginner**		**Competent**		**Proficient**		**Expert**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Word processing	0	0	2	0.8	1	0.4	25	9.2	223	89.6	**249**	**100**
Electronic spreadsheets	0	0	2	0.8	8	3.2	6	24.1	179	71.9	**249**	**100**
Electronic presentation	0	0	1	0.4	4	1.6	49	19.7	195	78.3	**249**	**100**
Accounting application	1	0.4	7	2.8	34	13.7	73	29.3	134	53.8	**249**	**100**
Tax return preparation application	9	3.6	63	25.3	0	0	65	26.1	112	45	**249**	**100**

Note. F = Frequency

Also about 72% of respondents were expert users of electronic spreadsheets and about 24% were professional users. Most of the respondents (78.3%) had expertise in using electronic presentations and 19.7% were professional users. In addition, nearly half of the respondents (53.8%) had expertise in using accounting applications, 29.3% were professional users, 13.7% were competent, and the remaining were beginner (2.8%), and novice (0.4%). Forty five percent of the respondents know how to use tax return preparation applications, 26.1% were professional users, 25.3% beginners, and the remaining novice 3.6%. It shows that the accounting lecturers in the sample had a good experience in IT.

4.4 IMPORTANCE OF IT SKILLS

This section discusses the importance of IT skills. Respondents were asked to about their perceptions of the importance of 35 types of technology in accounting practice. Each question was measured on a five-point scale, ranging from ‘1’ “not important” to ‘5’ “very important.” The mean values of the perceived importance of the technology are shown in Table 4.11, arranged a descending order. We chose the midpoint of the response range as a benchmark. Using a five-point scale, the midpoint is 2.5 (Greenstein & McKee, 2004).

Table 4.11 shows that the mean values for 35 items were above the midpoint. The values ranged from 2.59 to 4.89, and the mean value for about 94% for the technologies ranked between 3.52 and 4.89, which implies that most of the respondents perceived that the technologies are important to be integrated in the accounting curriculum. The highest mean value was generalized audit software, followed by embedded audit modules/real-time modules, word processing, small business accounting software, electronic spreadsheets, computer-aided systems engineering tools, electronic working papers, test data, and tax return preparation software. This finding showed that technologies related to the accounting and auditing process are seen to be the most important technologies among the respondents. Generalized audit software, embedded audit modules/real-time modules, small business accounting software, computer-aided systems engineering tools, electronic working papers, test data, and tax return preparation software were perceived as the 10 most important technologies. Technologies related to office automation such as word processing, electronic spreadsheets, electronic presentation ranked third, fifth, and tenth, respectively. This finding is not surprising as most of the respondents had professional experience and professional qualifications in accounting. Therefore, they probably used more the technologies related to accounting and auditing profession than those related to office automation.

Table 4.11
Mean Rating for Importance of Technologies

Technology	**Mean**	**Rank**
Generalized audit software	4.89	1
Embedded audit modules/Real-time audit modules	4.89	2
Word processing	4.88	3
Small business accounting software	4.86	4
Electronic spreadsheets	4.86	5
Computer-aided systems (CAS) engineering tools	4.78	6
Electronic working papers	4.77	7
Test data	4.76	8
Electronic presentations	4.72	9
Tax return preparation software	4.72	10

Table 4.11 (Continued)

Technology	**Mean**	**Rank**
EDI—web based	4.67	11
Internet search and retrieval	4.66	12
E-mail	4.64	13
EDI—traditional	4.61	14
Database design and installation	4.55	15
Encryption software	4.52	16
Database search and retrieval	4.48	17
Groupware	4.46	18
Time management and billing systems	4.39	19
Firewall software/hardware	4.30	20
Expert systems	4.27	21
Enterprise resource planning	4.22	22
User authentication systems	4.14	23
Image processing	4.14	24
Flowcharting/data modeling	4.14	25
Workflow technology	4.09	26
Digital communications	3.94	27
Intrusion detection and monitoring	3.92	28
Simulation software	3.88	29
Wireless communications	3.69	30

Table 4.11 (Continued)

Technology	**Mean**	**Rank**
Cooperative client/server environment	3.61	31
Agent technologies	3.56	32
External network configurations	3.51	33
Application service providers	2.92	34
Internal network configurations	2.59	35

On the other hand, internal network configurations, application service providers, external network configurations, agent technologies and cooperative client/server environment were perceived by most respondents as being relatively less important technologies. This result may also indicate the technologies commonly used by the respondents at work.

4.5 INTEGRATION OF IT SKILLS

Respondents were asked to indicate to what extent the 35 types of technology are integrated in the accounting curriculum in Egypt, using a five-point scale, ranging from '1' "not integrated" to '5' "fully integrated." Table 4.12 shows the mean values of 35 technologies in descending order.

As shown in Table 4.12, most of the values were below the midpoint (26 items) and only nine items were above the midpoint (2.5). This result suggests that most of the technologies (74 %) are not fully integrated in the accounting curriculum in Egypt. For example, generalized audit software, which was rated by the respondents as being the most important item with mean value of 4.89 (see Table 4.11), revealed a mean value of 2.24 and ranked eleventh.

The technologies that were perceived to be highly integrated in the accounting curriculum in Egypt are wording processing, followed by electronic spreadsheets, and electronic presentations. This result revealed that the accounting curriculum in Egypt focuses currently on office automation, followed by system design and implementation (database search and retrieval, test data, database design and installation, flowcharting/data modeling, and simulation software), and accounting and auditing automation (expert systems, generalized audit software, workflow technology, and small business accounting software). In essence, the finding showed that there is a gap between the technologies that were perceived to be important, and the technologies that were actually taught at the tertiary level.

Table 4.12
Mean Rating for the Integration of Technologies in Accounting Curriculum

Technology	**Mean**	**Rank**
Word processing	4.37	1
Electronic spreadsheets	4.10	2
Electronic presentations	3.88	3
Database search and retrieval	3.15	4
Test data	2.91	5
Electronic working papers	2.90	6

Table 4.12 (Continued)

Technology	**Mean**	**Rank**
Database design and installation	2.84	7
Simulation software	2.51	8
Flowcharting/data modeling	2.51	9
Expert systems	2.29	10
Generalized audit software	2.24	11
Small business accounting software	2.18	12
EDI—traditional	2.10	13
Workflow technology	2.07	14
Embedded audit modules/Real-time audit modules	2.04	15
E-mail	1.92	16
Time management and billing systems	1.91	17
Computer-aided systems (CAS) engineering tools	1.90	18
Encryption software	1.87	19
Tax return preparation software	1.86	20
User authentication systems	1.67	21
Internet search and retrieval	1.63	22
Wireless communications	1.54	23
Firewall software/hardware	1.52	24
Digital communications	1.50	25
Enterprise resource planning	1.44	26
Agent technologies	1.42	27
Intrusion detection and monitoring	1.41	28

Table 4.12 (Continued)

Technology	**Mean**	**Rank**
Image processing	1.40	29
Internal network configurations	1.36	30
External network configurations	1.34	31
EDI—web based	1.33	32
Groupware	1.30	33
Cooperative client/server environment	1.19	34
Application service providers	1.05	35

As shown in Table 4.12, the technologies rated by the respondents as being less integrated in the accounting curriculum were application service providers, and cooperative client/server environment. These types of technology were also perceived as being less important by the respondents.

Table 4.13 summarizes and compares the results in Table 4.11 and Table 4.12. Table 4.13 shows that technologies perceived as being important generally received a higher mean rating than those perceived should be integrated into the curriculum, which indicates a lack of alignment between the two variables. Table 4.13 also reveals that all items received different rankings in terms of technological importance and integration. Indeed, only one item (intrusion detection and monitoring) had the same ranking in importance and integration. This finding indicates that the respondents were able to differentiate between technological importance and integration.

Table 4.13
A Summary of Mean Rating and Ranking for ITs Skills Importance and Integration

Technology	Importance		Integrated	
	Mean	**Ranking**	**Mean**	**Ranking**
Word processing	4.88	3	4.37	1
Electronic spreadsheets	4.86	5	4.10	2
E-mail	4.64	13	1.92	16
Internet search and retrieval	4.66	12	1.63	22
Image processing	4.14	24	1.40	29
Electronic presentations	4.70	9	3.92	3
Groupware	4.46	18	1.30	33
Small business accounting software	4.86	4	2.18	12
Tax return preparation software	4.72	10	1.86	20
Time management and billing systems	4.39	19	1.91	17
Electronic working papers	4.77	7	2.90	6
Generalized audit software	4.89	1	2.24	11
Embedded audit modules/Real-time audit modules	4.89	2	2.04	15
Expert systems	4.27	21	2.29	10
Firewall(software/hardware)	4.30	20	1.52	24
External network configurations	3.51	33	1.34	31
User authentication systems	4.14	23	1.67	21

Table 4.13 (Continued)

Technology	Importance		Integrated	
	Mean	Ranking	Mean	Ranking
Internal network configurations	2.59	35	1.36	30
Intrusion detection and monitoring	3.92	28	1.41	28
Wireless communications	3.69	30	1.54	23
Digital communications	3.94	27	1.50	25
Encryption software	4.52	16	1.87	19
EDI—traditional	4.61	14	2.10	13
EDI—web based	4.67	11	1.33	32
Agent technologies	3.56	32	1.42	27
Database search and retrieval	4.48	17	3.15	4
Simulation software	3.88	29	2.51	8
Flowcharting/data modeling	4.14	25	2.51	9
Computer-aided systems engineering(CASE) tools	4.78	6	1.90	18
Cooperative client/ server environment	3.61	31	1.19	34
Workflow technology	4.09	26	2.07	14
Database design and installation	4.55	15	2.84	7
Test data	4.76	8	2.91	5
Enterprise resource planning	4.22	22	1.44	26
Application service providers	2.92	34	1.05	35

4.6 THE ALIGNMENT

In this study, the alignment between the importance and integration of IT skills was explored as the dependent variable. This section explores IT skills alignment without employing a specific analytical scheme of measuring alignment and then it describes the matching approach to measure the IT skills alignment. Then factor analysis was used to indicate the possible alignment dimensions.

4.6.1 Exploring Importance and Integration of IT Skills

In order to understand the relationship between importance and integration of IT skills, a cross-tabulation technique was used. To simplify the analysis, responses of '1' and '2' for IT skills importance were combined into one category called “not important.” Similarly, responses of '4' and '5' were combined into one category called “important”, while responses of '3' were left unchanged and indicated as being “less important.” The same approach was applied to IT skills integration. Responses of '1' and '2' were combined into one category called “not integrated.” Similarly, responses of '4' and '5' were grouped into one category called “integrated,” while responses of '3' were left unchanged and called “partially integrated.” The italic-bold font was used to make it easy to identify large occurrences. The italic-bold font represents very high occurrences (100 or more), whilst the bold font represents high occurrences (50 and above but less than 100) (Ismail, 2004). Table 4.14 shows a summary of the results of the cross-tabulation between the IT skills importance and integration.

Table 4.14
A Summary of IT Skills Importance and Integration

Technology	**Importance**	**Integration**		
		Not integrated	**Partly integrated**	**integrated**
Word processing	Not important	0	0	0
	Less important	0	0	0
	important	0	34	***215***
Electronic spreadsheets	Not important	0	0	0
	Less important	0	0	1
	important	0	49	***199***
E-mail	Not important	1	0	0
	Less important	5	3	0
	important	***188***	46	6
Internet search and retrieval	Not important	0	0	0
	Less important	8	3	0
	important	***211***	22	5
Image processing	Not important	4	0	0
	Less important	40	1	0
	important	***196***	8	0
Electronic presentations	Not important	0	0	0
	Less important	0	1	6
	important	3	**68**	***171***

Table 4.14 (Continued)

Technology	**Importance**	**Integration** Not integrated	Partly integrated	integrated
Groupware	Not important	2	0	0
	Less important	12	0	0
	important	***231***	4	0
Small business accounting software	Not important	0	0	0
	Less important	0	0	0
	important	***184***	**59**	6
Tax return preparation software	Not important	3	0	0
	Less important	0	0	0
	important	***215***	20	11
Time management and billing systems	Not important	1	0	0
	Less important	18	4	0
	important	***184***	38	4
Electronic working papers	Not important	1	0	0
	Less important	2	0	0
	important	**80**	**96**	**70**
Generalized audit software	Not important	0	0	0
	Less important	1	0	1
	important	***153***	**77**	17

Table 4.14 (Continued)

Technology	**Importance**	**Integration**		
		Not integrated	**Partly integrated**	**integrated**
Embedded audit modules/Real-time audit modules	Not important	0	0	0
	Less important	0	0	0
	important	***184***	**60**	5
Expert systems	Not important	0	0	0
	Less important	30	6	1
	important	***128***	**67**	17
Firewall(software/hardware)	Not important	4	0	1
	Less important	23	1	0
	important	***199***	20	3
External network configurations	Not important	33	1	0
	Less important	**90**	1	2
	important	***119***	2	1
User authentication systems	Not important	4	1	0
	Less important	39	3	2
	important	***177***	22	1
Internal network configurations	Not important	***115***	1	0
	Less important	***117***	1	0
	important	15	0	0

Table 4.14 (Continued)

Technology	Importance	Integration		
		Not integrated	**Partly integrated**	**integrated**
Intrusion detection and monitoring	Not important	16	0	0
	Less important	**74**	3	1
	important	***144***	9	2
Wireless communications	Not important	15	2	0
	Less important	**75**	5	1
	important	***143***	8	0
Digital communications	Not important	8	2	0
	Less important	**53**	3	0
	important	***174***	5	4
Encryption software	Not important	1	1	0
	Less important	5	0	0
	Important	***196***	32	14
EDI—traditional	Not important	1	0	0
	Less important	4	2	0
	important	***169***	46	26
EDI—web based	Not important	2	0	0
	Less important	8	0	0
	important	***238***	1	0

Table 4.14 (Continued)

Technology	**Importance**	**Integration**		
		Not integrated	**Partly integrated**	**integrated**
Agent technologies	Not important	9	1	0
	Less important	**99**	4	0
	important	***130***	6	0
Database search and retrieval	Not important	0	1	0
	Less important	6	7	2
	important	48	**88**	**97**
Simulation software	Not important	4	4	1
	Less important	44	25	3
	important	**79**	**58**	31
Flowcharting/data modeling	Not important	4	0	0
	Less important	21	13	5
	important	**99**	**74**	30
Computer-aided systems (CASE) engineering tools	Not important	0	0	0
	Less important	0	0	0
	important	***230***	16	3
Cooperative client/server environment	Not important	14	0	0
	Less important	**97**	0	0
	important	***136***	0	0

Table 4.14 (Continued)

Technology	**Importance**	**Integration**		
		Not integrated	**Partly integrated**	**integrated**
Workflow technology	Not important	6	2	1
	Less important	28	15	1
	important	***139***	49	8
Database design and installation	Not important	2	0	0
	Less important	3	9	3
	important	**79**	***97***	**56**
Test data	Not important	0	0	0
	Less important	0	1	0
	important	**75**	***107***	**66**
Enterprise resource planning	Not important	4	0	0
	Less important	43	0	0
	important	***200***	2	0
Application service providers	Not important	**87**	0	0
	Less important	***101***	0	0
	important	**60**	1	0

From Table 4.14, it is observed that three different patterns of IT skills importance - IT skills integrated emerged. The first pattern refers to a group of items with a very large number of occurrences (100 or more) for the category of "important and integrated.' These items include word processing, electronic spreadsheets, and electronic presentations. In this group, many lecturers perceived that these types of technology are important and required for accounting graduates. They also perceived that these technologies are currently being integrated in the accounting curriculum. Therefore, it is reasonable to label this group a as the “aligned” group.

The second pattern refers to a group of items with a very large number of occurrences (100 or more) in categories of “important but not integrated” and “less important but not integrated.” This group includes most of the IT skills items (26 items). These items are e-mail, internet search and retrieval, image processing, groupware, small business accounting software, tax return preparation software, time management and billing systems, generalized audit software, embedded audit modules/real-time audit modules, expert systems, firewall (software/hardware), external network configurations, user authentication systems, internal network configurations, intrusion detection and monitoring, wireless communications, digital communications, encryption software, EDI—traditional, agent technologies, EDI—web based, computer-aided systems (CASE) engineering tools, cooperative client/server environment, workflow technology, enterprise resource planning, and application service providers. While many lecturers perceived that these IT skills are important or less important, many also perceived that these IT skills are not being currently integrated into the accounting curriculum. Therefore, it is reasonable to label this group of variables as the “non-aligned” group.

The third and final pattern represents a group of items that received an important rating but a mixture of responses for the integration (not integrated or partly integrated). These items include database search and retrieval, electronic working papers, simulation software, flowcharting/data modeling, test data, and database design and installation. Result for these items suggests that while many of the lecturers perceived these items are important or required for the accounting graduates, many also perceived that these IT skills are not being integrated or partly integrated into the accounting curriculum. Therefore, it is reasonable to label this group as the "mixed" group. Table 4.15 summarizes the three different types of alignment groups.

Table 4.15
A Summary of Alignment Groups of 35 Items

Aligned	Mixed	Non-aligned
Word processing	Test data	Application service providers
Electronic spreadsheets	Electronic working papers	Cooperative client/server environment
Electronic presentations	Database design and installation	External network configurations
		Internal network configurations
	Flowcharting/data modeling	Workflow technology
		Agent technology
	Simulation software	Expert systems

Table 4.15 (Continued)

Aligned	Mixed	Non-aligned
	Database search and retrieval	Wireless communications
		Intrusion detection and monitoring
		Generalized audit software
		EDI- traditional
		Time management and billing systems
		Digital communications
		User authentication systems
		Small business accounting software
		Embedded audit modules/Real-time audit modules
		E-mail
		Enterprise resource planning
		Image processing
		Firewall (software/hardware)
		Encryption software
		Internet search and retrieval
		Computer-aided systems (CASE) engineering tools

Table 4.15 (Continued)

Aligned	**Mixed**	**Non-aligned**
		Groupware
		EDI-web based
		Tax return preparation software

* Variables in each group are listed in descending order

For the aligned group, the order of alignment is based on the value in the category of "important-integrated." Table 4.15 shows that word processing had the highest value in that category and therefore the most aligned variable. On the other end, database search and retrieval had the lowest values and therefore the least aligned variable in the aligned group. For the mixed group, the order of alignment is based on the value in the category of "important-partly integrated." Table 4.15 shows that test data appeared to have the highest value and therefore the most aligned variable in the mixed group, whilst simulation software had the lowest value and thus the least aligned variable in this group. Finally, the order of alignment in the non-aligned group is based on the value in the category of "important-not integrated." From Table 4.15 it appears that application service providers had the lowest value and therefore the most aligned variable in the nonaligned group. On the other end, tax return preparation software had the highest value and therefore the least aligned variable in the nonaligned group.

4.6.2 Matching Approach as Alignment Measure

As explained earlier in Chapter Three (Section 3.3.3), this study used the matching approach to measure the alignment between required (important) and integrated IT skills in the accounting curriculum. According to Venkatraman (1989), the deviation score analysis is one of the analytical schemes that can be used for the matching perspective. This method is based on a premise that the absolute difference between the standard scores of two variables indicates a lack of fit. For the purpose of this study, the deviation score analysis was adopted and the measure of alignment was computed as the absolute difference between the rating of IT skills importance and the rating for the IT skills integration level. A low value of the difference indicates that the alignment between the two variables is high, whilst a high value implies that there is a high degree of misalignment. The mean difference for each IT skills was calculated by summing up the absolute difference for all responses and divided it by the number of responses. A mathematical representation of the above is as follows:

Mean Difference = Σ ABS (required [important] IT skills rating – integration level of IT skills rating) / N (Equation 4.1)

The results of all 35 technologies are represented in Table 4.16 with items arranged in ascending order of the mean. A low mean indicates a high degree of alignment between important IT skills and integrated IT skills integration variables. From Table 4.16, it appears that word processing, electronic spreadsheets and electronic presentations were most aligned with integrated IT skills. The greatest mismatch was observed for advanced technologies such as EDI-web based, groupware, internet search and retrieval, and tax return preparation software. These results are consistent with those of the cross-tabulation technique.

Table 4.16
Mean Rating (Matching Approach)

Technologies	**Mean**	**Rank**
Word processing	.63	1
Electronic spreadsheets	.84	2
Electronic presentations	.98	3
Internal network configurations	1.22	4
Database search and retrieval	1.37	5
Simulation software	1.51	6
Flowcharting/data modeling	1.70	7
Database design and installation	1.78	8
Electronic working papers	1.87	9
Test data	1.88	10
Application service providers	1.95	11
Expert systems	1.97	12
Workflow technology	2.07	13
Wireless communications	2.16	14
Agent technologies	2.16	15
External network configurations	2.19	16

Table 4.16 (Continued)

Technologies	**Mean**	**Rank**
Cooperative client/server environment	2.42	17
User authentication systems	2.46	18
Digital communications	2.47	19
Time management and billing systems	2.47	20
EDI—traditional	2.50	21
Intrusion detection and monitoring	2.53	22
Encryption software	2.66	23
Small business accounting software	2.69	24
Generalized audit software	2.691	25
E-mail	2.74	26
Image processing	2.75	27
Enterprise resource planning	2.78	28
Firewall(software/hardware)	2.79	29
Embedded audit modules/Real-time audit modules	2.86	30
Computer-aided systems engineering (CASE)	2.87	31
Tax return preparation software	2.88	32
Internet search and retrieval	3.03	33
Groupware	3.17	34
EDI—web based	3.35	35

4.6.3 Factor Analysis for IT Skills Alignment

The 35 technologies were considered distinct in previous analysis. However, it is possible that some of these technologies are correlated with each other, or there may be some underlying dimensions related to this variable. In an attempt to examine further IT skills alignment variable, factor analysis was used to search for such dimensions. To test whether factor analysis was appropriate for the IT skills alignment, KMO and Bartlett tests were first conducted. The result is reproduced in Table 4.17 below.

Table 4.17
KMO and Bartlett's Test IT Skills Alignment

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.795
Bartlett's Test of Sphericity Approx. Chi-Square	2355.180
Df	595
Sig.	.000

From Table 4.17, the KMO measure for the technologies alignment showed a value 0.795. This indicates a 'middling' adequacy according to Hair et al. (2010) and hence was appropriate for use in further factor analysis. The Bartlett's test of sphericity yielded a value of 2355.180 and its associated significance level was very low. Therefore the hypothesis that the variables are independent can be rejected (Ho, 2006). Overall, these results show that factor analysis can be applied for the IT skills alignment variable.

The factor analysis was conducted using principal component analysis (PCA) and varimax rotation with Kaiser Normalization (Ho, 2006). The results of the test revealed nine factors with an Eigenvalue of more than 1. The scree plot in Figure 4.1 shows that the plot slopes steeply downwards from one factor to five factors and more gently from five factors to nine factors.

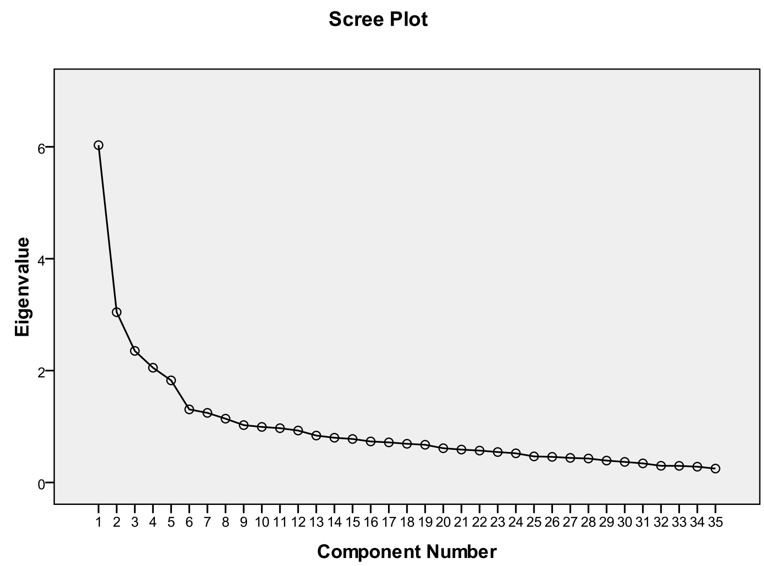

Figure 4.1
Scree Plot of IT Alignment

Considering the results of the scree plot test and the purpose of the factor analysis was to search the appropriate dimensions related to the alignment variable, the factor analysis was re-run with the number of factors pre-set at five. The five factors solution explained 43.718 percent of the variance (Appendix C). Table 4.18 shows the factor loading and the factor structure for all 35 items.

Table 4.18
Rotated Component Matrix[a] of IT Alignment

	Component				
	1	**2**	**3**	**4**	**5**
Flowcharting/data modeling	.740				
Test data	.701				
Database design and installation	.700				
Simulation software	.660				
Workflow technology	.605				
Cooperative client/ server environment	.592				
Application service providers	.522				
Database search and retrieval	.493				
Computer-aided systems engineering (CASE)	.454				
Enterprise resource planning	.436				
Firewall(software/hardware)		.703			
Digital communications alignment		.592			
External network configurations		.580			
Encryption software alignment		.573			
Intrusion detection and monitoring		.572			
EDI—traditional		.569			
Wireless communications		.544			
User authentication systems		.521			
Agent technologies		.367			

Table 4.18 (Continued)

	Component				
	1	**2**	**3**	**4**	**5**
Internal network configurations		.358			
Expert systems		.348			
Internet search and retrieval			.775		
E-mail			.729		
Image processing			.666		
Groupware			.584		
Time management and billing systems			.526		
EDI—web based			.365		
Word processing				.773	
Electronic spreadsheets				.768	
Electronic working papers				.712	
Electronic presentations				.660	
Generalized audit software					.748
Small business accounting software					.732
Tax return preparation software					.701
Embedded audit modules/Real-time audit modules					.695

Note.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a] Rotation converged in 6 iterations.

The results in Table 4.18 show that all 35 technologies exhibited minimal factor loadings. A factor loading is a correlation between an item and a given factor (Ho, 2006). Hair et al. (2010) suggest that "factor loading in range of ±.30 to ±.40 are considered to meet the minimal level for interpretation of structure" (Hair et al., 2010, p 117). Furthermore, to be considered significant a smaller loading is given either to a large sample size or a larger number of variables being analyzed. Based on our sample size (i.e. 249), ±.035 factor loading was considered significant for our sample and it could be decreased because of the large number of variables analyzed (Hair et al., 2010, pp. 117-118). In our case, the results show that all items had a factor loading of more than 0.35 except one item (expert systems alignment, whose factor loading was 0.348), implying that the items making up each of the factors were significantly correlated to the factor itself. This analysis confirms that the 35 technologies can be measured by five factors. The five factors include all items as shown in Table 4.19, which include each factor items and its name.

Table 4.19
Alignment Dimensions (Factors)

Factor name	**Items**
Factor (1)	Flowcharting/data modeling, database design and installation, test data, database search and retrieval, simulation software, computer-aided systems engineering (CASE), workflow technology, cooperative client/ server environment, application service providers, and enterprise resource planning

Table 4.19 (Continued)

Factor name	Items
Factor (2)	Firewall (software/ hardware), EDI—traditional, digital communications, encryption software, wireless communications, external network configurations, user authentication systems, intrusion detection and monitoring, agent technologies, internal network configurations, and expert systems.
Factor (3)	Internet search and retrieval alignment, groupware, E-mail, image processing, and time management , billing systems and EDI—web based
Factor (4)	Word processing, electronic spreadsheets, electronic working papers and electronic presentations
Factor (5)	Generalized audit software, small business accounting software, tax return preparation software and embedded audit modules/real-time audit modules

4.6.3.1 Comparison of Factor Analysis Results for IT Alignment

Table 4.20 compares the results of factor analysis for IT alignment items with the original five dimensions developed by Greenstein and McKee (2004). It was observed that while 25 items appear to be similar with each factor, 10 other items are different from the grouping factors. EDI-web based was in factor 2 in Greenstein and McKee (2004) but in factor 3 in our analysis. If we look at the factor loading for EDI-web based in Table 4.18, it was .327 in factor 2 and .365 in factor 3; so we can consider EDI–web based in factor 2 because the difference in factor loadings was very small. Expert system was on factor 2 in our analysis and in factor 3 in Greenstein and McKee (2004). Expert system did not relate to the e-commerce technology, as it is an auditing application. Therefore, expert system was deleted from the analysis. Factor 3 was completely different from the two analyses. Items appeared in our results were related to communication technologies except time management and billing systems, which were deleted. This factor was then renamed general communication technologies. Word processing, electronic spreadsheets and electronic presentation were similar in the two analyses. Electronic working paper was not in Greenstein and McKee (2004) but we can consider it an office application because it is software that generates schedules. Therefore, this factor was named as general office applications. In our results, factor 5 included small business accounting software and tax return peroration software, while those items were in accounting automation factor in Greenstein and McKee (2004). In addition, it included embedded audit modules/real-time audit modules and generalized audit software; those items were included in audit automation factor in Greenstein and McKee (2004). Therefore, the fifth factor was named accounting and auditing technologies. In sum, the next analysis was carried out based on 33 technologies only.

Table 4.20

Comparison of IT Alignment Factors

Greenstein and McKee (2004)	IT Alignment
Factor (1):System design and implementation	
Flowcharting/data modeling	Flowcharting/data modeling
Database design and installation	Database design and installation
Test data	Test data
Database search and retrieval	Database search and retrieval
Simulation software	Simulation software,
Computer-aided systems engineering (CASE)	Computer-aided systems engineering (CASE)
Workflow technology	Workflow technology
Cooperative client/ server environment	Cooperative client/ server environment
Application service providers	Application service providers
Enterprise resource planning	Enterprise resource planning
Factor (2): E-commerce technologies	
Firewall (software/ hardware)	Firewall (software/ hardware)
EDI—traditional	EDI—traditional
Digital communications	Digital communications
Encryption software	Encryption software
Wireless communications	Wireless communications
External network configurations	External network configurations,
User authentication systems	User authentication systems
Intrusion detection and monitoring	Intrusion detection and monitoring
Agent technologies,	Agent technologies
Internal network configurations	Internal network configurations

Table 4.20 (Continued)

Greenstein and McKee (2004)	IT Alignment
EDI- web based	*Expert systems*
Factor(3): Audit automation	
Electronic working papers	*Internet search and retrieval*
Generalized audit software	*Groupware*
Expert systems	*E-mail*
Embedded audit modules/real-time audit modules	*Image processing*
	Time management and billing systems
	EDI—web based
Factor (4):General office automation	
Word processing	Word processing,
Electronic spreadsheets	Electronic spreadsheets
Electronic presentations	Electronic presentations
E-mail	*Electronic working papers*
Internet search and retrieval	
Image processing	
Groupware	
Factor (5): Accounting automation	
Small business accounting software	Small business accounting software
Tax return preparation software	Tax return preparation
Time management and billing systems	*Embedded audit modules/real-time audit modules*
	Generalized audit software

In the following analysis, this study took the mean of the respondents' rating of the separate variables that constituted the dimension to obtain the dimension scores. The aggregate score for each alignment dimension was calculated by averaging the items in each dimension group, that is:

System design and implementation score = (Flowcharting/data modeling + database design and installation + test data + database search and retrieval + simulation software + computer-aided systems engineering (CASE) + workflow technology + cooperative client/server environment + application service providers + enterprise resource planning) / 10

E-commerce technologies score = (Firewall (software/hardware) + EDI—traditional + digital communications + encryption software + wireless communications + external network configurations + user authentication systems + intrusion detection and monitoring + agent technologies + internal network configurations + EDI- web based) / 11

General communication technologies score = (Internet search and retrieval + groupware + E-mail + image processing) / 4

Office applications score = (Electronic spreadsheets + word processing + electronic presentations + electronic working papers) / 4

Accounting and auditing technologies score = (Embedded audit modules/real-time audit modules + generalized audit software + small business accounting software + tax return preparation software) / 4

4.7 FACTORS INFLUENCING THE ALIGNMENT

As discussed earlier in Chapter Three, this study has identified four factors that may influence the alignment between important IT skills and integrated IT skills in the accounting curriculum in Egypt. These factors are financial resources, university/faculty support, interest and attitude of academics toward IT integration, and market needs. Respondents were asked to indicate their perception on a five-point scale, ranging from '1' "strongly disagree" to '5' "strongly agree.' This section summarizes the responses of each variable.

4.7.1 Financial Resources

Financial resources were measured by the level of satisfaction of IT services and the adequacy of hardware and software. The variable was adopted from Ismail and Salim (2005) and for validation purpose, a factor analysis was run to determine whether the variable could be treated as one dimension. The test was conducted using principal component analysis and Varimax rotation with Kaiser Normalization. To test whether factor analysis was appropriate for the financial resources variable, KMO and Bartlett test were conducted. The results are shown in Table 4.21.

Table 4.21
KMO and Bartlett's Test for Financial Resources

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.760
Bartlett's Test of Sphericity Approx. Chi-Square	533.487
Df	21
Sig.	.000

Table 4.21 indicates that the KMO measure for financial resources items showed a value of 0.760. This indicates a 'middling' adequacy according to Hair et al. (2010), and hence further factor analysis was appropriate. The Bartlett's test of sphericity yielded a value of 533.487 and its associated significance level was very low. Therefore the hypothesis that the variables are independent can be rejected (Ho, 2006). Overall, the results show that factor analysis can be applied for financial resources.

The results of the test reveal two factors with an Eigenvalue of more than 1. The scree plot in Figure 4.2 shows that the plot sloped steeply downwards from one factor to two factors before slowly approaching to become approximately a horizontal line.

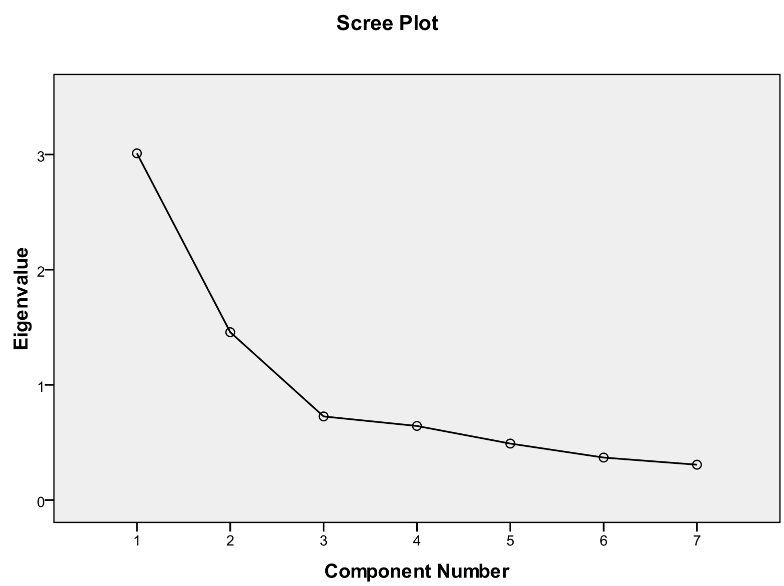

Figure 4.2
Scree Plot of Financial Resources

The two factors solution explained 63.8 percent of the variance (Appendix C2). The factor loadings and factor structure for each financial resource item and the reliability test for each factor are shown in Table 4.22.

Table 4.22
Factor Structure for Financial Resources

	Factor loading	**Factor loading**
Satisfaction with IT services (Factor 1)		
Support for computing services from technical staff is satisfactory	.792	
Network services are satisfactory	.786	
Hardware facilities are upgraded	.687	

Table 4.22 (Continued)

	Factor loading	**Factor loading**
Application/software required to integrate IT in accounting is updated regularly	.659	
Adequacy of hardware and software (Factor 2)		
Hardware facilities, i.e. number of PCs for accounting students to acquire IT skills are adequate		.886
Hardware facilities, i.e. number of PCs for accounting lecturers to acquire IT skills are adequate		.851
Application/software required to integrate IT in accounting is adequate		.767
Reliability Test (Cronbach's Alpha)		
Satisfaction with IT services (Factor 1)	.737	
Adequacy of hardware and software (Factor 2)	.809	

Table 4.22 shows the factor loading and the factor structure for all seven items. The results showed that all items have a factor loading of more than 0.60 and reliability test is more than 0.70, which implies that the items making up each of the factor are significantly correlated to the factor itself. This analysis confirms that the seven items of financial resources can be grouped into two factors. This result is consistent with Ismail and Salim (2005).

Table 4.23 shows the results of the mean value of each factor used to measure the financial resources arranged in descending order.

Table 4.23
Financial Resources Items Mean

Items	Mean
Satisfaction with IT services	
Support for computing services from technical staff is satisfactory	2.33
Network services are satisfactory	2.17
Application/software required to integrate IT in accounting is updated regularly	1.81
Hardware facilities are upgraded regularly	1.78
Average	2.02
Adequacy of hardware and software	
Hardware facilities, i.e. number of PCs for accounting lecturers to acquire IT skills are adequate	1.55
Application/software required to integrate IT in accounting is adequate	1.52
Hardware facilities, i.e. number of PCs for accounting students to acquire IT skills are adequate	1.36
Average	1.48

As shown in Table 4.23, the average value of means of the IT services satisfactory items (2.02) is below the midpoint (2.5). The results indicate that most respondents believed that IT services are not sufficient and needs to be improved. Likewise, the results indicated that the average value of means of adequacy of hardware and software items (1.48) is below the midpoint. This means that hardware and software facilities for accounting students and lecturers are not sufficient. In general, the results imply that the universities do not provide sufficient financial resources to use appropriate/satisfactory IT services and facilities in order to integrate IT into the accounting curriculum.

To obtain the dimension or factor scores, the mean of the respondents' rating was calculated by averaging the items, as follows:

IT services satisfaction score = (support from technical staff+ upgrade hardware+ network service+ update software) / 4.

Adequacy of hardware and software score = (hardware facilities for students+ adequate software to integrate IT in accounting+ hardware facilities for lecturers) / 3.

4.7.2 University/Faculty Support

University/faculty support was measured by the appreciation and support given by the head of department, colleagues and students for the efforts toward integrating IT into the accounting curriculum and the university policy to improve these efforts. The measure was adopted from Ismail and Salim (2005) and Kavanagh and Drennan (2007). Factor analysis was conducted to validate the variable to find out whether they could be treated as one dimension. The test was conducted using principal component analysis and Varimax rotation with Kaiser Normalization. In order to test whether factor analysis was appropriate for the university/faculty support variable, KMO and Bartlett test were conducted. The results are shown in Table 4.24.

Table 4.24
KMO and Bartlett's Test for University/Faculty Support

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.735
Bartlett's Test of Sphericity Approx. Chi-Square	2557.177
Df	45
Sig.	.000

Table 4.24 show that the KMO measure for university/faculty support items showed a value of 0.755. This indicates a 'middling' adequacy (Hair et al., 2010) and the value of Bartlett's test of sphericity was also large 2557.177, and its associated significance level was very low. KMO measure and Bartlett's test of sphericity results demonstrate that the items used to measure the university/faculty support met the conditions for factor analysis, and it can be applied for the university/faculty support items. The results of the test reveal three factors with an Eigenvalue of more than 1. The scree plot in Figure 4.3 shows that the plot sloped steeply downwards from one factor to three factors, more gently from three factors to four factors.

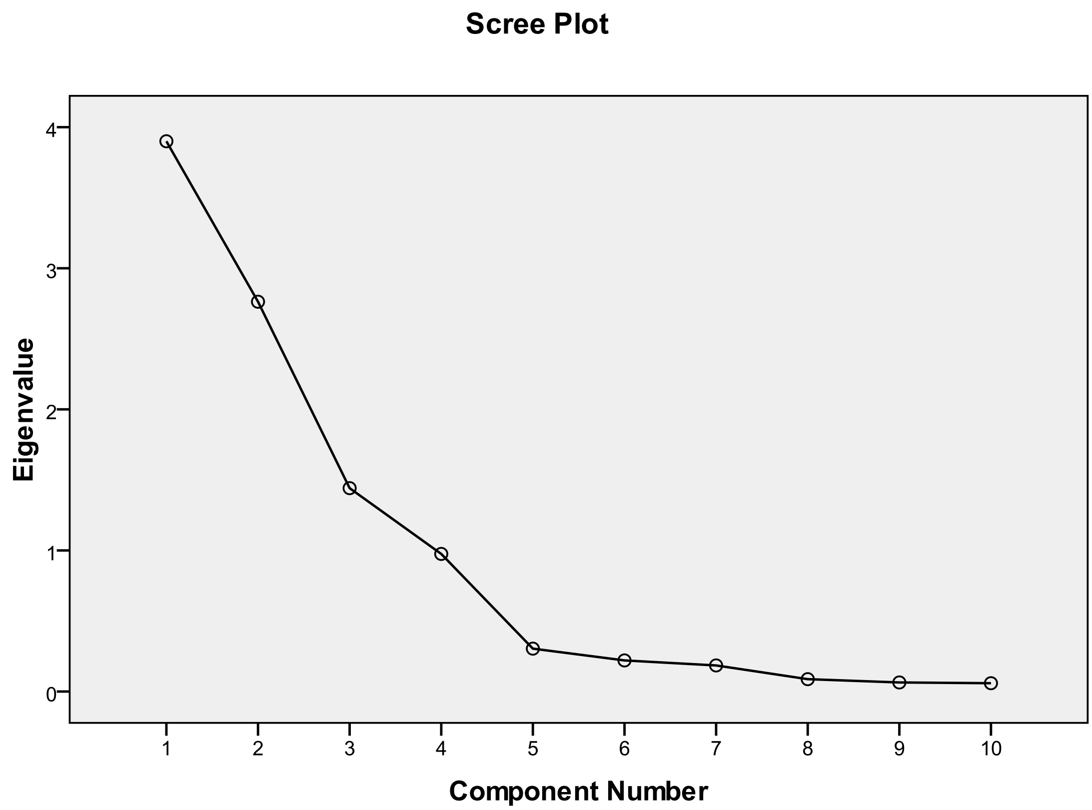

Figure 4.3
Scree Plot of University/Faculty Support

The three-factor solution explained 82.9 percent of the variance (appendix C3). Table 4.25 shows the factor loading the factor structure for all ten items and the reliability test of each factor.

Table 4.25

Factor Structure for University/ Faculty Support

	Factor loading	Factor loading	
University policy (Factor 1)			
Training for staff to acquire skills in IT is sufficient	.939		
My university has insufficient budgets to improve the interface between practice and education	.934		
Training for AIS is always given a higher priority to other areas of accounting	.928		
The effort for teaching IS/AIS are not adequately rewarded by my university	.833		
Support from colleagues and students (Factor 2)			
Appreciated by students		.937	
Fully supported by students		.923	
Fully supported by colleagues		.648	
Appreciated by colleagues		.641	
Support from management(Factor 3)			
Fully supported by head of department			.937
Appreciated by head of department			.929
Reliability Test (Cronbach's Alpha)			
University policy (Factor 1)		.927	
Support from colleagues and students (Factor 2)		.866	
Support from management(Factor 3)		.963	

Table 4.25 shows the factor loading and the factor structure for the university/faculty support items. The results showed that all items have a factor loading ranging from 0.641 to 0.939, suggesting that they correlate very significantly to the factor. This analysis confirms that the ten items of university/faculty support can be measured by three dimensions (factors). These results are different from that of previous studies (Ismail & Salim, 2005; Kavanagh & Drennan, 2007), which used two factors only to measure the university/faculty support. Furthermore, the present results indicate that the responses were able to differentiate between support from student and colleagues, and support from management.

Table 4.26 shows the results of the mean value for ten items used to measure the university/faculty support factor, arranged in a descending order of mean. All negative items were re-coded for the analysis.

Table 4.26

University/Faculty Support Items Mean

Items	Mean
Support from colleagues and student	
Appreciated by students	3.67
Fully supported by students	3.61
Appreciated by colleagues	3.39
Fully supported by colleagues	3.38
Average	**3.51**
Support from management	
Appreciated by head of department	3.07
Fully supported by head of department	3.05
Average	**3.06**
University policy	
The effort for teaching IS/AIS are not adequately rewarded by my university.	1.46
Training for staff to acquire skills in IT is sufficient	1.35
My university has insufficient budgets to improve the interface between practice and education	1.33
Training for AIS is always given a higher priority to other areas of accounting	1.33
Average	**1.37**

Table 4.26 shows that the mean values of the colleagues and student support items (3.51) and also the mean values of the management support items (3.06) were above the midpoint (2.5). Respondents agreed that their efforts toward integrating IT into the accounting curriculum were appreciated and supported by students, colleagues,

and heads of department. But the mean value of the university policy items (1.37) was below the midpoint, indicating that respondents agreed that efforts for teaching IS/AIS are not adequately rewarded by their universities, and training for staff to acquire skills in IT is insufficient. They also disagreed that training for AIS is always given a higher priority to other areas of accounting, and their universities have sufficient budgets to improve the interface between practice and education. The results suggest that the university polices are not supporting the integration of IT in accounting curriculum.

To obtain the dimensions or factors scores, the mean of the respondents' rating was calculated by averaging the items as follows:

University policy score = (The efforts for teaching IS/AIS are not adequately rewarded by my university + training for AIS is always given a higher priority to other areas of accounting + university has insufficient budgets to improve the interface between practice and education + training for staff to acquire skills in IT is sufficient) / 4

Support from colleagues and student score = (appreciated by colleagues + fully supported by colleagues + appreciated by students + fully supported by students) / 4

Support from management score= (appreciated by head of department + fully supported by head of department) / 2

4.7.3 Interest and Attitude of Academics toward IT Integration

Factor analysis was conducted for all four items that measured interest and attitude of academics toward IT integration. The variable was adopted from Ismail and Salim (2005) to find out whether they could be treated as one dimension. The test was conducted using principal component analysis and Varimax rotation with Kaiser Normalization. To test whether factor analysis was appropriate for the variable interest and attitude of academics toward IT integration, KMO and Bartlett tests were conducted. The results are shown in Table 4.27.

Table 4.27
KMO and Bartlett's Test of Interest and Attitude

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.824
Bartlett's Test of Sphericity Approx. Chi-Square	784.851
Df	6
Sig.	.000

Table 4.27 shows that KMO value was 0.824, Bartlett's Test of Sphericity value was 784.851 and significant. This demonstrates that items used to measure interest and attitude of academician toward the integration clearly met the conditions of factor analysis. Figure 4.4 shows that there is only one factor with Eigenvalue of more than 1, which explained 78.6 % of the variance.

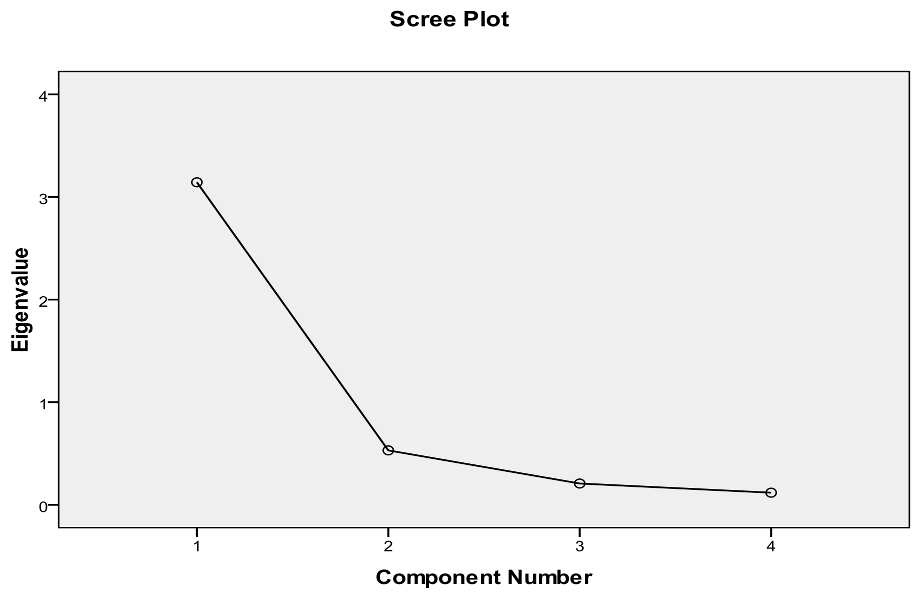

Figure 4.4
Scree Plot of Interest and Attitude

The scree plot in Figure 4.4 shows that the plot sloped steeply downward from one factor to two factors before slowly becoming an approximately horizontal line. Table 4.28 shows that the factor loading for all four items exhibited a factor loading ranging from 0.752 to 0.936, which means that the items correlated very significantly to the factor itself. Furthermore, the reliability value was more than 0.70, confirming that the four items of interest and attitude measured the same variable.

Table 4.28

Factor Structure for Interest and Attitude

	Factor loading
Accounting academicians are aware that IT skills are crucial for the enhancement of accounting profession	.936
Accounting academicians are aware of the importance of IT in accounting	.935
Accounting academicians are receptive to learn new IT skills	.910
Accounting academicians are apprehensive to learn new IT skills	.752
Reliability Test (Cronbach's Alpha)	
Interest and attitude of academics toward IT integration	.901

Table 4.29 shows the results of the mean value of four items used to measure the interest and attitude of academics toward IT integration arranged in descending order. All negative items were re-coded for analysis.

Table 4.29
Interest and Attitude of Academics toward IT Integration Mean

Items	Mean
Accounting academicians are aware that IT skills are crucial for the enhancement of accounting profession	4.69
Accounting academicians are aware of the importance of IT in accounting	4.66
Accounting academicians are receptive to learn new IT skills	4.64
Accounting academicians are apprehensive to learn new IT skills	4.59
Average	**4.65**

As shown in Table 4.29 the mean value of interest and attitude of academics toward IT integration items (4.65) was above the midpoint (2.5). Furthermore all items had a mean value over the midpoint. This means that the respondents were aware of the importance of IT in accounting. They also agreed that IT skills are crucial for the enhancement of accounting profession, and agreed that accounting academicians are receptive to learn new IT skills. However, they disagreed that accounting academicians are apprehensive to learn new IT skills.

To obtain the dimension or factor scores, the mean of the respondents' rating was calculated by averaging the items in each dimension group as follows:

Interest and attitude of academics toward IT integration score = (Accounting academicians are aware of the importance of IT in accounting+ Accounting academicians are receptive to learn new IT skills+ Accounting academicians are aware that IT skills are crucial for the enhancement of accounting profession + Accounting academicians are apprehensive to learn new IT skills) / 4

4.7.4 Market needs

This study adapted the instrument developed by Kavanagh and Drennan (2007) to measure the market needs by asking the accounting lecturers about the importance of IT for graduates to work in industry or in government and to have a good salary. For validation purpose factor analysis was conducted on all five items that measured the market needs variable to find out whether they could be treated as one dimension. The test was conducted using principal component analysis and Varimax rotation with Kaiser Normalization. To test whether factor analysis was appropriate for the market needs variable, KMO and Bartlett test were conducted. The results are shown in Table 4.30.

Table 4.30
KMO and Bartlett's Test of Market needs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.766
Bartlett's Test of Sphericity Approx. Chi-Square	381.587
Df	10
Sig.	.000

Table 4.30 shows that the KMO value for market needs items was 0.766, the value of Bartlett's Test of Sphericity was 381.587 and significant, demonstrating that the items used to measure the market needs met the conditions for factor analysis. Figure 4.5 shows that there is only one factor with Eigenvalue of more than 1, which explained 54.599 % of the variance.

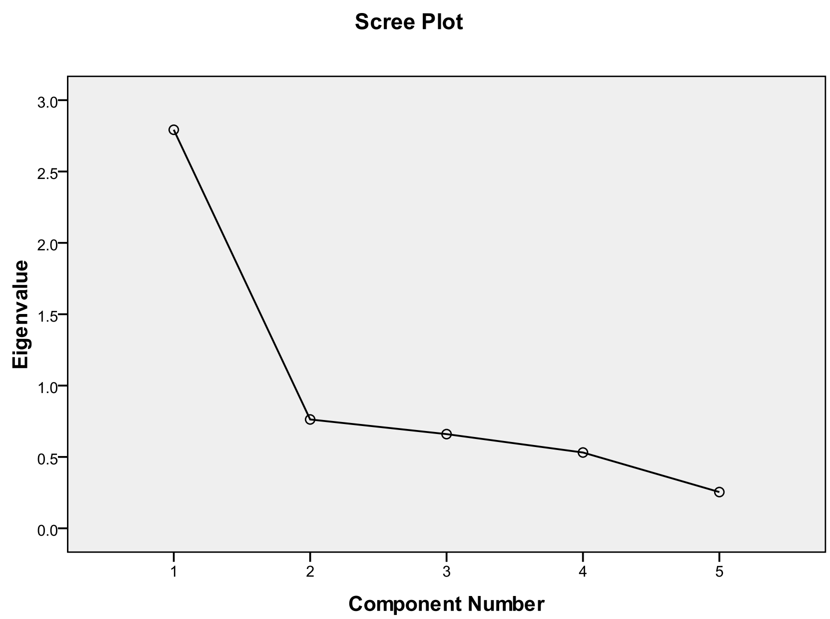

Figure 4.5
Scree plot of Market needs

The scree plot in Figure 4.5 shows that the plot sloped steeply downward from one factor to two factors and more gently from two factors to three factors. In addition, Table 4.31 shows that the factor loading for all five items exhibit a factor loading of more than 0.4, suggesting that they correlate very significantly to the factor itself with factor loading ranging from 0.597 to 0.865 (Hair et al., 2010). Furthermore, the reliability test was more than 0.7. These analyses confirmed that the five items of market needs measured as a single variable.

Table 4.31
Factor Structure for Market needs

Items	Factor loading
Graduates with good IT skills would have salary better than those without	.865
Graduates with good IT skills would get jobs easier than those without	.793
Graduates with good IT skills would be more successful in their career than those without	.762
IT skills are important for accounting graduates to work in industry	.645
IT skills are important for accounting graduates to work in government agencies	.597
Reliability Test (Cronbach's Alpha)	
Market needs	.773

As shown in Table 4.32, the mean value of five items used to measure the market needs are above the midpoint (ranging from 4.25 to 4.84, in which the mean was 4.61). This means that the respondents agreed that IT skills are important for accounting graduates to work in industry and in government agencies. Graduates with good IT skills would be likely to get jobs, have better salary and succeed in their career than those without.

Table 4.32
Market needs Mean

Items	Mean
IT skills are important for accounting graduates to work in industry	4.83
Graduates with good IT skills would be more successful in their career than those without	4.73
Graduates with good IT skills would have salary better than those without.	4.61
Graduates with good IT skills would get jobs easier than those without.	4.61
IT skills are important for accounting graduates to work in government agencies	4.26
Average	**4.61**

To obtain the factor score, the mean of the respondents' rating was calculated by averaging items in each dimension group as follows:

Market needs score = (graduates with good IT skills get good salary+ graduates with good IT skills get jobs easier + graduates with good IT skills success in their career + IT important for work in government+ IT important for work in industry) / 5

4.8 RELIABILITY TEST

Reliability test helps to assess the goodness of measure, the stability and consistency with which the instrument is measuring the concepts (Sekaran & Bouge 2010). This study used Cronbach's alpha coefficients to test the reliability of the questionnaire instruments. According to Hair et al (2010), Cronbach's 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 4.33 presents the results of the reliability test for each variable.

Table 4.33
Reliability Test

Factors	Cronbach's alpha
System design and implementation	0.806
E-Commerce technologies	0.787
Communication technologies	0.735
General office automation	0.769
Accounting and audit automation	0.726
IT service satisfaction	0.737
Adequacy of hardware and software	0.809
University policy	0.927
Support from colleagues and students	0.866
Support from management	0.963
interest and attitude of academics toward IT integration	0.901
Market needs	0.773

Table 4.33 shows that the Cronbach's alpha value for each variable ranged from 0.726 to 0.963, indicating a high reliability for the study variables (Hair et al., 2010). The result suggests that the variables are appropriate for further analysis.

4.9 HYPOTHESES AFTER FACTOR ANALYSIS

Results from factor analysis in section 4.6.3 suggested that IT alignment should be divided into five groups: system design and implementation technologies, e-commerce technologies, general communication technologies, office applications and accounting, and auditing technologies. Therefore, each of the initial hypotheses stated in section 3.4 in chapter 3 also need to be divided into five sub hypotheses as follows:

Hypothesis (H_1):

There is a positive relationship between availability of financial resources and IT alignment at universities in Egypt.

Hypothesis (H_{1a}):

There is a positive relationship between availability of financial resources and system design and implementation of technologies alignment at universities in Egypt.

Based on the results of section 4.7.1 financial resources were divided into two variables: IT services satisfaction and adequacy of hardware and software, so each sub-hypothesis was further divided into specific hypotheses as follows:

Hypothesis (H_{1a1}):

There is a positive relationship between IT services satisfaction and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{1a2}):

There is a positive relationship between adequacy of hardware and software and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{1b}):

There is a positive relationship between availability of financial resources and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{1b1}):

There is a positive relationship between IT services satisfaction and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{1b2}):

There is a positive relationship between adequacy of hardware and software and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{1c}):

There is a positive relationship between availability of financial resources and communication technologies alignment at universities in Egypt.

Hypothesis (H_{1c1}):

There is a positive relationship between IT services satisfaction and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{1c2}):

There is a positive relationship between adequacy of hardware and software and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{1d}):

There is a positive relationship between availability of financial resources and office applications technologies alignment at universities in Egypt.

Hypothesis (H_{1d1}):

There is a positive relationship between IT services satisfaction and office applications technologies alignment at universities in Egypt.

Hypothesis (H_{1d2}):

There is a positive relationship between adequacy of hardware and software and office application technologies alignment at universities in Egypt.

Hypothesis (H_{1e}):

There is a positive relationship between the availability of financial resources and the accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{1e1}):

There is a positive relationship between IT services satisfaction and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{1e2}):

There is a positive relationship between adequacy of hardware and software and accounting and auditing technologies alignment at universities in Egypt.

Figure 4.6 summarizes the previous hypotheses.

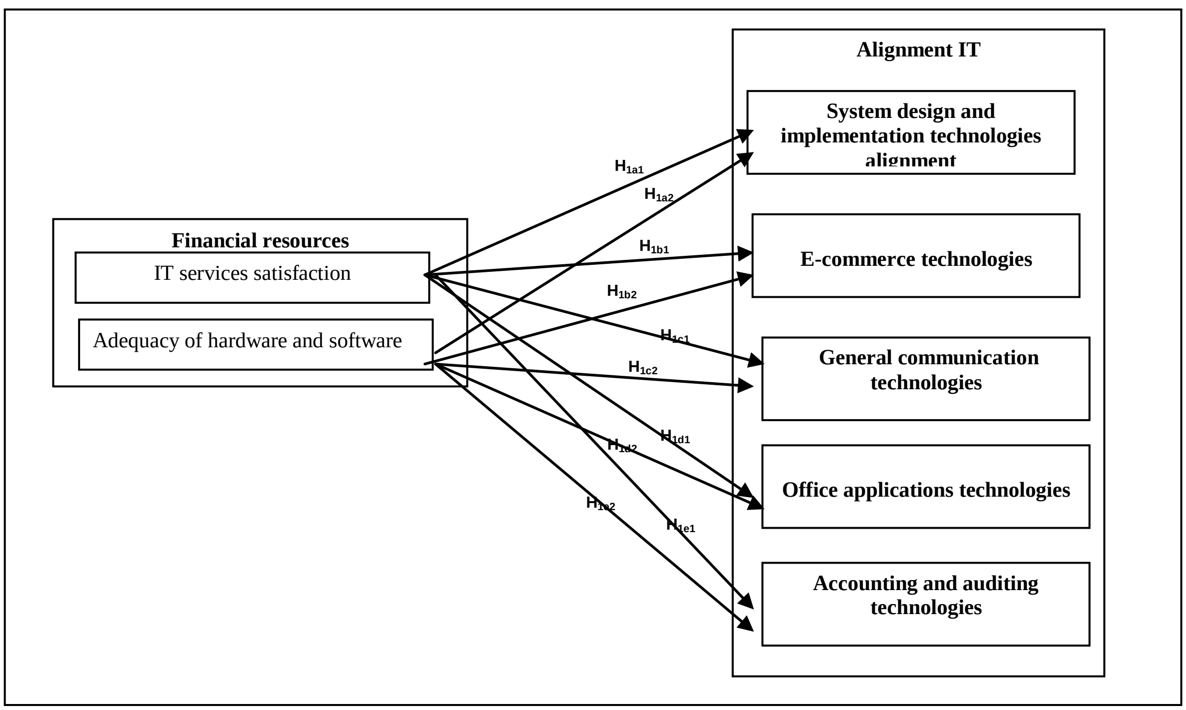

Figure 4.6
Hypothesis One after Factor Analysis

Hypothesis (H_2):

There is a positive relationship between university/faculty support and IT alignment at universities in Egypt.

Based on the results of section 4.7.2, university/faculty supports was divided into three variables: university policy, colleagues and student support, and management support; so each sub-hypothesis was divided into three specific hypotheses as follows:

Hypothesis (H_{2a}):

There is a positive relationship between university/faculty support and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{2a1}):

There is a positive relationship between university policy and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{2a2}):

There is a positive relationship between colleague and student support and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{2a3}):

There is a positive relationship between management support and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{2b}):

There is a positive relationship between university/faculty supports and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{2b1}):

There is a positive relationship between university policy and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{2b2}):

There is a positive relationship between colleagues and student support and the e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{2b3}):

There is a positive relationship between management support and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{2c}):

There is a positive relationship between university/faculty support and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{2c1}):

There is a positive relationship between university policy and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{2c2}):

There is a positive relationship between colleagues and student support and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{2c3}):

There is a positive relationship between management support and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{2d}):

There is a positive relationship between university/faculty support and office applications technologies alignment at universities in Egypt.

Hypothesis (H_{2d1}):

There is a positive relationship between university policy and office application technologies alignment at universities in Egypt.

Hypothesis (H_{2d2}):

There is a positive relationship between colleague and student support and office application technologies alignment at universities in Egypt.

Hypothesis (H_{2d3}):

There is a positive relationship between management support and office application technologies alignment at universities in Egypt.

Hypothesis (H_{2e}):

There is a positive relationship between university/faculty support and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{2e1}):

There is a positive relationship between university policy and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{2e2}):

There is a positive relationship between colleague and student support and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{2e3}):

There is a positive relationship between management support and accounting and auditing technologies alignment at universities in Egypt.

Figure 4.7 illustrates hypothesis two.

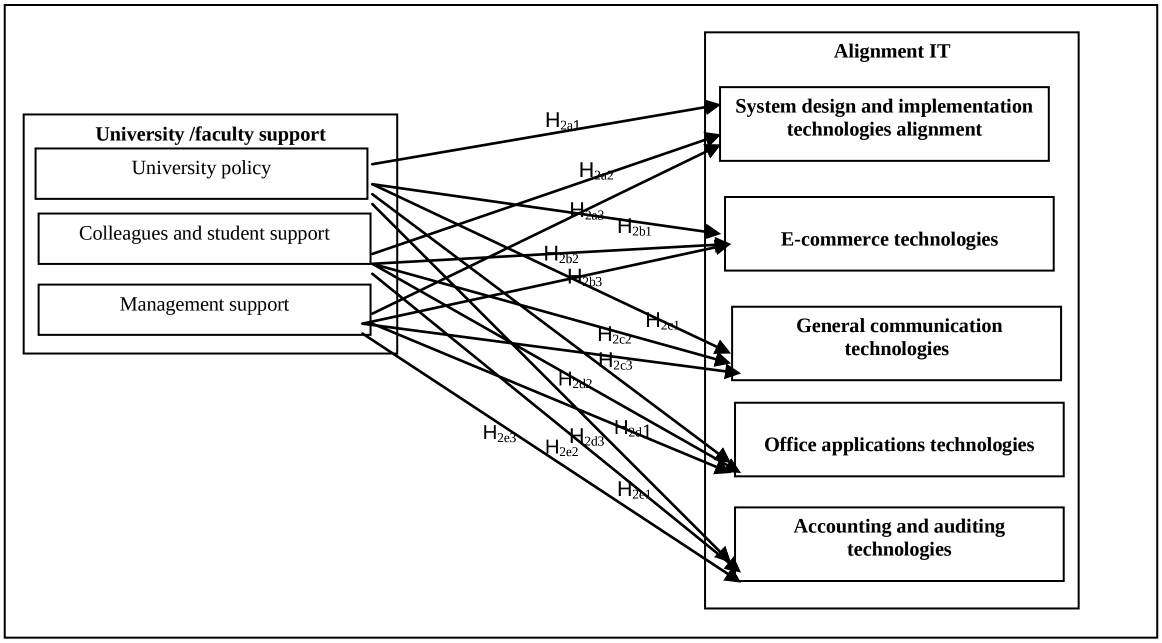

Figure 4.7
Hypothesis Two after Factor Analysis

Hypothesis (H_3):

There is a positive relationship between lecturers' attitude and interest towards IT and IT alignment at universities in Egypt.

Based on the results of section 4.7.3, interest and attitude of academics measured by one factor so hypothesis three was divided into five sub- hypotheses as follows:

Hypothesis (H_{3a}):

There is a positive relationship between lecturers' attitude and interest towards IT and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{3b}):

There is a positive relationship between lecturers' attitude and interest towards IT and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{3c}):

There is a positive relationship between lecturers' attitude and interest towards IT and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{3d}):

There is a positive relationship between lecturers' attitude and interest towards IT and office application technologies alignment at universities in Egypt.

Hypothesis (H_{3e}):

There is a positive relationship between lecturers' attitude and interest towards IT and accounting and auditing technologies alignment at universities in Egypt.

Figure 4.8 shows hypothesis three.

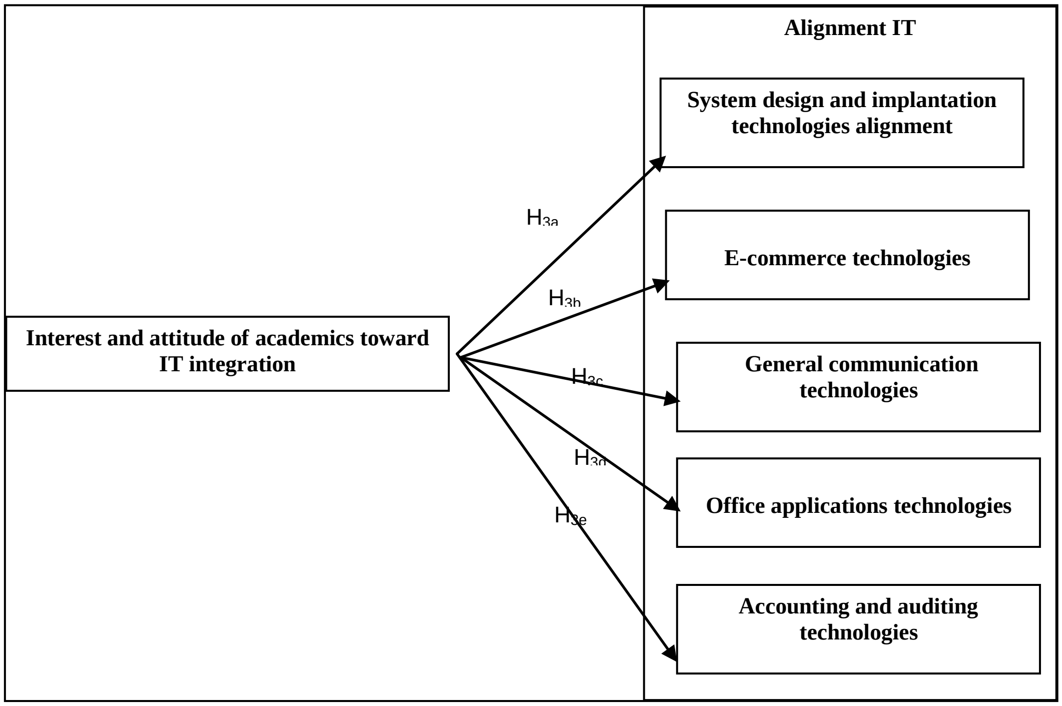

Figure 4.8
Hypothesis Three after Factor Analysis

Hypothesis (H_4):

There is a positive relationship between market (employer) needs and IT alignment at universities in Egypt.

Based on the results of section 4.7.4, market needs measured by one factor so hypothesis four was divided into five sub- hypotheses as follows:

Hypothesis (H_{4a}):

There is a positive relationship between market needs and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{4b}):

There is a positive relationship between market needs and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{4c}):

There is a positive relationship between market needs and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{4d}):

There is a positive relationship between market needs and office application technologies alignment at universities in Egypt.

Hypothesis (H_{4e}):

There is a positive relationship between market needs and accounting and auditing technologies alignment at universities in Egypt.

Figure 4.9 shows hypothesis four.

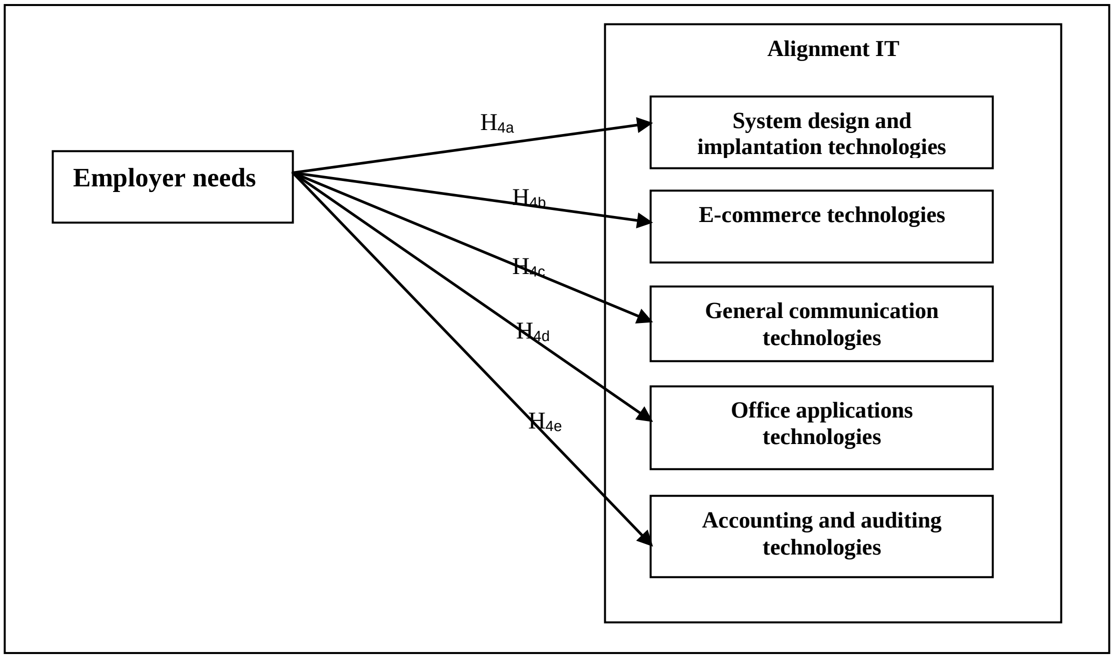

Figure 4.9
Hypothesis Four after Factor Analysis

4.10 MULTIPLE REGRESSION ANALYSIS

This section presents an analysis and discussion of the relationship between IT alignment (for each dimension) as the dependent variable, and financial resources, university/faculty support, interest and attitude of academics, and market needs as the independent variables. The relationships were examined using a multiple regression technique. Multiple regression technique is a statistical technique that can be used to analyze the relationship between one dependent variable and many independent variables (Hair et al., 2010). There are three major types of multiple regression technique such as standard multiple regression, hierarchical regression, and statistical (stepwise) regression**.** In the standard multiple regression model, all independent variables are entered into the regression equation simultaneously (Ho, 2006), and they are assumed to have an equal importance (Tabachinck & Fidell, 2007). In this study, the standard regression method was adopted to analyze the relationships between one dependent variable and a few independent variables because the independent variables are assumed to have an equal importance. Before performing the multiple regression procedure, the assumptions underlying regression analysis and the correlation between variables (multicollinearity) were checked. This is discussed in the next sections.

4.10.1 Matching Approach Without Low-Low Combination

As discussed earlier (section 4.6.2), the matching approach was adopted to measure the alignment between the IT skills required (important) and IT skills integrated in the accounting curriculum. Ismail and King (2005) suggest that a matching approach can give a misleading picture about the fit and therefore requires further investigation. One of the reasons is that the matching approach recognizes both high-high and low-low combination as having a high fit. High-high responses mean "very important and fully integrated," while low-low responses mean "not important and not integrated." Thus according to Nori (2011), to improve the results of multiple regression analysis, the responses with low-low combination were excluded**.** In order to exclude the low-low combination, two steps were followed. The first step was to change the absolute different values as shown in Table 4.34 to avoid the possibility of value "0" distorting the calculation.

Table 4.34

Original and New Absolute Different Values

Original value[a]	**New value**
0	9
1	8
2	7
3	6
4	5

Note.

[a] The absolute different values between two rating score on a five-point scale each.

The minimum value is ‘0’ (e.g. 1 – 1; 5 – 5) and the maximum value is ‘4’ (e.g. 5 -1)

The second step was to exclude the low-low combination (1 – 1) from the alignment dataset. Thirteen responses were deleted from the alignment dataset; these responses were processed in the next analysis as missing values. The next sections of analysis are devoted to explaining this new dataset. (Note that from now, high value means high alignment and low value means low alignment).

4.10.2 Linearity, Normality and Homoscedasticity

Assumptions in multiple regression analysis are normality, linearity, and homoscedasticity (Hair et al., 2010). The first assumption, linearity (the linearity of the relationship between dependent and independent variables), can easily be examined by residual plots (Ho, 2006). The result of testing linearity through scatter plot diagrams for system design and implementation technologies (first dimension of alignment) is shown in Figure 4.10, which indicates that no evidence of nonlinear pattern to the residuals.

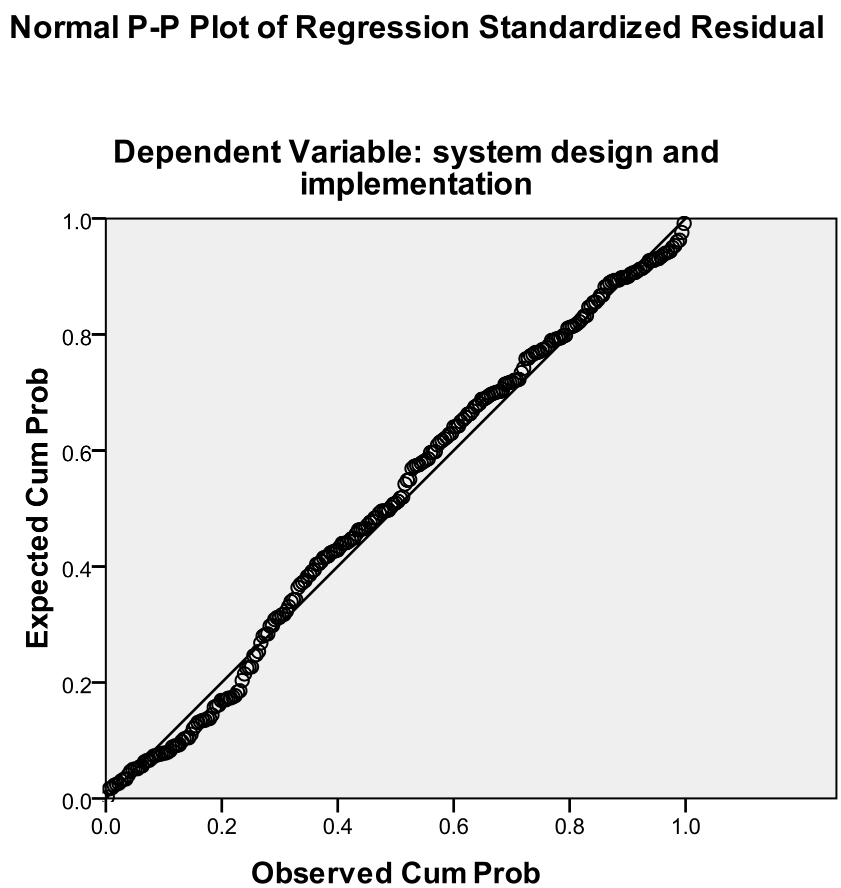

Figure 4.10
Linearity Test for System Design and Implementation Technologies

Furthermore, Figure 4.11 shows the results of homoscedasticity test (refers to the assumption that that the dependent variable exhibits similar amount of variance across the range of values for an independent variable). The findings of homoscedasticity test through scatter plot of standardizes residuals illustrated that homoscedasticity exists in the set of independent variables and the variance of dependent variable.

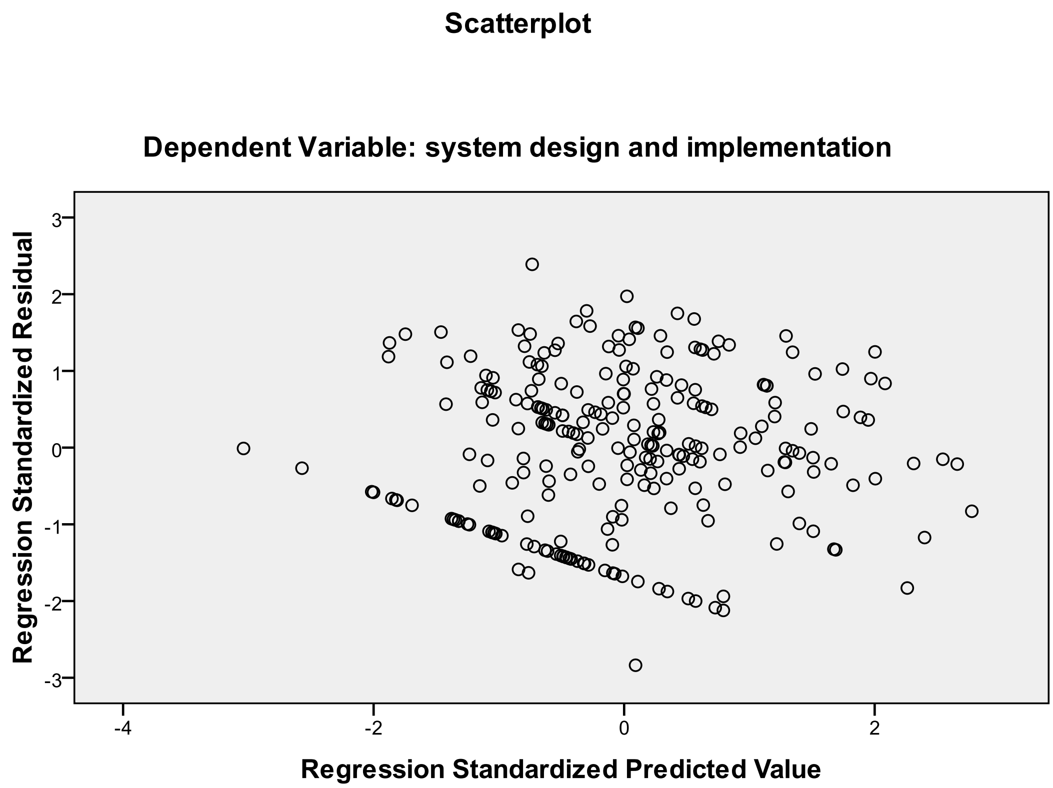

Figure 4.11
Homoscedasticity Test of System Design and Implementation Technologies

The last assumption to be checked was the normality of the error distribution**.** It is assumed that errors of prediction are normally distributed (Ho, 2006). In order to test the normality assumption of the regression model, a histogram of distribution of the residuals was used. Figure 4.12 illustrates that the distribution approximated a normal curve, which met the normality assumption.

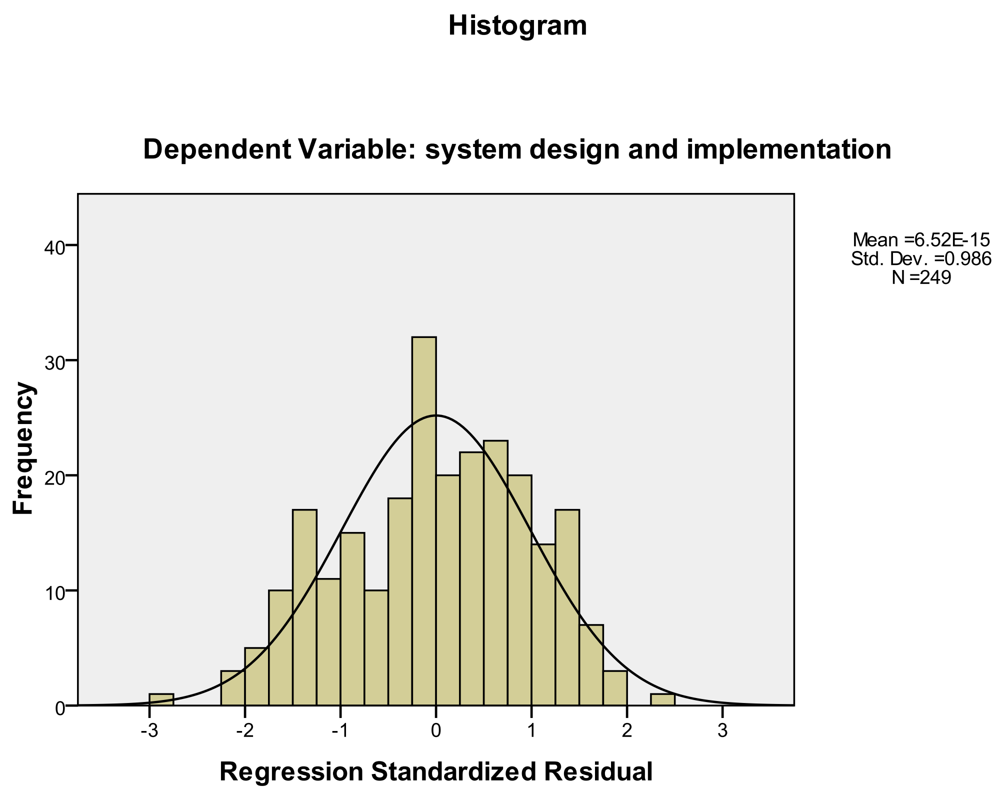

Figure 4.12
Normality Test for System Design and Implementation Technologies

Figures 4.10, 4.11 and 4.12 illustrate the results of linearity, normality, and homoscedasticity tests for system design and implementation. Results suggest that the assumption of linearity, normality, and homoscedasticity are met.

Similarly, the linearity, normality, and homoscedasticity tests were conducted on the other four dimensions of alignment as follows: the results of linearity test through the scatter plot diagram for e-commerce technologies (second dimension), as shown in Figure 4.13. No evidence of nonlinearity pattern to the residuals was found.

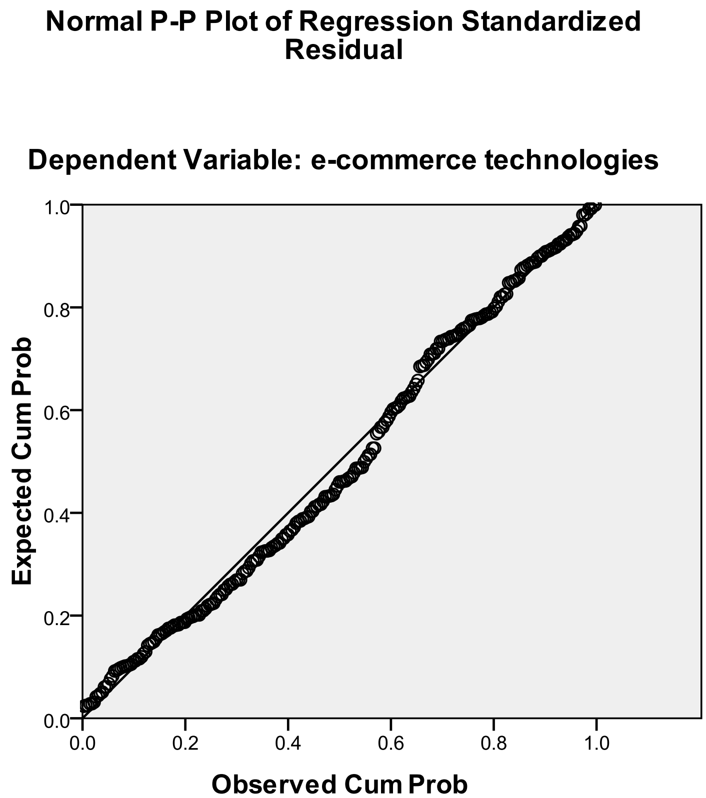

Figure 4.13
Linearity Test for E-Commerce Technologies

Likewise, Figure 4.14 shows the results of homoscedasticity test through scatter plot diagrams of residuals. The results indicated that there is homoscedasticity in the set of independent variables as well as the variance of dependent variable.

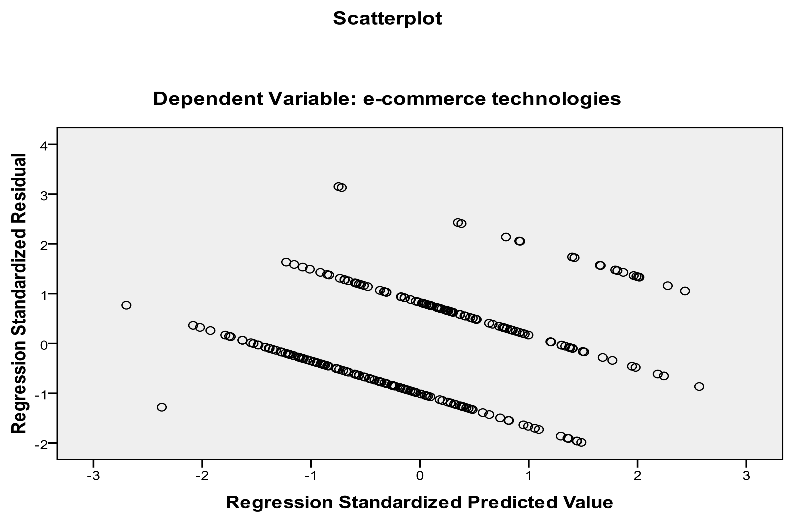

Figure 4.14
Homoscedasticity Test for E-Commerce Technologies

Finally, to test the normality assumption of the regression model for e-commerce technologies, a histogram of distribution of the residuals was plotted. Figure 4.15 illustrates that the distribution approximated a normal curve, which met the normality assumption.

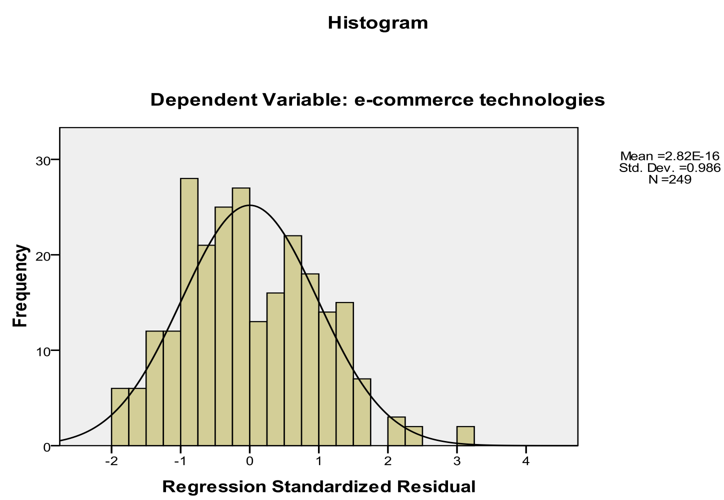

Figure 4.15
Normality Test E-Commerce Technologies

Figures 4.13, 4.14, and 4.15 display the results of linearity, normality, and homoscedasticity tests for e-commerce technologies. The results indicated that the assumption of linearity, normality, and homoscedasticity of the data are met.

The same tests were done to the general communication technologies (third dimension). The result of linearity test through the scatter plot diagram for general communication technologies is shown in Figure 4.16, which indicates no evidence of nonlinearity pattern to the residuals.

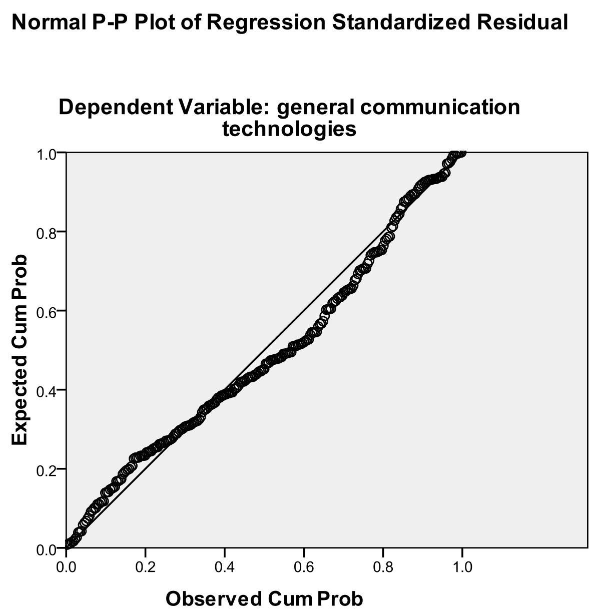

Figure 4.16
Linearity Test for General Communication Technologies

Also, Figure 4.17 shows the results of homoscedasticity test through scatter plot diagrams of residuals. The results indicated that there is homoscedasticity in the set of independent variables as well as the variance of dependent variable.

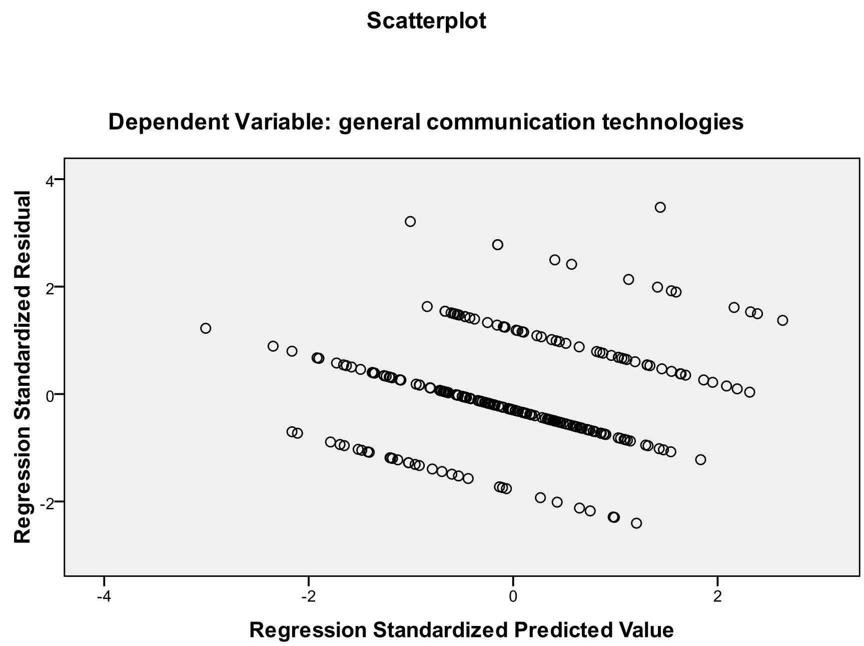

Figure 4.17
Homoscedasticity Test General Communication Technologies

Finally, the normality assumption of the regression model for communication technologies was tested by using a histogram of distribution of the residuals. Figure 4.18 shows that the distribution approximated a normal curve, which assessed the normality assumption.

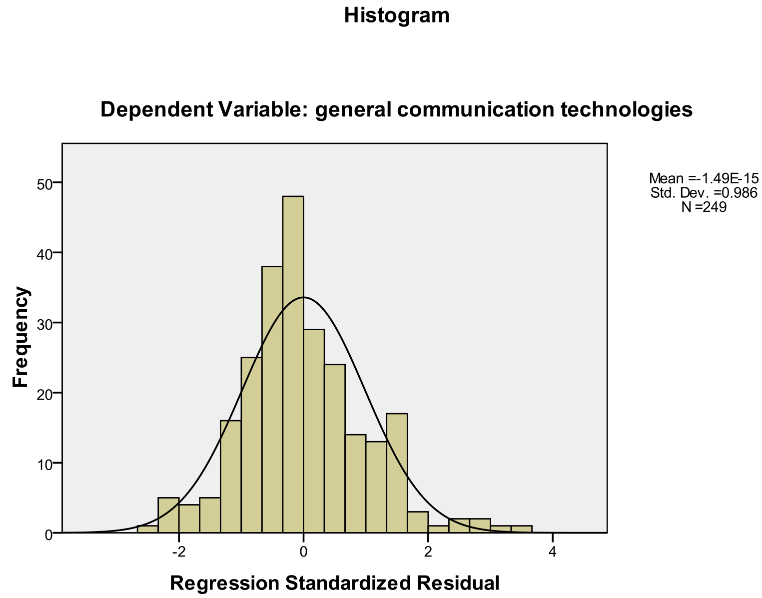

Figure 4.18
Normality test for general communication technologies

Figures 4.16, 4.17, and 4.18 display the results of linearity, normality, and homoscedasticity tests for communication technologies. The results indicated that the assumption of linearity, normality, and homoscedasticity of the data are met.

Same tests of linearity, normality, and homoscedasticity were run for office applications technologies (the fourth dimension) and accounting and auditing technologies (the fifth dimension). Results indicated that the assumption of linearity, normality, and homoscedasticity of the data are met. Figures 4.19, 4.20, 4.21, 4.22, 4.23, and 4.24 show the results of linearity, normality, and homoscedasticity tests for the office applications and the accounting and auditing technologies.

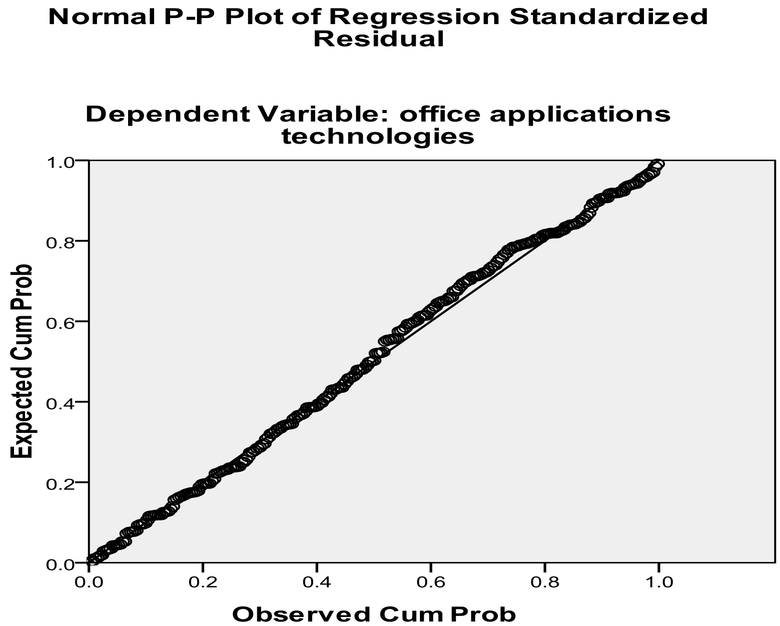

Figure 4.19
Linearity Test for Office Applications

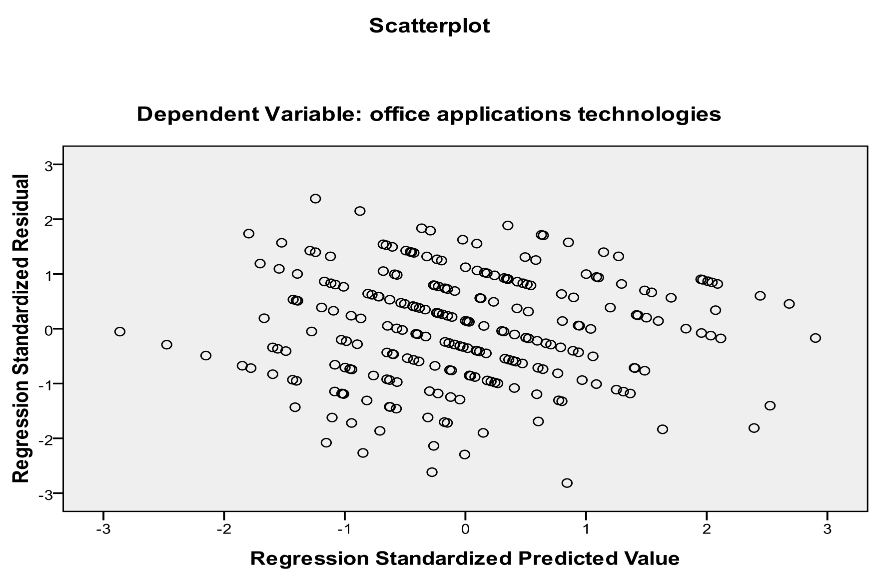

Figure 4.20
Homoscedasticity Test for Office Applications

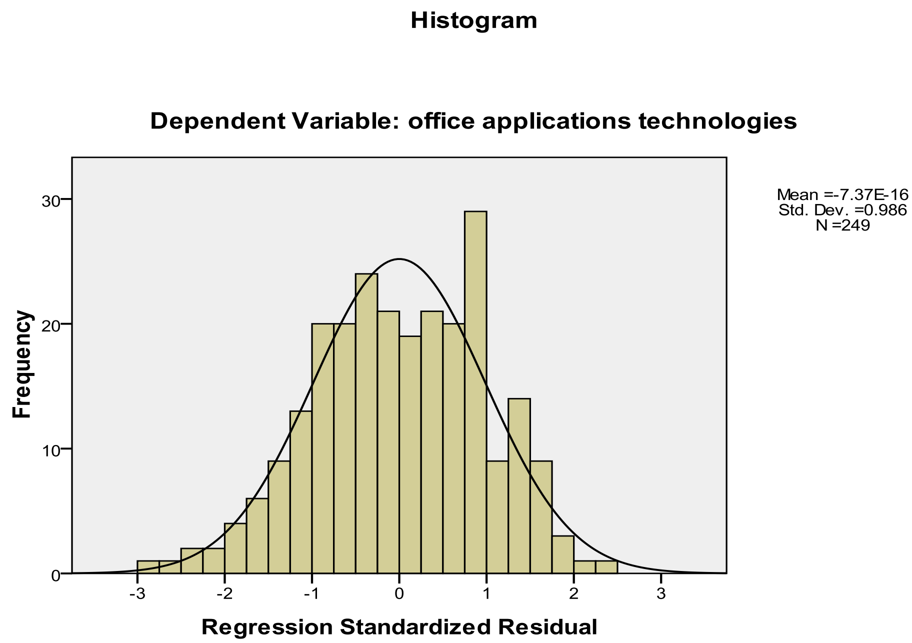

Figure 4.21
Normality Test for Office Applications

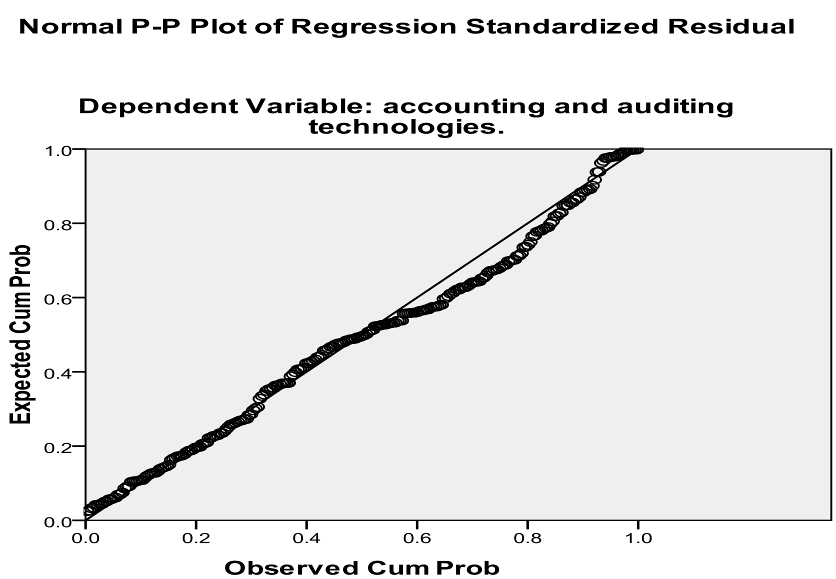

Figure 4.22
Linearity Test for Accounting and Auditing Technologies

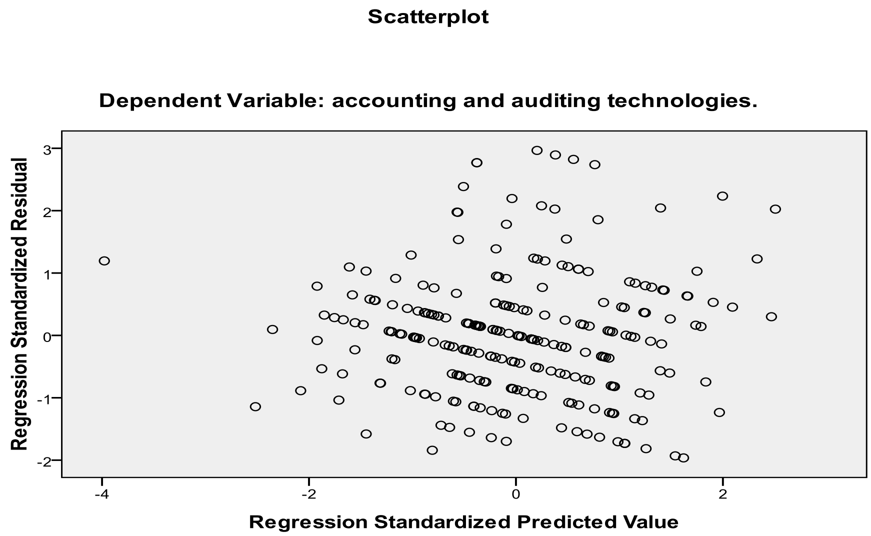

Figure 4.23

Homoscedasticity Test for Accounting and Auditing Technologies

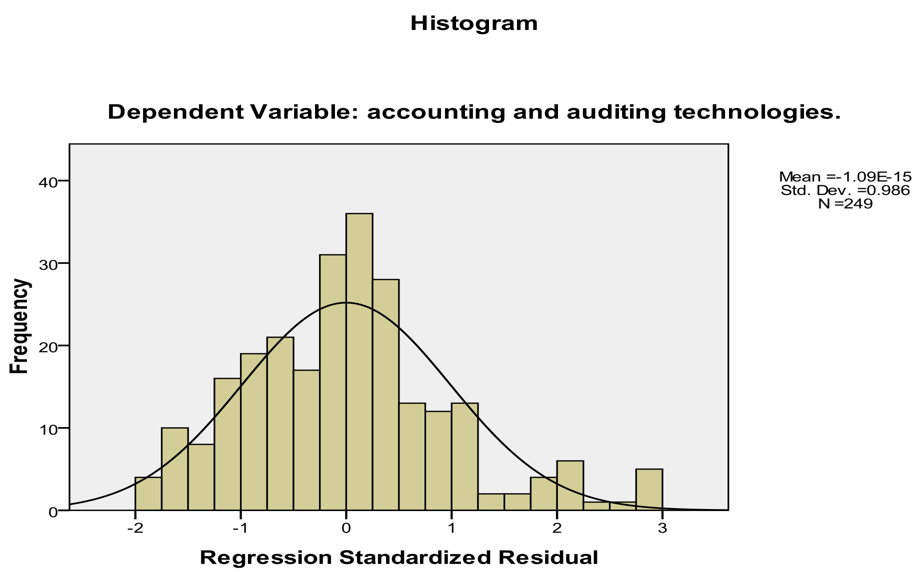

Figure 4.24

Normality Test for Accounting and Auditing Technologies

4.10.3 Multicollinearity

The last test conducted before performing the multiple regression procedure is the multicollinearity test. Multicollinearity refers to the situation in which the independent variables are highly correlated. When independent variables are multicollinear, there is "overlap" or sharing of predictive power. This may deteriorate the results of the regression model (Ho, 2006). Checking for multicollinearity can be done by Tolerance Value and the Variance Inflation Factor (VIF). According to Hair et al. (2010), the common cut off threshold is tolerance value of 0.10, which corresponds to a VIF value less than 10. Table 4.35 shows the tolerance Value and VIF for the independent variables.

Table 4.35
Tolerance Value and the Variance Inflation Factor (VIF)

	Collinearity Statistics	
Independent variables	**Tolerance**	**VIF**
(Constant)		
IT service satisfactory	.786	1.272
Adequacy of hardware and software	.763	1.310
University policy	.912	1.097
Support from colleagues and students	.779	1.284
Support from management	.757	1.321
interest and attitude of academics toward IT integration	.954	1.048
Market needs	.957	1.045

Table 4.35 indicates that multicollinearity did not exist among the independent variables because the tolerance values were more than 0.10 and VIF values were less than 10. Therefore this study did not have any problem with multicollinearity.

4.10.4 Exploring the Relationship between the Independent Variables and the Dependent Variable

As illustrated earlier in this chapter (section 4.6.3), the dependent variable (IT alignment) was divided into five dimensions: system design and implementation, e-commerce technologies, general communication technologies, office applications, and accounting and audit technologies. The independent variables were identified as IT service satisfaction, adequacy of hardware and software, university policy, support from colleagues and students, support from management, interest and attitude of academics toward IT integration, and market needs.

This section presents the results of standard multiple regression analysis between the independent variables and the dependent variable (for each dimension). Appendix D shows the results of the multiple regression.

Table 4.36 shows the results of multiple regression analysis between independent variables and system design and implementation technologies. It displays the correlations between the variables, the unstandardized regression coefficient (*B*) and intercept, the standardized regression coefficient (β), R, R^2 and adjusted R^2. Table 4.36 shows that the R^2 was statistically significant with F ratio 10.761 and $p<.05$, indicating a significant relationship between the independent variables and the dependent variable.

Table 4.36

Results of Multiple Regression between Independent Variables and System Design and Implementation Technologies.

Model Summary[b]

Model	R	R square	Adjusted R square	Std. Error of the estimate	Change statistics				
					R Square change	F change	df[1]	df[2]	Sig. F change
1	.488[a]	.238	.216	.545	.238	10.761	7	241	.000

Note.

[a] Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfaction, colleagues, student support, adequacy of hardware and software, and management support

[b] Dependent Variable: system design and implementation

ANOVA[b]

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	22.368	7	3.195	10.761	.000[a]
	Residual	71.561	241	.297		
	Total	93.929	248			

Note.

[a] Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfaction, colleagues, student support, , adequacy of hardware and software, and management support

[b] Dependent variable: system design and implementation

Table 4.36 (Continued)

Coefficients[a]

	Model	Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
		B	Std. Error	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	3.542	.578		6.126	.000		
	IT satisfaction	.155	.069	.143	2.257	.025	.786	1.272
	Adequacy of hardware and software	.198	.094	.135	2.098	.037	.763	1.310
	University policy	.173	.077	.131	2.227	.027	.912	1.097
	Colleague and student support	.240	.059	.260	4.076	.000	.779	1.284
	Management support	-.016	.052	-.020	-.315	.753	.757	1.321
	Interest and attitude	.171	.078	.126	2.189	.030	.954	1.048
	Market needs	.209	.089	.135	2.356	.019	.957	1.045

Note.

[a] Dependent variable: system design and implementation

*$p < .05$

Whilst *F* ratio is a useful test of statistical significance for the equation as a whole, a *t* test for each coefficient and significant test represent a test of the statistical significance of the individual regression coefficients (Hair et al., 2010) to assess each variable's unique contribution to the prediction of the dependent variable ((Meyers et al., 2006). As shown in Table 4.36, IT satisfaction, adequacy of hardware and software, university policy, colleagues and student support, interest and attitude, and market needs variables contributed significantly to the regression. Furthermore, colleagues and student support variable had the highest contribution to the dependent variable amongst the independent variables (*t* value = 4.076 and β = .260), while management support variable appeared unimportant.

Table 4.37
Results of Multiple Regression between Independent Variables and E-commerce Technologies.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.556a	.309	.289	.545	.309	15.368	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: e-commerce technologies

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.980	7	4.569	15.368	.000a
	Residual	71.642	241	.297		
	Total	103.622	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: e-commerce technologies

Table 4.37 (Continued)

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	2.032	.578		3.513	.001		
IT satisfactory	.154	.069	.135	2.229	.027	.786	1.272
adequacy hard	.287	.094	.187	3.043	.003	.763	1.310
university policy	.193	.078	.140	2.487	.014	.912	1.097
colleagues, student support	.163	.059	.168	2.772	.006	.779	1.284
management support	-.003	.052	-.003	-.053	.958	.757	1.321
interest and attitude	.432	.078	.302	5.512	.000	.954	1.048
market needs	.211	.089	.130	2.368	.019	.957	1.045

a. Dependent Variable: e-commerce technologies
*p < .05

Table 4.37 shows the results of multiple regression analysis for e-commerce technologies (second dimension) and the independent variables. Results indicate that R^2 (30.9%) was statistically significant at $p<.05$ with *F* ratio of 15.368, indicating a significant relationship between the independent variables and the dependent variable. Coefficients table in Table 4.37 shows that IT satisfaction, adequacy of hardware and software, university policy, colleague and student support, interest and attitude, and market needs variables contributed significantly to the regression. Also results indicate that interest and attitude variable had the highest contribution to the dependent variable amongst the independent variables (*t* value = 5.512 and β = .432), while management support variable appeared not significant.

Table 4.38

Results of Multiple Regression between Independent Variables and General Communication Technologies

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.456a	.208	.185	.667	.208	9.043	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general communication technologies

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.158	7	4.023	9.043	.000a
	Residual	107.200	241	.445		
	Total	135.357	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general communication technologies

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	3.338	.708		4.718	.000		
IT satisfactory	.218	.084	.167	2.591	.010	.786	1.272
adequacy hard	.331	.116	.188	2.870	.004	.763	1.310
university policy	-.137	.095	-.087	-1.445	.150	.912	1.097
colleagues, student support	.012	.072	.011	.168	.867	.779	1.284
management support	.177	.063	.184	2.799	.006	.757	1.321
interest and attitude	-.046	.096	-.028	-.483	.629	.954	1.048
market needs	.384	.109	.207	3.529	.000	.957	1.045

a. Dependent Variable: communication technologies , $p < .05$

The result of multiple regression analysis between general communication technologies (third dimension) and the independent variables is shown in Table 4.38 It indicates a significant relationship between the independent variables and the dependent variable because R^2 (20.8%) was statistically significant at $p<.05$ with *F* ratio of 9.043. The results show that four independent variables contributed significantly to the regression; these variables were IT satisfaction, adequacy of hardware and software, management support and market needs. Market needs variable had the highest contribution to the dependent variable amongst the independent variables (*t* value = 3.529 and β = .348), while university policy, colleague and student support, and interest and attitude were not significant.

Table 4.39
Results of Multiple Regression between Independent Variables and General Office Automation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.529[a]	.279	.258	.512	.279	13.343	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general office automation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.440	7	3.491	13.343	.000[a]
	Residual	63.060	241	.262		
	Total	87.501	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general office automation

Table 4.39 (Continued)

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.997	.543		7.366	.000		
IT satisfactory	.154	.065	.147	2.387	.018	.786	1.272
adequacy hard	.222	.089	.157	2.505	.013	.763	1.310
university policy	.207	.073	.163	2.841	.005	.912	1.097
colleagues, student support	.147	.055	.165	2.665	.008	.779	1.284
management support	.033	.049	.043	.687	.493	.757	1.321
interest and attitude	.197	.073	.150	2.683	.008	.954	1.048
market needs	.323	.083	.217	3.877	.000	.957	1.045

a. Dependent Variable: general office automation

*p<.05

As shown in Table 4.39, the relationship between general office automation (DV) and IT satisfaction, adequacy of hardware and software, university policy, colleague and student support, management support, interest and attitude, and market needs variables (IVs) were significant at $p<.05$ with F ratio of 13.343. The results indicate that all independent variables contributed significantly to the regression, except management support variable. The highest contribution to the dependent variable amongst the independent variables was made by employer need variable (t value = 3.877 and β = .217)

Table 4.40

Results of Multiple Regression between Independent Variables and Accounting and Audit Automation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.383[a]	.147	.122	.575	.147	5.921	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

c. Dependent Variable: accounting and audit automation.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.683	7	1.955	5.921	.000[a]
	Residual	79.566	241	.330		
	Total	93.249	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: accounting and audit automation.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.353	.610		5.500	.000		
IT satisfactory	-.009	.073	-.008	-.118	.906	.786	1.272
adequacy hard	.239	.100	.163	2.398	.017	.763	1.310
university policy	-.119	.082	-.091	-1.454	.147	.912	1.097
colleagues, student support	.206	.062	.224	3.328	.001	.779	1.284
management support	-.061	.055	-.076	-1.112	.267	.757	1.321
interest and attitude	.198	.083	.146	2.394	.017	.954	1.048
market needs	.275	.094	.179	2.935	.004	.957	1.045

a. Dependent Variable: accounting and audit automation. , $p < .05$

The result of multiple regression analysis for accounting and audit automation (fifth dimension**)** and the independent variables shows a significant relationship between the independent variables and the dependent variable (Table 4.40) with F ratio of 5.921 at p<.05. Adequacy of hardware and software, colleague and student support, interest and attitude, and market needs variables contributed significantly to the regression but other independent variables were not significant.

4.11 HYPOTHESES TESTING

As shown in section 4.9, IT alignment was divided into five groups. Therefore, each of the initial hypotheses was also divided into five sub-hypotheses as follows:

Hypothesis (H_1):

There is a positive relationship between the availability of financial resources and IT alignment at universities in Egypt.

Based on the results of section 4.7.1 financial resources were divided into two variables, so each sub-hypothesis was divided into two specific hypotheses as follows:

Hypothesis (H_{1a}):

There is a positive relationship between availability of financial resources and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{1a1}):

There is a positive relationship between IT services satisfaction and system design and implementation of technologies alignment at universities in Egypt.

The results in Table 4.36 show a positive and significant relationship between the IT services satisfaction and system design and implementation of technologies alignment (t = 2.257, p<.05). The result suggests that for each unit increase in IT services satisfaction, there was an expected increase of .143 in system design and implementation of technologies alignment. Therefore, hypothesis (H_{1a1}) is supported.

Hypothesis (H_{1a2}):

There is a positive relationship between adequacy of hardware and software and system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 show a positive significant relationship between the adequacy of hardware and software and the system design and implementation of technologies alignment (t = 2.098, p<05). The result suggests that for each unit increase in adequacy of hardware, there was an expected increase of .135 in system design and implementation of technologies alignment. Therefore, hypothesis (H_{1a2}) is supported.

Hypothesis (H_{1b}):

There is a positive relationship between availability of financial resources and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{1b1}):

There is a positive relationship between the IT services satisfaction and the e-commerce technologies alignment at universities in Egypt.

Table 4.37 show a positive significant relationship between the IT services satisfaction and e-commerce technologies alignment (t = 2.229, p < .05). The result suggests that for each unit increase in IT services satisfaction, there was an expected increase of .154 in e-commerce technologies alignment. Therefore, hypothesis (H_{1b1}) is supported.

Hypothesis (H_{1b2}):

There is a positive relationship between adequacy of hardware and software and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive significant relationship between the adequacy of hardware and software and e-commerce technologies alignment (t = 3.043, p < .05) was found. The result suggests that for each unit increase in adequacy of hardware and software, there was an expected increase of .287 in e-commerce technologies alignment. Therefore, hypothesis (H_{1b2}) is supported.

Hypothesis (H_{1c}):

There is a positive relationship between availability of financial resources and communication technologies alignment at universities in Egypt.

Hypothesis (H_{1c1}):

There is a positive relationship between IT services satisfaction and general communication technologies alignment at universities in Egypt.

The results in Table 4.38 show a positive significant relationship between the IT services satisfaction and general communication technologies alignment (t = 2.591, $p < .05$). The result suggests that for each unit increase in IT services satisfaction, there was an expected increase of .218 in communication technologies alignment. Therefore, hypothesis (H_{1c1}) is supported.

Hypothesis (H_{1c2}):

There is a positive relationship between adequacy of hardware and software and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a positive significant relationship between the adequacy of hardware and software and the general communication technologies alignment (t = 2.870, $p < .05$). The result suggests that for each unit increase in adequacy of hardware and software, there was an expected increase of .331 in general communication technologies alignment. Therefore, hypothesis (H_{1c2}) is supported.

Hypothesis (H_{1d}):

There is a positive relationship between availability of financial resources and office application technologies alignment at universities in Egypt.

Hypothesis (H_{1d1}):

There is a positive relationship between IT services satisfaction and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between IT services satisfaction and office application technologies alignment (t = 2.387, $p < .05$). The result suggests that for each unit increase in IT services satisfaction, there was an expected increase of .147 in office application technologies alignment. Therefore, hypothesis (H_{1d1}) is supported.

Hypothesis (H_{1d2}):

There is a positive relationship between adequacy of hardware and software and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between adequacy of hardware and software and office application technologies alignment (t = 2.505, p <

.05). The result suggests that for each unit increase in adequacy of hardware and software, there was an expected increase of .157 in office application technologies alignment. Therefore, hypothesis (H_{1d2}) is supported.

Hypothesis (H_{1e}):

There is a positive relationship between availability of financial resources and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{1e1}):

There is a positive relationship between IT services satisfaction and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a negative but insignificant relationship between IT services satisfaction and accounting and auditing technologies alignment (t = -.118, p > .05). Therefore, hypothesis (H_{1e1}) is rejected.

Hypothesis (H_{1e2}):

There is a positive relationship between adequacy of hardware and software and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a positive and significant relationship between adequacy of hardware and software and accounting and auditing technologies alignment (t = 2.398, p < .05). The result suggests that for each unit increase in adequacy of hardware and software, there was an expected increase of .163 in accounting and auditing technologies alignment. Therefore, hypothesis (H_{1e2}) is supported.

Hypothesis (H_2):

There is a positive relationship between university/faculty support and IT alignment at universities in Egypt.

Based on the results of section 4.7.2, university/faculty support was divided into three variables, so each sub-hypothesis was divided into three specific hypotheses as follows:

Hypothesis (H_{2a}):

There is a positive relationship between university/faculty support and system design and implementation of technologies alignment at universities in Egypt.

Hypothesis (H_{2a1}):

There is a positive relationship between university policy and system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 shows a positive and significant relationship between university policy and system design and implementation of technologies alignment (t = 2.227, $p<.05$). The result suggests that for each unit increase in university policy, there was an expected increase of .131 in system design and implantation technologies alignment. Therefore, hypothesis (H_{2a1}) is supported.

Hypothesis (H_{2a2}):

There is a positive relationship between colleague and student support and system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 shows a positive significant relationship between colleague and student support and system design and implementation of technologies alignment (t = 4.076, p<05). The result suggests that for each unit increase in colleague and student support, there was an expected increase of .260 in system design and implantation technologies alignment. Therefore, hypothesis (H_{2a2}) is supported.

Hypothesis (H_{2a3}):

There is a positive relationship between management support and system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 shows a negative but insignificant relationship between management support and system design and implementation of technologies alignment (t = -.315, p>05). Therefore, hypothesis (H_{2a3}) is rejected.

Hypothesis (H_{2b}):

There is a positive relationship between university/faculty support and e-commerce technologies alignment at universities in Egypt.

Hypothesis (H_{2b1}):

There is a positive relationship between university policy and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive significant relationship between university policy and e-commerce technologies alignment (t = 2.487, $p < .05$). The result suggests that for each unit increase in university policy, there was an expected increase of .193 in e-commerce technologies alignment. Therefore, hypothesis (H_{2b1}) is supported.

Hypothesis (H_{2b2}):

There is a positive relationship between colleague and student support and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive significant relationship between colleague and student support and e-commerce technologies alignment (t = 2.772, $p < .05$). The result suggests that for each unit increase in colleague and student support, there was an expected increase of .163 in the e-commerce technologies alignment. Therefore, hypothesis (H_{2b2}) is supported.

Hypothesis (H_{2b3}):

There is a positive relationship between management support and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive but insignificant relationship between management support and e-commerce technologies alignment (t = .958 p>05). Therefore, hypothesis (H_{2b3}) is rejected.

Hypothesis (H_{2c}):

There is a positive relationship between university/faculty support and general communication technologies alignment at universities in Egypt.

Hypothesis (H_{2c1}):

There is a positive relationship between university policy and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a negative but insignificant relationship between university policy and general communication technologies alignment (t = -1.445, p > .05). Therefore, hypothesis (H_{2c1}) is rejected.

Hypothesis (H_{2c2}):

There is a positive relationship between colleague and student support and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a negative but insignificant relationship between colleague and student support and general communication technologies alignment (t = .168, $p > .05$). Therefore, hypothesis (H_{2c2}) is not supported.

Hypothesis (H_{2c3}):

There is a positive relationship between management support and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a positive significant relationship between management support and general communication technologies alignment (t = 2.799, $p < .05$). The result suggests that for each unit increase in management support, there was an expected increase of .177 in communication technologies alignment. Therefore, hypothesis (H_{2c3}) is supported.

Hypothesis (H_{2d}):

There is a positive relationship between university/faculty support and office application technologies alignment at universities in Egypt.

Hypothesis (H_{2d1}):

There is a positive relationship between university policy and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between university policy and office application technologies alignment (t = 2.841, p < .05). The result suggests that for each unit increase in university policy, there was an expected increase of .163 in office application technologies alignment. Therefore, hypothesis (H_{2d1}) is supported.

Hypothesis (H_{2d2}):

There is a positive relationship between colleague and student support and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between colleague and student support and office application technologies alignment (t = 2.665, p < .05). The result suggests that for each unit increase in colleague and student support, there was an expected increase of .165 in the office applications technologies alignment. Therefore, hypothesis (H_{2d2}) is supported.

Hypothesis (H_{2d3}):

There is a positive relationship between management support and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive but insignificant relationship between management support and office application technologies alignment (t = .687, p < .05). Therefore, hypothesis (H_{2d3}) is rejected.

Hypothesis (H_{2e}):

There is a positive relationship between university/faculty support and accounting and auditing technologies alignment at universities in Egypt.

Hypothesis (H_{2e1}):

There is a positive relationship between university policy and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a negative but insignificant relationship between university policy and accounting and auditing technologies alignment (t = -1.454, p > .05). Therefore, hypothesis (H_{2e1}) is rejected.

Hypothesis (H_{2e2}):

There is a positive relationship between colleagues and student support and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a positive and significant relationship between colleague and student support and accounting and auditing technologies alignment (t = 3.328, p < .05). The result suggests that for each unit increase in colleague and student support, there was an expected increase of .224 in accounting and auditing technologies alignment. Therefore, hypothesis (H_{2e2}) is supported.

Hypothesis (H_{2e3}):

There is a positive relationship between management support and accounting and auditing technologies alignment at universities in Egypt.

A negative but insignificant relationship between management support and accounting and auditing technologies alignment (t = -1.112, p > .05) is appendix 5. Therefore, hypothesis (H_{2e3}) is rejected.

Hypothesis (H_3):

There is a positive relationship between lecturers' attitude and interest towards IT and IT alignment at universities in Egypt.

Based on the results of section 4.7.3, interest and attitude of academics measured by one factor so hypothesis three was divided into five sub- hypotheses as follows:

Hypothesis (H_{3a}):

There is a positive relationship between lecturers' attitude and interest towards IT and the system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 shows a positive and significant relationship between lecturers' attitude and interest towards IT and system design and implementation of technologies alignment (t = 2.189, p < .05). The result suggests that for each unit increase in the lecturers' attitude and interest towards IT, there was an expected increase of .126 in system design and implementation of technologies alignment. Therefore, hypothesis (H_{3a}) is supported.

Hypothesis (H_{3b}):

There is a positive relationship between lecturers' attitude and interest towards IT and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive and significant relationship between the lecturers' attitude and interest towards IT and e-commerce technologies alignment (t = 5.512, $p < .05$). The result suggests that for each unit increase in lecturers' attitude and interest towards IT, there was an expected increase of .432 in e-commerce technologies alignment. Therefore, hypothesis (H_{3b}) is supported.

Hypothesis (H_{3c}):

There is a positive relationship between lecturers' attitude and interest towards IT and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a negative but insignificant relationship between lecturers' attitude and interest towards IT and general communication technologies alignment (t = -.483, $p > .05$). Therefore, hypothesis (H_{3c}) is rejected.

Hypothesis (H_{3d}):

There is a positive relationship between lecturers' attitude and interest towards IT and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between lecturers' attitude and interest towards IT and office application technologies alignment (t = 2.683, $p < .05$). The result suggests that for each unit increase in lecturers' attitude and interest towards IT, there was an expected increase of .150 in general office automation technologies alignment. Therefore, hypothesis (H_{3d}) is supported.

Hypothesis (H_{3e}):

There is a positive relationship between lecturers' attitude and interest towards IT and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a positive and significant relationship between lecturers' attitude and interest towards IT and accounting and auditing technologies alignment (t = 2.394, $p < .05$). The result suggests that for each unit increase in lecturers' attitude and interest towards IT, there was an expected increase of .146 in accounting and auditing technologies alignment. Therefore, hypothesis (H_{3e})is supported.

Hypothesis (H_4):

There is a positive relationship between market (employer) needs and IT alignment at universities in Egypt.

Based on the results of section 4.7.3, market needs measured by one factor so hypothesis four was divided into five sub- hypotheses as follows:

Hypothesis (H_{4a}):

There is a positive relationship between market needs and system design and implementation of technologies alignment at universities in Egypt.

Table 4.36 shows a positive and significant relationship between market needs and system design and implementation of technologies alignment (t = 2.356, $p < .05$). The result suggests that for each unit increase in market needs, there was an expected increase of .135 in system design and implementation of technologies alignment. Therefore, hypothesis (H_{4a}) is supported.

Hypothesis (H_{4b}):

There is a positive relationship between market needs and e-commerce technologies alignment at universities in Egypt.

Table 4.37 shows a positive and significant relationship between market needs and e-commerce technologies alignment (t = 2.368, $p < .05$). The result suggests that for each unit increase in market needs, there was an expected increase of .211 in e-commerce technologies alignment. Therefore, hypothesis (H_{4b}) is supported.

Hypothesis (H_{4c}):

There is a positive relationship between market needs and general communication technologies alignment at universities in Egypt.

Table 4.38 shows a positive and significant relationship between market needs and general communication technologies alignment (t = 3.529, $p < .05$). The result suggests that for each unit increase in market needs, there was an expected increase of .384 in the communication technologies alignment. Therefore, hypothesis (H_{4c}) is supported.

Hypothesis (H_{4d}):

There is a positive relationship between market needs and office application technologies alignment at universities in Egypt.

Table 4.39 shows a positive and significant relationship between market needs and office application technologies alignment (t = 3.877, $p < .05$). The result suggests that for each unit increase in market needs, there was an expected increase of .217 in office application technologies alignment. Therefore, hypothesis (H_{4d}) is supported.

Hypothesis (H_{4e}):

There is a positive relationship between market needs and accounting and auditing technologies alignment at universities in Egypt.

Table 4.40 shows a positive and significant relationship between market needs and accounting and auditing technologies alignment (t = 2.935, p < .05). The result suggests that for each unit increase in market needs, there was an expected increase of .179 in accounting and auditing technologies alignment. Therefore, hypothesis (H_{4e}) is supported.

Table 4.41 summarizes the results of the research.

Table 4.41
Summary of Hypotheses Results

Hypothesis	Significant	t-value	Result
H_{1a1}	Yes	2.257	Supported
H_{1a2}	Yes	2.098	Supported
H_{1b1}	Yes	2.229	Supported
H_{1b2}	Yes	3.043	Supported
H_{1c1}	Yes	2.591	Supported
H_{1c2}	Yes	2.870	Supported
H_{1d1}	Yes	2.387	Supported
H_{1d2}	Yes	2.505	Supported
H_{1e1}	No	-.118	Not supported
H_{1e2}	Yes	2.398	Supported
H_{2a1}	Yes	2.227	Supported
H_{2a2}	Yes	4.076	Supported

Table 4.41 (Continued)

Hypothesis	**Significant**	**t-value**	**Result**
H_{2a3}	No	-.315	Not supported
H_{2b1}	Yes	2.487	Supported
H_{2b2}	Yes	2.772	Supported
H_{2b3}	No	.958	Not supported
H_{2c1}	No	-1.445	Not supported
H_{2c2}	No	.168	Not supported
H_{2c3}	Yes	2.799	Supported
H_{2d1}	Yes	2.841	Supported
H_{2d2}	Yes	2.665	Supported
H_{2d3}	No	.687	Not supported
H_{2e1}	No	-1.454	Not supported
H_{2e2}	Yes	3.328	Supported
H_{2e3}	No	-1.112	Not supported
H_{3a}	Yes	2.189	Supported
H_{3b}	Yes	5.512	Supported
H_{3c}	No	-.483	Not supported
H_{3d}	Yes	2.683	Supported
H_{3e}	Yes	2.394	Supported
H_{4a}	Yes	2.356	Supported
H_{4b}	Yes	2.368	Supported

Table 4.41 (Continued)

Hypothesis	**Significant**	**t-value**	**Result**
H_{4c}	Yes	3.529	Supported
H_{4d}	Yes	3.877	Supported
H_{4e}	Yes	2.935	Supported

4.12 IDENTIFYING AND INTERPRETING ALIGNMENT GROUPS

The previous section has revealed different patterns of alignment in different groups of 33 technologies. However, the degree of variation in alignment as perceived by the respondents has not been ascertained. This led to a question of whether lecturers had a similar profile in terms of IT alignment. Therefore, the main aim of this section is to see if the sample can be classified into groups by IT alignment to help understand the regression results. Cluster analysis method was used to produce clusters or groups.

Cluster analysis technique is "concerned with exploring data sets to assess whether or not they can be summarized meaningfully in terms of a relatively small number of groups or clusters of objects or individuals which resemble each other and which are different in some respects from individuals in other clusters" (Everitt et al., 2011, p 13). The resulting clusters of objects exhibit high internal (within-cluster) homogeneity and high external (between- clusters) heterogeneity (Hair et al., 2010). Cluster analysis differs from factor analysis in its objective of assessing structure. While cluster analysis groups objects, factor analysis is concerned with grouping variables. In addition, factor analysis makes the grouping based on patterns of variation (correlation) in the data, whilst cluster analysis makes grouping based on distance (proximity) (Hair et al., 2010).

Cluster analysis technique has been extensively used in many fields, such as medicine, psychiatry, sociology, anthropology, archaeology, geology, criminology, geography, remote sensing, market research, economics, and engineering (Rencher, 2002). However, it is not used widely in accounting research (Ismail, 2004). Ketchen and Shook (1996) recommend ways to carry out the clustering process, namely, selecting of clustering variables, selecting of clustering algorithms, determining the number of clusters, and validating the clusters.

4.12.1 Clustering Variables

The most important step in the application of cluster analysis is choosing the variables according group observations (Ketchen & Shook, 1996). Hair et al. (2010) suggest that only variables that characterize the objects being clustered and relate specifically to the objectives of the cluster analysis should be included. This is because inclusion of irrelevant variables increases the chance that outliers will be created on these variables, which will influence the results of cluster analysis.

Ketchen and Shook (1996) indicate three basic approaches to identifying appropriate clustering variables: inductive, deductive, and cognitive. The inductive approach focuses on exploratory classification of observations. In other words, neither the clustering variables nor the number and nature of the resultant groups are tightly linked to a deductive theory. In the deductive approach the number and suitability of clustering variables, as well as the expected number and nature of groups in a cluster solution, are strongly tied to theory. Finally, the cognitive approach is similar to the inductive approach, and differs from the deductive approach as it relies on the perceptions of expert informants to define clustering variables instead of what the researchers view as important.

This study adopted the deductive approach in selecting the clustering variables. The study focused on the alignment scores as the clustering variables. This in line with Ketchen and Shook (1996), who suggest that studies designed to discern the nature and extent of links between key constructs (in this study, it would be between the IT alignment and the factors that influence alignment) should rely on deductive approach.

As explained previously, factor analysis was applied prior to the regression analysis to reduce the number of variables to be analyzed by regression analysis. Like factor analysis that generated five dimensions of IT, it was decided to use the five dimensions of IT alignment for cluster analysis.

4.12.2 Clustering Algorithms

Concepts of distance and similarity are fundamental to cluster analysis. Several distance measures are available in most statistical package such as Euclidean, Squared Euclidean distance, Chebychev and City Block or Manhattan distance (Fielding, 2007). Squared Euclidean distance is the most common method used for measuring distance (Ismail, 2004), which is the sum of the square differences over all the variables (Hair et al., 2010). There are two general types of algorithms: hierarchal and non-hierarchal. The popular method for forming clusters is hierarchal cluster algorithm, where the number of clusters shrinks and the clusters themselves grow larger (Rencher, 2002).

To decide which clusters should be combined at each step various methods can be used. These methods are single linkage or nearest neighbour, complete linkage or furthest neighbour, average linkage, centroid, median linkage, and Ward’s method. According to Everitt et al. (2011), Ward’s method is more accurate than the others in recovering the clusters because it more likely to join smaller cluster or clusters of equal size and it also appropriate to use with the Squared Euclidean distance. From the above discussion, this study used the cluster analysis routine in SPSS for Windows (release 17.0) to identify the accounting lecturers with similar IT alignment perception. The classification method used was Ward’s hierarchical clustering method and distances between objects were measured using the Squared Euclidean distance.

4.12.3 Cluster Analysis Results

The main issue when using cluster analysis is to determine the final number of cluster to be used; but no standard objectives selection procedure exists (Hair et al., 2010). Hence, researchers have developed many approaches to solve the problem. The most common approach is to look for the large changes in distances at which clusters are formed (Rencher, 2002). According to Hair et al. (2010) “when a large increase occurs, the researcher selects the prior cluster solution on the logic that its combination caused a substantial decrease in similarity” (Hair et al., 2010, p. 510). Appendix E shows the results of the cluster analysis including the cases combined at each stage of process, the cluster coefficient, and the dendrogram. The dendorogram indicates that five clusters were formed with little stress giving a cluster distance of approximately 2.0 units, where 2.5 units emerged when four clusters were formed, but 7.0 units when three clusters were formed, and 7.5 when two clusters were formed. The distance further jumped to 25.0 units when one cluster was formed. This suggests that the appropriate number of cluster is either two or three.

Hair et al. (2010) suggest that the agglomeration coefficient is particularly useful to use as a stopping rule. They note that, “This approach focuses on the large percentage changes in coefficient, to identify cluster combination stages that are markedly different” (Hair et al., 2010, p. 528). Table 4.42 shows the values for the final ten stages. The last column shows the percentage changes in agglomeration coefficient from 10 to 2 clusters.

Table 4.42

Analysis of Agglomeration Coefficient for Hierarchical Cluster Analysis

Number of clusters	Stage number	Agglomeration coefficient	Change in coefficient	% of change to next level
10	239	203.508	11.709	5.75
9	240	215.217	12.042	5.60
8	241	227.259	15.213	6.69
7	242	242.472	18.808	7.76
6	243	261.280	21.438	8.21
5	244	282.718	29.250	10.35
4	245	311.968	34.749	11.14
3	246	346.717	50.330	14.52
2	247	397.047	116.612	29.37
1	248	513.658		

From Table 4.42, it was observed that the largest increase occurs moving from two clusters to one cluster (29.37%). Similarly, the next noticeable change in percentage increase occurs moving from three clusters to two clusters (14.52%). This result suggests that two cluster or three clusters solution is appropriate. This supports the dendrogram results.

To decide whether two cluster or three clusters is the appropriate solution, a frequency analysis was conducted on both solutions (Ismail, 2004). The results of the frequencies analysis of the two clusters solution show that 157 (63.0%) of sample were in cluster 1 and 92 (37.0%) were in cluster 2. The results of frequency analysis for the three cluster solution shows that 157 (63.0%) lecturers were in cluster 1, 43 (17%) lecturers were in cluster 2, and 49 (20.0%) lecturers were in cluster 3. However, it is thought inappropriate to have such a disproportionate number of lecturers in the clusters for further analysis. Furthermore the mean values for each cluster in the three cluster solution were approximately similar. Therefore, a two-cluster solution revealed a more proportionate number of lecturers in the clusters.

To examine whether the two cluster solution is statistically valid, an analysis of variance (ANOVA) for the two clusters was computed (Hair et al., 2010). ANOVA technique tests the hypothesis that several population means are equal (Ho, 2006). It examines the variability of observations between the group means as well as variability within each group. This technique will provide a significant result if at least two of the means are significantly different (Ismail, 2004).

Table 4.43 shows the results of the one- way ANOVA and the mean value for each item. The result of the one–way ANOVA shows that the observed significant level was less than 0.01 for all items. Therefore, we can reject the null hypothesis that the two clusters have the same means for the five alignment dimension.

Table 4.43
Clustering Variables Profiles for the Two Cluster Solution

	Cluster (1) mean	**Cluster (2) mean**	**F**	**Sig.**
System design and implementation	6.82	7.09	11.883	.001
E-commerce technologies	6.31	6.96	74.813	.000
General communication technologies	5.80	6.87	235.347	.000
Office applications	7.73	8.27	59.243	.000
Accounting and auditing technologies	6.14	6.44	14.707	.000

* p< 5%

From Table 4.43, cluster 1 was found to have the lowest means in each clustering items compared to cluster 2. This means that cluster 2 was clearly more aligned on the five items than cluster 1. Therefore, it was decided to label cluster 2 as “aligned” and cluster 1 as “non-aligned.” Overall, the results indicate that only 37.0% of the total sample of accounting lecturers thought that universities in Egypt have integrated what is important in their accounting curriculum, while 63.0% thought no such alignment has occurred.

4.12.4 Cluster Validation

Cluster analysis seeks about selecting an optimal cluster solution. Hence, it is important to validate and examine the stability of the chosen final cluster solution. According to Hair et al. (2010), validation attempts to assure that the cluster solution is representative of the general population. Initial validation was carried out by the multivariate analysis of variance which indicates that the two clusters are significantly different from each other. To gain further assurance in the chosen clusters, the following methods suggested by Green et al. (1988) were considered. These methods are: (1) using a different clustering routine to test the replicability of the cluster solution, (2) splitting the data files into halves and analysis each has separately to check the stability of the clusters, and (3) in case of a large number of variables, deleting various variables in the original data set, computing dissimilarity measures across the remaining variables, and computing this result with the clusters from the full set of variables. In our case, the third method would be inappropriate because there are only five variables and all of them are important. Therefore, this study implemented the first two methods suggested for validating the two cluster solution.

Hair et al. (2010) suggest using the non-hierarchical technique called K-Means cluster analysis to examine the results from Ward's hierarchical cluster analysis. The first step in conducting a K-Means cluster analysis was to use the Ward's hierarchical cluster analysis results to determine the number of clusters and the means of those clusters. The results of the cross- tabulation test for Ward's cluster and K-Means's cluster are shown in Table 4.44.

Table 4.44
Comparison of Ward's Cluster and K-Means's Cluster

			K-means		
			Non-aligned	**Aligned**	**Total**
Ward Method	non-aligned	Count	146	11	157
		% within Ward Method	93.0%	7.0%	100.0%
		% within K-means	92.4%	12.1%	63.1%
	aligned	Count	12	80	92
		% within Ward Method	13.0%	87.0%	100.0%
		% within K-means	7.6%	87.9%	36.9%
Total		Count	158	91	249
		% within Ward Method	63.5%	36.5%	100.0%
		% within K-means	100.0%	100.0%	100.0%
		% of Total	63.5%	36.5%	100.0%

From Table 4.44, it can be seen that 226 out of 249 cases (90.8%) were classified consistently. This means that the Ward's method and K-Means method results are similar.

The purpose of the second method was to check the stability of the clusters. The steps taken were: (1) dividing the sample in two halves randomly; in this case 124 and 125 cases in the first half and second half; (2) performing Ward's clustering method for each half and examining the mean of each half, when the means for the two halves of the sample were similar; and (3) comparing the results from the overall sample and the split halves. Table 4.45 shows that both the first half and second half of the data set was classified into two clusters, which is similar to the results from the whole dataset. All clustering variables were significant in first half except office applications and all variables were significant in the second half except accounting and auditing technologies.

Table 4.45

Comparison of Group Mean and Significance Level from Splitting Data Set

	Cluster (1) means		**Cluster (2) means**		**F**		**Sig.**	
	1st half	**2nd half**	**1st half**	**2nd half**	**1st half**	**2nd half**	**1st half**	**2nd half**
System design and implementation	6.72	6.87	7.17	7.15	12.641	7.237	.001	.008
E-commerce technologies	6.40	6.03	7.23	6.97	68.099	105.649	.000	.000
General communication technologies	5.95	5.73	7.03	6.65	127.445	56.847	.000	.000
Office applications	8.01	7.62	8.12	8.02	1.028	13.172	*.313*	.000
Accounting and auditing technologies	6.14	6.17	6.88	6.19	36.849	0.023	.000	*.881*
No of members	94	63	30	62				

Further, cross- tabulation test was performed to compare results from the whole sample and the results from the split halves. Table 4.46 shows that 211 cases out of 249 cases (85%) were classified consistently. Therefore, it is reasonable to say that there is consistency between the results for cluster analysis using the whole sample and the results for using part of the dataset.

Table 4.46

Comparison of Results from Analysis Whole Data Set and the Analysis of the Two Halves Split

			Split- halves		
			1.00	2.00	**Total**
Overall	Non-aligned	Count	138	19	157
		% within overall	87.9%	12.1%	100.0%
		% within split	87.9%	20.7%	63.1%
	Aligned	Count	19	73	92
		% within overall	20.7%	79.3%	100.0%
		% within split	12.1%	79.3%	36.9%
Total		Count	157	92	249
		% within overall	63.1%	36.9%	100.0%
		% within split	100.0%	100.0%	100.0%

The results of the two methods suggest that the two-cluster solution was valid. The two groups were different in how they thought IT alignment in accounting curriculum in Egypt takes place.

4.13 EXPLORING THE RELATIONSHIP BETWEEN IT ALIGNMENT GROUPS AND FACTORS INFLUENCE THE ALIGNMENT

As discussed in section 4.7, seven dimensions were determined by factor analysis to measure their influence in IT alignment. This section presents an analysis and discussion of the relationship between IT alignment groups, and seven factors that influence IT alignment. Table 4.47 shows the results of one–way ANOVA for the two-cluster solution. The table summarizes the mean values of each dimension indicators of the two alignment groups, and the statistical information to assist in deciding whether or not there is a significant difference between the factors that influence IT alignment and IT alignment groups.

Table 4.47
One–Way ANOVA between Alignment Groups and Factors Influencing IT Alignment

	Non -Aligned	**Aligned**	**F**	**Sig.**
IT services satisfaction	1.76	2.18	34.713	.000
Adequacy of hardware and software	1.39	1.63	21.899	.000
University policy	1.32	1.45	4.933	.027
Colleague, student support	3.41	3.69	10.944	.001
Management support	2.91	3.32	17.089	.000
Interest and attitude	4.61	4.69	1.640	.201
Employer need	4.52	4.74	19.000	.000

Table 4.47 shows that the two alignment groups differed significantly on all dimensions except on interest and attitude variable. The difference was significant at the 95% level. From Table 4.47, it was observed that the aligned group has higher means on all dimensions than the non-aligned group. This suggests that lecturers thought that the accounting curriculum has achieved a higher degree of IT alignment, and perceived that these factors were available to support the alignment.

4.14 EXPLORING THE PROFILE FOR THE ALIGNMENT GROUPS

A summary of the alignment group's profile is presented in this section. Table 4.48 shows that 40.8% of the non-aligned group members were professors, 35.7% were lecturers and 25.6% were assistant professors. The aligned group members were similar, in which 38.0% were professors, 33.9% lecturers, and 26.1% assistant professors. Tables 4.49, 4.50, and 4.51 show that most of the members in both groups were male, above 45 years old, and obtained their PhD from Egypt. Table 4.52 indicates that 94.3% of the non-aligned group members had an academic experience above 15 years, but 82.6% of the aligned group members had an academic experience above 15 years. Similarity, Table 4.53 shows that 75.8% of the non-aligned group members had professional experience above 10 years and 65.2% of the aligned group members had professional experience above 10 years. Furthermore, Table 4.54 shows that only 1.9% of the non- aligned group members did not have any professional accounting qualification and 6.5% of the aligned group members did not have any professional accounting qualification. Likewise, Table 4.55 shows that the non-aligned group had more technological expertise than the aligned group in word processing, electronic spreadsheets, electronic presentation, accounting application, and tax return preparation application.

Table 4.48
Academic Position of Alignment Groups

		Non-Aligned		**Aligned**	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Academic Position	Professor	64	40.8	35	38.0
	Assistant Professor	37	25.6	24	26.1
	Lecturer	56	35.7	33	33.9

Table 4.49

Gender of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Gender	Male	143	91.1	81	88.0
	Female	14	6.9	11	12

Table 4.50

Age of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Age	Less than 35 years	0	0	1	1.1
	35-45 years	40	25.5	25	27.2
	Above 45 years	117	74.5	66	71.7

Table 4.51

PhD Degree of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
PhD Degree	Egypt	124	79.0	68	73.9
	UK	21	13.4	13	14.1
	USA	12	7.6	7	6.6
	Others	0	0	4	4.3

Table 4.52
Academic Experience of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Academic experience	Less than 10 years	1	0.6	2	2.2
	10-15 years	8	5.1	14	15.2
	Above 15	148	94.3	76	82.6

Table 4.53
Professional Experience of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Professional experience	Less than 5 years	0	0	4	4.3
	5-10 years	38	24.2	28	30.4
	Above 10 Years	119	75.8	60	65.2

Table 4.54

Professional Qualification of Alignment Groups

		Non-Aligned		Aligned	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Professional qualification	Non	3	1.9	6	6.5
	ACCA	7	4.5	7	7.6
	CIMA	1	0.6	1	1.1
	ESAA	34	21.7	29	31.5
	Others	112	71.3	49	53.3

Table 4.55

Technology Experience of Alignment Groups

			Non-Aligned		Aligned	
			Frequency	**Percentage**	**Frequency**	**Percentage**
Technology experience	Word processing	Novice	0	0	0	0
		Beginner	0	0	2	2.2
		Competent	0	0	1	1.1
		Proficient	15	9.6	8	8.7
		Expert	142	90.4	81	88.0
	Electronic spreadsheets	Novice	0	0	0	0
		Beginner	0	0	2	2.2
		Competent	5	3.2	3	3.3
		Proficient	35	22.3	25	27.2
		Expert	117	74.5	62	67.4

Table 4.55 (Continued)

		Non-Aligned		Aligned	
		Frequency	Percentage	Frequency	Percentage
Electronic presentation	Novice	0	0	0	0
	Beginner	0	0	1	1.1
	Competent	3	1.9	1	1.1
	Proficient	30	19.1	19	20.7
	Expert	124	79.0	71	77.2
Accounting application	Novice	0	0	1	1.1
	Beginner	1	0.6	6	6.5
	Competent	18	11.5	16	17.4
	Proficient	48	30.6	25	27.2
	Expert	90	57.3	44	47.8
Tax return preparation application	Novice	3	1.9	6	6.5
	Beginner	35	22.3	28	30.4
	Competent	0	0	0	0
	Proficient	48	30.6	17	18.5
	Expert	71	45.2	41	44.6

From the above discussion, we can conclude that lecturers who had an academic experience above 15 years, professional experience above 10 years, and had expertise in technologies believed that there is no IT integration in the accounting curriculum in Egypt.

4.15 SUMMARY

In summary, a very good response rate was achieved (69.02%) in the present study. Mann-Whiteny test indicates a significant difference between the non-professional and professional respondents; therefore, all analyses were run on the professional respondents only. IT skills importance and integration were ranked based on the mean rating. Factor analysis was conducted to test the alignment variable, in which five groups were formed. The same analysis was conducted on the factors that influence the alignment. Further, the researcher tested the assumptions of normality, linearity, and homoscedasticity of each factor of alignment and the results show that the assumptions were generally met. Multiple regression analysis was conducted to investigate the relationship between the factors that influence the alignment and the alignment groups. Thirty five hypotheses were tested and results indicate that only nine hypotheses were not supported. Furthermore, cluster analysis was conducted to see if the sample could be classified into groups of similar profile of IT alignment. Cluster analysis indicate two groups of IT alignment, labeled non-aligned and aligned group.

CHAPTER FIVE

DISCUSSIONS AND CONCLUSIONS

5.1 INTRODUCTION

This chapter discusses and interprets the research findings. To this end, it is organised around the research questions and hypotheses. In addition, the contributions and limitations of the research, and finally recommendations for future research are discussed.

5.2 DISCUSSION

The overall purpose of this study was to understand the relationship between required IT skills and the integration level of required IT skills into the accounting curriculum, and to identify the factors that influence the alignment between the two variables. Toward the purpose, this research focused on the following questions: (1) what are the IT skills required for accounting students? (2) to what extent are the required IT skills integrated into the accounting curriculum? (3) to what extent does the required IT skills match the IT skills integrated into the accounting curriculum? and (4) what are the factors that influence the alignment between the required and the integrated IT skills in the accounting curriculum? In the next sections, each of these issues is discussed by locating them within the existing knowledge and the contribution of this study's findings in furthering understanding in the area.

5.2.1 IT Skills Required

According to Uyar and Gungormus (2011), changes in business environment and technological developments necessitate incorporation of new technology into the traditional accounting curriculum because such changes affect the skills levels required of accounting graduates. Results from previous studies as reported by Greenstein and McKee (2004), Greenstein et al. (2008), and Ismail and Abidin (2009) indicated that the most important technologies required for the accounting graduates are word processing, electronic spreadsheets, email, internet search, and retrieval and electronic presentations. In continuation of previous studies, the present study explored what are the required IT skills to be integrated into the accounting curriculum in Egyptian universities so as to be consistent with the recent developments.

Based on a sample of 249 accounting lecturers in Egypt, this study showed that most accounting lecturers perceived that it is important that all technologies listed in the survey to be integrated into the accounting curriculum. Results indicated that the most important technologies perceived were generalized audit software, embedded audit modules/ real time modules, word processing, electronic spreadsheets, and small business accounting software. The findings are consistent with the results of previous studies in terms of the need for the technologies to be integrated into the accounting curriculum but they are inconsistent with previous works in terms of which technologies are more important than the others to be integrated. This study indicated that the highest important technologies are those related to the accounting and auditing processes, while previous studies indicated that technologies related to office automation are the most important.

5.2.2 Integration of IT Skills

Mohamed and Lashine (2003) argue that accounting education is not developed to be in line with the skills required in a business environment. For instance, Chang and Hwang (2003) concluded that only a few IT topics are integrated into the accounting curriculum despite the recognition made by the accounting lecturers that IT topics need to be wholly integrated. Prior studies have also indicated that the integrated IT topics into the accounting curriculum do not meet the requirements of the business environment (Ahmed, 2003; Chandra et al., 2006; Harrast et al., 2010; Lien et al., 2005). Whilst the previous section has provided empirical evidence of the importance of IT, this section explores the current level of IT integration.

The present study showed that the mean rating of IT integration into the accounting curriculum is lower than that of IT importance. Furthermore, the findings indicated that the technologies mostly integrated into the accounting curriculum in Egypt are office applications such as word processing, electronic spreadsheets, and electronic presentations. This means that the integration of IT into the accounting curriculum in Egypt places more emphasis on basic technologies. The second group of technologies that are integrated into the accounting curriculum in Egypt is system design and implementation technologies (database search and retrieval, test data, database design and installation, flowcharting/data modeling, and simulation software), and the third group is accounting and auditing technologies (such as electronic working paper, small business accounting software, generalized audit software, and expert systems). The present study also showed that the findings of integration of IT skills into the accounting curriculum in Egypt are different from those of importance of IT skills. This indicates that a gap exists between what is expected and what is being practiced. But the findings are consistent with those of previous studies, which found that the accounting lecturers in the sample perceived that while IT is important to be integrated in the accounting curriculum, it not currently being fully integrated into the curriculum.

5.2.3 Alignment of IT Skills

The previous two sections have provided discussion on the results of required and integrated IT skills in the accounting curriculum. This section focuses on the alignment between required and integrated IT.

This study used a cross-tabulation technique to understand the relationship between required and integrated IT. Cross-tabulation technique identified three degrees of alignment (aligned, mixed, and non-aligned). This study also used the matching approach to measure the IT alignment. Section 4.6.2 showed the degree of alignment between the required and integrated IT into the accounting curriculum. Results indicated that the most aligned technologies are word processing, electronic spreadsheets, electronic presentations, and database research technologies. The least nonaligned technologies are EDI-web based, groupware, tax return preparation software, and internet search and retrieval.

5.2.4 Factors Influencing Alignment

The main thrust of this study was to identify the factors that influence the alignment between the required and integrated IT in Egypt. This study suggested four factors that may influence the alignment. This study also suggested dividing the IT alignment variable into five groups. To test if these factors influence each group, the following hypotheses were tested.

5.2.4.1 Relationship between Financial Resources and IT Alignment (H_1)

This study adopted Ismail and Salim's (2005) measures of financial resources based on the adequacy of hardware and software facilities provided to the accounting lecturers and students. Results indicated that the financial resources variable can be divided into two dimensions: IT services satisfaction and adequacy of hardware and software. The mean value of IT services satisfaction was found to be 2.02, while the mean value of adequacy of hardware and software was 1.48. Both mean values are below the midpoint of 2.5, which means that the respondents believed that support from technical staff and network services are not sufficient. They also perceived that hardware and software facilities required to integrate IT into the accounting curriculum are not sufficient.

Based on the two dimensions of financial resources, this study found a significant positive relationship between IT services satisfaction and four groups of IT alignment (system design and implementation, e-commerce technologies, general communication technologies, and office applications) but insignificant yet negative relationship between IT services satisfaction and accounting and auditing technologies alignment. On the other hand, results showed a positive significant relationship between the adequacy of hardware and software and all groups of IT alignment. In addition, the cluster analysis technique found the mean values of IT services satisfaction and adequacy of hardware and software are below the midpoint (2.5) for both the non-aligned and the aligned groups, suggesting that financial resources are perceived to be important by the accounting lecturers to integrate the IT skills into the accounting curriculum. This findings are consistent with those reported by Boritz (1999) and Chang and Hwang (2003), who found that accounting departments in the USA do not have sufficient resources to make significant improvements in their curriculum. The implication of this finding is that Egyptian universities need to provide sufficient financial support to enable effective integration of IT skills into the accounting curriculum.

5.2.4.2 Relationship between University/Faculty Support and IT Alignment (H_2)

This study measured university/faculty support in terms of the appreciation and support given by the heads of department, colleagues and student for the efforts toward integrating IT into the accounting curriculum, and the university policy to improve these efforts. Results from factor analysis divided the university/faculty support into three dimensions: university policy, colleague and student support, and management support. The mean values of the colleague and student support items were, and the management support items were found to be 3.51 and 3.06, respectively. The values are above the midpoint, which means that the respondents believed that their efforts in integrating IT into the accounting curriculum were appreciated and supported by colleagues, students, and heads of department. In contrast, the mean value of the university policy items was 1.37, which is below the midpoint. This means that the respondents agreed that their efforts to teaching IS/AIS are not adequately rewarded by the universities, that training to acquire skills in IT is insufficient, and that their universities do not allocate sufficient budget to improve the interface between practice and education. They also agreed that training for AIS is given a lower priority than that for other areas of accounting.

The present study found a significant positive relationship between university policy and alignment of system design and implementation, e-commerce, and office application technologies. However, no significant relationship between the university policy and the alignment of general communications and accounting/auditing technologies was found. In addition, the cluster analysis showed that the two aligned groups believed that the university policy needs to be improved (as the mean value is below the midpoint). In other words, the respondents agreed that their efforts in teaching IS/AIS are not adequately rewarded by the universities, and they were dissatisfied with that less priority is given to IT-related training and that their universities do not have a sufficient budget to improve the interface between practice and education.

Results further indicated a positive and significant relationship between colleague and student support, and all dimensions of IT alignment except for the general communication technologies group. On the other hand, the results only indicated a positive and significant relationship between management support and the alignment of communication technologies group. Furthermore the aligned groups derived from the cluster analysis believed that support from colleagues, students and management are sufficient (above 2.5), which means that both the aligned group or non-aligned group believed that appreciation and support from heads of department, colleagues and students are important to encourage them to integrate IT into the accounting curriculum

Overall, the results suggest that the university policy and the support from colleagues and students play an important role in encouraging accounting lecturers to integrate IT skills into the accounting curriculum. The implications of these findings are that universities in Egypt need to have a clear and sound policy towards IT integration. Furthermore, creating awareness and understanding among lecturers and students on the need for effective integration of IT skills into the accounting curriculum is important.

5.2.4.3 Relationship between Interest and Attitude Toward IT and IT Alignment (H_3)

Interest and attitude of academics toward IT integration was measured by the importance and apprehensiveness of accounting academics to learn IT. Such measure was similar to that in Ismail and Salim (2005). Results showed that the mean value of the interest and attitude items was found to be very high of 4.65. This means that the respondents were aware that IT skills are important to develop the accounting profession, and agreed that accounting academicians are receptive to learn new IT skills.

This study examined the relationship between the lecturers' interest and attitude toward IT and IT alignment. Results found a significant positive relationship between the lecturers' interest and attitude toward IT and all dimensions of IT alignment except for general communication technologies. Consistent with Ismail and Salim (2005) and Senik and Broad (2008),the results suggest that accounting lecturers' interest and positive attitude toward IT can be a major motivating factor towards successful integration of IT skills into the accounting curriculum. Therefore, it is crucial for universities in Egypt and professional accounting bodies to take an initiative to create awareness and understanding of the importance of IT among the accounting lecturers.

5.2.4.4 Relationship between Market needs and IT Alignment (H_4)

This study measured market needs by asking the accounting lecturers, who were also professional accountants, about the importance of IT skills to the accounting graduates to work and have a good salary. Results indicated that the respondents agreed that IT skills are important for accounting graduates to work in industry and in government agencies, to get jobs, to have a better salary, and to succeed in their carrier. This means that accounting lecturers believed that the accounting curriculum should be driven by the demand of employers to help the accounting graduates to have jobs and get a good salary.

Results showed a positive and significant relationship between market needs and all dimensions of IT alignment. This finding is consistent with those reported by Albrecht and Sack (2000), Chandra et al. (2006), Kavangh and Dreman (2007), and Theuri and Gunn (1998). They found that feedback from employers are important to reduce the gap between skills currently being integrated into the accounting programs and those needed by the market or employers. Therefore, universities in Egypt need to establish good relationships with employers and professional accounting bodies for frequent and valuable input to help them design an effective curriculum.

Table 5.1 summarizes the above results. It shows each group of IT alignment and the factors affecting each group.

Table 5.1
Summary of the Results

IT group	Factors
System design and implementation	IT services satisfaction
	Adequacy of hardware and software
	University policy
	Colleague and student support
	Interest and attitude
	Employer need
E-commerce technologies	IT services satisfaction
	Adequacy of hardware and software
	University policy
	Colleague and student support
	Interest and attitude
	Employer need
General communication technologies	IT services satisfaction
	Adequacy of hardware and software
	Management support
	Employer need

Table 5.1 (Continued)

IT group	Factors
Office applications	IT services satisfaction Adequacy of hardware and software University policy Colleague and student support Interest and attitude Employer need
Accounting and auditing technologies	Adequacy of hardware and software Colleague and student support Interest and attitude Employer need

5.3 CONTRIBUTIONS OF THE RESEARCH

This section discusses the theoretical, methodological as well as the practical contributions of the present research. Subsections, 5.3.1 and 5.3.2 discuss the theoretical and methodological contributions respectively. In addition, subsection 5.3.3 discusses how the research findings could practically benefit accounting lecturers in Egypt.

5.3.1 Theoretical Contribution

Many studies have examined the importance of IT skills for accountants (e.g. Albrecht& Sack, 2000; Burnett, 2003; Ismail et al., 2005; Janverien et al., 2008). In addition, many studies have investigated the level of IT knowledge among accounting professionals (e.g. Greenstein et al., 2008; Greenstein &Mckee, 2004; Merhout& Buchman, 2007). A few studies have examined the alignment between importance of knowledge of IT skills such as Ismail and Abidin (2009), and a few studies have attempted to investigate the integration of IT skills into the accounting curriculum (e.g. Ahmed, 2003; Chang &Hwang, 2003;Helliar et al., 2009; Lin et al., 2005). However, no attempt has been made to examine the alignment between what IT skills that are important and what IT skills that are currently being integrated into the accounting curriculum, which was what the present study sought to achieve. To do so, information processing theory was used. This theory asserts that information requirements (required IT skills) must be aligned with information processing capacity (integrated IT skills) to have an impact on accountant performance. Information processing theory defines organization as an entity that uses information in order to control its activities. Furthermore, organization is well designed when its information processing capacity match its information processing load (Galbraith, 1974). This study extends this argument to include individuals who produce the information for the organization need to have the necessary skills which help them to produce the information required by the organization.

Similarly, task-technology fit theory (TTF) assumes that IT skills is more likely to have a positive impact on individual performance and will be useful if capability of the IT skills (integrated IT skills) matches with the task that the user must perform (required IT skills) (Goodhue& Thompson, 1995).

Results of this study found that word processing, electronic spreadsheets, electronic presentations, and database research technologies are the most aligned technologies, while the least non-aligned technologies are EDI-web based, groupware, tax return preparation software, and internet search and retrieval. This result revealed that accounting curriculum in public universities in Egypt are giving more focus on office applications but less on advanced technologies as part of the curriculum. Therefore, universities in Egypt need to develop the accounting curriculum by integrating the advanced technologies like EDI-web based and groupware to be in line with the advanced business environment.

5.3.2 Methodological Contribution

Apart from theoretical implications, the present study also has its methodological implications. Firstly, the limited prior literatures that examined the alignment between the required and integrated IT skills into the accounting curriculum have encouraged the researcher to examine the issue in Egypt. The present study used the matching approach to measure the alignment between required and integrated IT skills into the accounting curriculum, as suggested by Ismail and Abidin (2009). In addition, the present study adopted Ismail and Abidin's (2009) instrument to measure the required and integrated IT skills into the accounting curriculum in Egypt. This is because Ismail and Abidin (2009) had validated the instrument as having five dimensions: system design and implementation, e-commerce technologies, audit automation, general office automation, and accounting automation. This study also managed to validate 33 technologies into five but slightly different dimensions:

system design and implementation, e-commerce technologies, general communication technologies, office applications, and accounting and auditing technologies. The Cronbach's alpha statistic for each dimension was found to be higher than 0.7, which is generally accepted and represents a high reliability. It can be concluded that the study instrument can be used in further studies in developing countries.

Secondly, many studies have investigated the impact of financial resources on the quality of educational system (e.g. Bortiz, 1999; Celik & Ecer, 2009; Chang & Hwang, 2003; Ismail & Salim, 2005). However, no attempt has been made to examine the influence of financial resources on the alignment between required and integrated IT skills into the accounting curriculum. This study adopted Ismail and Salim's (2005) instrument to measure financial resources in terms of the adequacy of hardware and software plus software updates, and IT services satisfaction provided to accounting lecturers Ismail and Salim (2005) validated the instrument into two dimensions: IT services satisfaction, and adequacy of hardware and software. This study validated the instrument into the same two dimensions. The Cronbach's alpha statistic of each dimension was found to be 0.737 and 0.809, respectively. The values are generally accepted and represent a high reliability (Hair et al., 2010). The instrument can be used in further studies in developing countries.

Thirdly, many studies have also investigated the impact of university and faculty support for lecturers to develop accounting curriculum (e.g. Chang & Hwang, 2003:

Ismail & Salim, 2005; Kavangh & Drennan, 2007; Mohamed & Lashin, 2003). However, no attempt has been made to examine the influence of university and faculty support on the alignment between the required and integrated IT skills into the accounting curriculum. This study adopted Ismail and Salim's (2005), and Kavangh and Drennan's (2007) instrument to measure the university and faculty support. Ismail and Salim (2005) and Kavangh and Drennan (2007) validated the instrument as having two dimensions only: appreciation and support, and university policy. However, this study validated 10 items, which measured the university/faculty support, into three dimensions (university policy, colleague and student support, and management support). The Cronbach's alpha statistic for each dimension was higher than 0.8, which is generally accepted and represents a high reliability. It can be concluded that the instrument can be used in further studies in developing countries.

Fourthly, studies like Philips (2005), Lin et al. (2005), Ismail and Salim (2005) and Senik and Broad (2008) examined the interest and attitude of academics as the major motivating factor toward IT integration in accounting curriculum. However, no attempt has been made to examine the interest and attitude of academics on the alignment between the required and integrated IT skills into the accounting curriculum. This study adopted Ismail and Salim's (2005) instrument to measure the interest and attitude of academics toward IT integration. Ismail and Salim (2005) validated the instrument as having one dimension: interest and attitude of academics toward IT integration. Similarly, one dimension was also revealed by this study. The

Cronbach’s alpha statistic for the scale of interest and attitude of academics toward IT integration was 0.9, which is generally accepted and represents a high reliability (Hair et al., 2010). It can be concluded that the instrument can be used in further studies in developing countries.

Fifthly, many studies have examined employer expectations about the skills of accounting graduates to enter the profession (e.g. Kavangh& Drennan, 2007; Merhout& Buchman, 2007; Theuri& Gunn, 1998; Weligamage& Sienghai, 2003). However, no attempt has been made to examine the market needs on the alignment between the required and integrated IT skills into the accounting curriculum. This study adapted the instrument developed by Kavangh and Drennan (2007) to measure the market needs by asking the respondents about the importance of IT skills that graduates need to have to work and have a good salary. This study validated the concept into a single dimension. The Cronbach’s alpha statistic for the variable was 0.773, which is generally accepted and represents a high reliability (Hair et al., 2010). It can be concluded that the instrument can be used in further studies in developing countries.

5.3.3 Practical Contribution

This study has demonstrated that universities with adequate IT services and adequate hardware and software would achieve better alignment between required and integrated IT. It can be concluded that to improve the accounting curriculum, Egyptian universities should provide sufficient financial support to integrate IT in the accounting curriculum.

Unlike previous studies (e.g. Ismail &Salim, 2005; Kavanagh &Drennan, 2007), this study divided the university and faculty support into three dimensions: university policy, support from colleagues and students, and support from management. The difference in the findings may be because the respondents differentiated the support from management from the support from colleagues and students. This study also showed that universities with a good university policy and adequate support from colleagues and students would achieve better alignment between the required and integrated IT.

This study demonstrated that accounting lecturers with a positive interest and attitude toward IT integration would perceive better alignment between the required and IT integrated into the accounting curriculum. Likewise, universities that have good relationships with employers would perceive better alignment between the required and IT integrated into the accounting curriculum.

Finding from this study might assist the relevant education agencies in Egypt such as the National Authorities for Quality Assurance and Accreditation of Education (NAQAAE) and policy makers in the formulation of education strategies in Egypt. For example, government should provide sufficient budget to universities to improve the interface between practice and education. The government and management of the universities also need to provide sufficient resources to use appropriate IT services and facilities to integrate IT into accounting curriculum. Furthermore training for accounting faculty members to acquire IT skills should be improved and given a high priority to other areas of accounting.

Finally, results from this study can be used as a benchmark by professional bodies, professionals, and audit firms not only in Egypt but also in other developing countries with similar IT development to evaluate accountants' IT skills.

5.4 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

There are number of limitations that need to be addressed in future research. Firstly, the sample of the present research involved the accounting lecturers who had professional experience only. Replication of this research can be done using a sample of professional and non-professional lecturers to compare the two groups. Furthermore, as the response rate of 69% obtained in this study was relatively good for survey studies, future research could explore the use of other techniques to collect data such as using web-based questionnaire.

Secondly, this research was cross-sectional, which means that changes over time that occur in accounting education could not be captured. In this case, the problem of misfit of IT skills found in this present research may be solved in a short time period by developers. Thus, it would be useful to conduct a longitudinal research on the alignment, its antecedents and consequences. Furthermore, this study adopted IT skills listed in previous studies (Greenstein & Mackee, 2004; Ismail & Abidin, 2009). Future research can add more IT skills discovery in the future.

Thirdly, this research explored the alignment between the required and integrated IT skills into the accounting curriculum using the matching approach. Future research could explore other ways of measuring alignment, such as a moderating approach or a gestalt approach, which is more holistic, or incorporate various approaches so that it can provide different results.

Fourthly, the present research suggested four factors that could affect the alignment between the required and integrated IT skills into the accounting curriculum in Egypt. Future researches could consider other factors that may influence the IT alignment.

Fifthly, the instruments used to measure financial resources, university/ faculty support, interest and attitude toward IT integration, and market needs from previous studies. Future research works can develop different instruments or add more items to the current instruments.

5.5 Conclusion

The growth and changes in IT skills have created a gap between IT skills given to students, and required by businesses. Therefore the present study was carried out to investigate the alignment between what is offered and what is required in terms of IT skills in the accounting curriculum in Egypt. Results show that general office automation technologies are the most aligned group of technologies.

This study examined 35 hypotheses concerning the relationship between seven factors (IT service satisfaction, adequacy of hardware and software, university policy, colleague and student support, management support, academic interest and attitude toward IT integration, and market needs) and IT alignment in the specific context of Egyptian universities. It has made an important contribution by providing an increased understanding of how IT skills affect the accounting curriculum in Egypt, an issue that has received little attention in the literature. Using multiple regression analysis to test the hypotheses, this study found a positive and significant relationship between:

a. IT service satisfaction and system design and implementation technologies, e-commerce technologies, communication technologies, and office applications alignment;
b. adequacy of hardware and software and system design and implementation technologies, e-commerce technologies, communication technologies, and offices application, and accounting and auditing applications;

c. university policy and system design and implementation technologies, e-commerce technologies, and office applications;
d. colleague and student support and system design and implementation technologies, e-commerce technologies, office applications, and accounting and auditing applications;
e. management support and communication technologies;
f. academic interest and attitude toward IT integration and system design and implementation technologies, e-commerce technologies, offices applications and accounting and auditing applications;
g. Employer need and system design and implementation technologies, e-commerce technologies, communication technologies, offices applications and accounting and auditing applications.

Overall, the evidence suggests that the major factor that influences all groups of IT alignment is market needs. More research works need to be carried out to examine other factors that could possibly affect the alignment between the required and integrated IT skills into the accounting curriculum.

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APPENDICES

Appendix A-1

College Of Business (COB)
Universiti Utara Malaysia
Sintok UUM 06010
Kedah Darul Aman
Email: aymn.sabry@yahoo.com

QUESTIONNAIRE

The Integration of Information Technology Skills into Accounting Curriculum at Public Universities in Egypt

Dear Professor/Assistant Professor/Lecturer:

I am a lecturer in the Faculty of Commerce, Kafr Elshiekh University and a PhD candidate in the Department of Accounting, College of Business, Universiti Utara Malaysia. I am conducting a nationwide survey of Egyptian accounting lecturers to gather data for my study. The study aims to investigate the alignment between IT skills required and IT skills integrated in the accounting curriculum, and to identify factors that influence alignment between the two variables.

Your response is very important to my study. I understand that your time is valuable, but I would appreciate it if you would take a few minutes (approximately 30 minutes) to complete the short questionnaire Please complete and return the questionnaire to my email (aymn.sabry@yahoo.com). Let me assure you that all information collected will be kept confidential and all responses will be aggregated.

Thank you.

Sincerely yours,
Ayman Mohamed Sabry
Doctoral Candidate

SECTION A: RESPONDENT PROFILE

Please mark (√) in the appropriate box:

1) Your current position:

o Professor	
o Assistant Professor	
o Lecturer	

2) Your gender:

o Male	o Female

3) Your age: [|] years

4) Where did you obtain your PhD?

o Local	o Overseas
o If you obtained your PhD from overseas, please indicate the country	……………………………….. ………………………………..

5) Years of experience as an academic staff: [|] years

6) Years of experience as a professional accountant: [|] years

7) Do you possess any professional accounting qualification?

o Yes	o No
o If your answer is Yes, please indicate the professional body:	
o ACCA(Association of Chartered Certified Accountants)	
o CIMA (Chartered Institute of Management Accountants)	
o ESAA (The Egyptian Society of Accountants and Auditors)	
o Others (…………………………………………………)	

8) Does your department/faculty offer Accounting Information System (AIS) or Information Technology (IT) related subject(s)?

o Yes	o No
o If your answer is YES, please indicate name of the subject(s)	
Name: 1-…………………………………… 2-………………………………… 3-…………………………………… 4-………………………………………	

- If your answer is NO, please explain the reason(s) why such subjects are not offered in your faculty:

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

9) Please indicate your level of expertise on the following applications based on a five- point scale from 1= novice to 5 = expert:

	Novice 1	**Beginner 2**	**Competent 3**	**Proficient 4**	**Expert 5**
o Word processing application (example: Microsoft word)					
o Electronic spreadsheets application (example: Microsoft Excel)					
o Electronic presentations application (example: Microsoft PowerPoint)					
o Accounting application					
o Tax return preparation application					

SECTION B:

The following statements help us to understand factors that influence the level of IT integration in accounting curriculum in your department/faculty and at Egyptian universities as a whole., *please type the most appropriate number on the scale ranging from 1= strongly disagree to 5= strongly agree.*

SECTION B1: Financial resources

This section attempts to identify the financial resources allocated for IT-related expenditure, which would reflect by the quality of IT facilities provided by the universities to facilitate the teaching and learning process of AIS/IT-related subjects.

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Adequacy of Hardware and Software					
Hardware facilities, i.e. number of PCs for accounting lecturers to acquire IT skills are adequate					
Hardware facilities, i.e. number of PCs for accounting students to acquire IT skills are adequate					
Application/ software required to integrate IT in accounting is adequate					
IT Services Satisfactory					
Application/ software required to integrate IT in accounting is updated regularly					
Network services are satisfactory					
Support for computing services from technical staff is satisfactory					
Hardware facilities are upgraded regularly					

SECTION B2: University /Faculty support

This section measures university/faculty supports in terms of the appreciation and support given by the head of department, colleagues and students to the efforts of accounting lecturers to integrate IT into the accounting curriculum.

Appreciation and Support					
Your efforts toward integrating IT into accounting curriculum:					
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Appreciated by head of department					
Fully supported by head of department					

Appreciated by colleagues					
Fully supported by colleagues					
Appreciated by students					
Fully supported by students					
University policy					
The efforts for teaching IS/AIS are not adequately rewarded by my university					
My university has insufficient budgets o improve the interface between practice and education					
Training for staff to acquire skills in IT is sufficient					
Training for AIS is always given a higher priority to other areas of accounting					

SECTION B3: Interest and attitude of academics toward IT integration.

This statements measure the attitude of accounting academics to learn IT

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Accounting academicians are aware of the importance of IT in accounting					
Accounting academicians are aware that IT knowledge and skills are crucial for the enhancement of accounting profession					
Accounting academicians are receptive to learn new IT skills					
Accounting academicians are apprehensive to learn new IT skills					

SECTION B4: Market needs

The following statements measure your perception of the employers need for accounting graduates regarding IT skills:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
IT skills are important for accounting graduates to work in industry					
IT skills are important for accounting graduates to work in government agencies					
Graduates with good IT skills would get jobs easier than those without.					
Graduates with good IT skills would have salary better than those without.					
Graduates with good IT skills would be more successful in their career than those without.					

SECTION C: THE IMPORTANCE AND THE INTEGRATION LEVEL OF IT SKILLS

The following table of IT skills helps us understand the importance and the integration level of IT skills. Scales on the left-hand side attempt to measure your perceptions toward the importance of each skill using a five-point scale from 1= not important to 5= very important. Scales on the right-hand side attempt to measure the integration level of IT skills in the accounting curriculum using the five-point scale from 1= not integrated to 5= fully integrated. (*Please type an appropriate number on each side of the statement)*

Importance					Technology	Description	Integration				
1	2	3	4	5			1	2	3	4	5
		3			**Example**	**This is just an example**		**2**			
					General Office Automation						
					Word processing	Computer program that facilitates entry and preparation of documents such as letters or reports. (e.g. Microsoft word.)					
					Electronic spreadsheets	Software that allows the auditor to enter either alphanumeric or numeric data and manipulate it either via standard functions or auditor programmed functions (e.g. Microsoft Excel).					
					E-mail	Exchange of mail messages via Intranets and/or the Internet (e.g. Microsoft Outlook).					
					Internet search and retrieval	Permits user to search text that is in electronic format and retrieve, view, and print desired text (e.g. Google.com).					
					Image processing	Conversion of paper documents into electronic form through scanning and the subsequent storage and retrieval of the electronic image (Document Management software).					
					Electronic presentations	Software that facilitates the organization and use of text, voice, and/or images to communicate concepts (e.g. Microsoft PowerPoint).					
					Groupware	Software that permits auditors to categorize, store, and share data among themselves as well as communicate with each other about that data, preferably in a real-time mode(e.g. Lotus Notes)					
		`Accounting Firm Office Automation:									

					Small business accounting software	Accounting software package used to record transactions, maintain general and subsidiary ledgers, and generate financial statements (e.g. Peachtree Accounting Software)					
					Tax return preparation software	Software, perhaps incorporating expert knowledge, that assists the accountant/auditor in identifying relevant information, capturing and recording it in a manner that can be filed with tax authorities. (e.g. Turbo Tax by Quicken)					
					Time management and billing systems	Computer program that assists in capturing, managing, billing, and reporting time spent on professional activities.					
Audit Automation :											
					Electronic working papers	Software that generates a trial balance, lead schedules, and other schedules useful for the recording of evidence in an audit or assurance engagement.					
					Generalized audit software	Computer program that helps the auditor access client computer data files, extract relevant data, and perform some audit function such as addition or comparison (e.g. Audit Command Language (ACL)).					
					Embedded audit modules / Real-time audit modules	Programmed routines incorporated into application programs, which are designed to perform an audit function (e.g. as400 audit program).					
					Expert systems	Computer software that provides relevant information and/or decision models to assist a human in making a decision or accomplishing some task.					
E-Commerce Technologies :											
					Firewall software/ hardware)	Part of ‘‘security technology’’ that enforces an access control policy between two networks					
					External network configurations	Intranet, extranet, and Internet access devices that enable users physically separated from the server to access it.					
					User authentication systems	Devices used to verify that a system user is who he/she claims to be (e.g. Pluggable Authentication Modules(PAM))					
					Internal network configurations	Linkage of individuals and data through hardware and Software systems that permit the exchange of various types of data					

					Intrusion detection and monitoring	Part of ‘‘security technology’’ that identifies unauthorized requests for services (e.g. NetIQ Security Manager).					
					Wireless communications	The ability to transfer digital data without the use of cables, twisted-pair, or fiber optics					
					Digital communications	Bandwidth–telecommunications devices used to facilitate the rapid and unfettered transfer of data (e.g. video conferencing).					
					Encryption software	Changing data using some type of encoding/decoding algorithm so that unauthorized persons who can access the encrypted data will not be able to read it or use it.					
					EDI—traditional	Transfer of data or payments electronically between computers using software that may, or may not, require human intervention to affect the transfer					
					EDI—web based	The extension to XML-based EDI(e.g. Electronic Commerce)					
					Agent technologies	Programmed modules that are given certain levels of authority and autonomy to act on behalf of their ‘‘supervisor’’, such as to decide whether to order more inventory and from which supplier					
System Design and Implementation:											
					Database search and retrieval	Software that uses relational structures between data files and facilitates varying data retrieval and use (e.g. Microsoft Access)					
					Simulation software	Abstraction of some aspect of real system via software. Auditor may use model to evaluate the reliability of information from real world sources. This may be thought of as a very high level analytical review of a company’s data.					
					Flowcharting/data modeling	Software using the source code version of programs to produce flowcharts of program logic(e.g. Microsoft Visio).					
					Computer-aided systems (CASE) engineering tools	Integrated package of computer tools that automate important aspects of the software development process to increase software development effectiveness in terms of productivity of systems development and quality of					

						developed systems.					
					Cooperative client/ server environment	Distribution of processing functions between two or more computers as in a local area network. This also includes end-user computing where users on the network also process and store data on their personal computers.					
					Workflow technology	Software and hardware that facilitates the capture of data in the work place to improve management of the business. For example, using an electronic scanner to record the movement of materials in a warehouse based on the barcodes on the materials.					
					Database design and installation	Software that permits the creation and use of relational structures between data files (e.g. Microsoft Access).					
					Test data	A set of transactions processed by the auditor to test the programmed or procedural operations of a computer application (e.g. SPSS).					
					Enterprise resource planning	Business-wide information systems that cross boundaries (e.g. SAP).					
					Application service providers	Companies that host (provide hardware, software and connectivity) for specific business applications.					

Please use this space to write any comments you wish to make

Thank you for your time and participation

Appendix A-2: Second cover letter

Dear Professor/Assistant Professor/Lecturer:

About a month ago I wrote to you seeking your opinion on the IT skills already integrated in the accounting curriculum in your university and the IT skills required from the employer in your opinion. As of today we have not yet received your completed questionnaire.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. Your response is very important to my study. As mentioned in our last letter, the utmost confidentiality will be observed in using the information given.

In the event hat your questionnaire has been misplaced, replacement is attached.

Yours sincerely,

Ayman Mohamed Sabry

Doctoral Candidate

Appendix B: Results of Mann-Whitney Test between Professionals and Non Professionals Respondents

	Mann-Whitney U	Asymp. Sig. (2-tailed)	Are they significant at 95% level?
hardware facilities for lecturers	8610.000	.329	Not significant
hardware facilities for students	8317.000	.135	Not significant
adequate software	9209.500	.995	Not significant
updated software	8532.000	.298	Not significant
network service	9211.500	.998	Not significant
support from technical staff	8088.500	.079	Not significant
upgrade hardware	8540.000	.294	Not significant
appreciated by head	8498.000	.268	Not significant
support by head	8673.000	.399	Not significant
appreciated by colleagues	8454.000	.242	Not significant
support by colleagues	8705.000	.433	Not significant
appreciated by students	8485.500	.253	Not significant
support by students	8661.500	.388	Not significant
effort of teaching IT	8696.500	.409	Not significant
university budget	8954.500	.573	Not significant
training for AIS sufficient	8732.500	.315	Not significant
training for AIS	8421.500	.132	Not significant
academician aware of IT	8782.000	.309	Not significant
IT crucial	8699.000	.270	Not significant
academician receptive to learn IT	8697.500	.336	Not significant
academician apprehensive to learn IT	8850.500	.543	Not significant
IT important for work in industry	8923.500	.357	Not significant
IT important for work in government	8952.000	.695	Not significant
graduates with good IT skills get jobs easier	9077.500	.810	Not significant
graduates with good IT skills get good salary	8591.500	.275	Not significant
graduates with good IT skills success in their career	8281.000	.065	Not significant
Word processing importance	8455.5	0.074	Not significant

Electronic spreadsheets importance	8586	0.182	Not significant
E-mail importance	8647	0.328	Not significant
Internet search and retrieval importance	8968	0.668	Not significant
Image processing importance	9202.5	0.987	Not significant
Electronic presentations importance	8261.5	0.089	Not significant
Groupware importance	8791.5	0.500	Not significant
Small business accounting software importance	8742.5	0.313	Not significant
Tax return preparation software importance	8844.5	0.496	Not significant
Time management and billing systems importance	9195.5	0.978	Not significant
Electronic working papers importance	8841	0.454	Not significant
Generalized audit software importance	7900	0.002	significant
Embedded audit modules / Real-time audit modules importance	8339.5	0.035	significant
Expert systems importance	9189.5	0.971	Not significant
Firewall software/ hardware importance	9168	0.944	Not significant
External network configurations importance	8237.5	0.146	Not significant
User authentication systems importance	8423.5	0.226	Not significant
Internal network configurations importance	8404	0.198	Not significant
Intrusion detection and monitoring importance	8118.5	0.102	Not significant
Wireless communications importance	9011	0.760	Not significant
Digital communications importance	8866.5	0.598	Not significant

Encryption software importance	8464	0.219	Not significant
EDI—traditional importance	8648	0.334	Not significant
EDI—web based importance	8879.5	0.550	Not significant
Agent technologies importance	8510.5	0.275	Not significant
Database search and retrieval importance	8589.5	0.320	Not significant
Simulation software importance	7894.5	0.047	significant
Flowcharting/data modeling importance	8866	0.598	Not significant
Computer-aided systems (CAS) engineering tools importance	8970	0.633	Not significant
Cooperative client/ server environment importance	8976	0.714	Not significant
Workflow technology importance	8734	0.465	Not significant
Database design and installation importance	8668.5	0.374	Not significant
Test data importance	8412.5	0.142	Not significant
Enterprise resource planning importance	8853	0.584	Not significant
Application service providers importance	7606.5	0.014	significant
Word processing integrated	8175.5	0.100	Not significant
Electronic spreadsheets integrated	8744.5	0.470	Not significant
E-mail integrated	8389	0.206	Not significant
Internet search and retrieval integrated	8177	0.106	Not significant
Image processing integrated	7622	0.008	significant
Electronic presentations integrated	6955	0.000	significant
Groupware integrated	8879	0.538	Not significant
Small business accounting software integrated	8048	0.039	significant
Tax return preparation software	9070.5	0.807	Not significant
Time management and billing systems integrated	8009	0.059	Not significant
Electronic working papers integrated	7728	0.023	significant

Generalized audit software integrated	8148	0.103	Not significant
Embedded audit modules / Real-time audit modules integrated	8824	0.553	Not significant
Expert systems integrated	8240	0.139	Not significant
Firewall software/ hardware integrated	7814	0.025	significant
External network configurations integrated	7784.5	0.014	significant
User authentication systems integrated	7231.5	0.002	significant
Internal network configurations integrated	7492.5	0.004	significant
Intrusion detection and monitoring integrated	8228	0.091	Not significant
Wireless communications integrated	8756	0.465	Not significant
Digital communications integrated	7647	0.012	significant
Encryption software integrated	7833	0.034	significant
EDI—traditional integrated	8689.5	0.432	Not significant
EDI—web based integrated	8329	0.128	Not significant
Agent technologies integrated	8413	0.187	Not significant
Database search and retrieval integrated	9209.5	0.996	Not significant
Simulation software integrated	9201	0.986	Not significant
Flowcharting/data modeling integrated	8682	0.418	Not significant
Computer-aided systems (CAS) engineering tools integrated	9038.5	0.734	Not significant
Cooperative client/ server environment integrated	8806.5	0.389	Not significant
Workflow technology integrated	8636.5	0.386	Not significant
Database design and installation integrated	8732	0.462	Not significant
Test data integrated	8361.5	0.193	Not significant
Enterprise resource planning integrated	8642.5	0.347	Not significant
Application service providers integrated	9135.5	0.727	Not significant

Appendix C1: Factor Analysis for IT Alignment

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	2355.180
	df	595
	Sig.	.000

Communalities

	Initial	Extraction
Word processing	1.000	.651
Electronic spreadsheets	1.000	.670
E-mail	1.000	.616
Internet search and retrieval	1.000	.660
Image processing	1.000	.468
Electronic presentations	1.000	.526
Groupware	1.000	.388
Small business accounting software	1.000	.561
Tax return preparation software	1.000	.523
Time management and billing systems	1.000	.289
Electronic working papers	1.000	.521
Generalized audit software	1.000	.571
Embedded audit modules / Real-time audit modules	1.000	.491
Expert systems	1.000	.171
Firewall(software/ hardware)	1.000	.550
External network configurations	1.000	.424
User authentication systems	1.000	.427
Internal network configurations	1.000	.198

Intrusion detection and monitoring	1.000	.435
Wireless communications	1.000	.356
Digital communications	1.000	.452
Encryption software	1.000	.365
EDI—traditional	1.000	.435
EDI—web based	1.000	.245
Agent technologies	1.000	.299
Database search and retrieval	1.000	.260
Simulation software	1.000	.495
Flowcharting/data modeling	1.000	.578
Computer-aided systems engineering (CASE)	1.000	.239
Cooperative client/ server environment	1.000	.374
Workflow technology	1.000	.404
Database design and installation	1.000	.554
Test data	1.000	.520
Enterprise resource planning	1.000	.271
Application service providers	1.000	.312

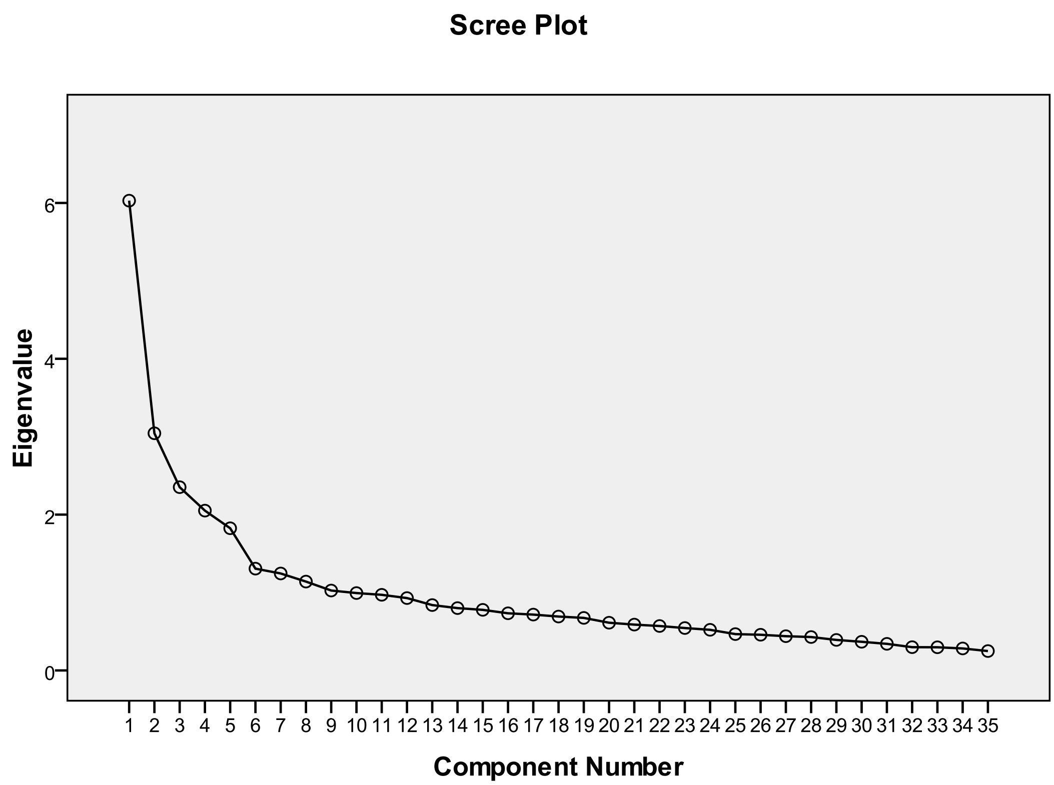
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.029	17.227	17.227	6.029	17.227	17.227	3.908	11.166	11.166
2	3.044	8.697	25.924	3.044	8.697	25.924	3.498	9.993	21.159
3	2.352	6.720	32.644	2.352	6.720	32.644	2.899	8.284	29.443
4	2.051	5.860	38.504	2.051	5.860	38.504	2.692	7.691	37.135
5	1.825	5.214	43.718	1.825	5.214	43.718	2.304	6.584	43.718
6	1.307	3.733	47.451						
7	1.244	3.555	51.006						
8	1.140	3.258	54.265						
9	1.026	2.930	57.195						
10	.993	2.838	60.032						
11	.971	2.773	62.806						
12	.929	2.654	65.459						
13	.839	2.397	67.856						
14	.800	2.286	70.142						
15	.778	2.222	72.363						
16	.734	2.096	74.459						
17	.717	2.048	76.507						
18	.692	1.976	78.483						
19	.674	1.927	80.410						
20	.612	1.750	82.160						
21	.588	1.681	83.840						
22	.570	1.629	85.469						
23	.544	1.555	87.024						
24	.521	1.490	88.514						
25	.466	1.332	89.846						
26	.458	1.309	91.155						
27	.440	1.256	92.411						
28	.429	1.225	93.635						

29	.392	1.119	94.754						
30	.368	1.051	95.805						
31	.341	.975	96.780						
32	.299	.853	97.633						
33	.297	.849	98.483						
34	.282	.807	99.289						
35	.249	.711	100.000						

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component				
	1	2	3	4	5
Digital communications	.579	.107	.256		-.177
User authentication systems	.568	.124		-.141	-.261
Firewall(software/ hardware)	.562	.206	.271	-.282	-.197
EDI—traditional	.547	-.157	.201	-.200	-.176
Flowcharting/data modeling	.540	-.504			.157
Database design and installation	.531	-.448	-.142	.224	
Electronic spreadsheets	.530	.267	-.333	.203	-.408
Electronic presentations	.514	.220	-.225	.291	-.279
Internet search and retrieval	.499	.457	-.231	-.113	.368
Intrusion detection and monitoring	.475	.176		-.392	-.146
External network configurations	.463	.251	.223	-.311	
Encryption software	.454		.246	-.177	-.259
Enterprise resource planning	.435	-.175	-.175		.137
Cooperative client/ server environment	.395	-.364	-.168	.111	.212
EDI—web based	.384	.216		-.191	.114
Database search and retrieval	.369	-.346			
Groupware	.367	.205	-.281		.364
Agent technologies	.366		.168	-.284	.237
Computer-aided systems engineering (CASE)	.358	-.275			.186
Time management and billing systems	.266	.264	-.245	-.138	.264
Simulation software	.427	-.543			
Test data	.404	-.510	-.199	.238	
E-mail	.417	.475	-.337		.321
Workflow technology	.412	-.430			.223

Application service providers	.377	-.381	-.142		
Tax return preparation software	.276	.186	.438	.417	.216
Internal network configurations	.136		.403	-.105	
Wireless communications	.398		.401	-.104	-.151
Word processing	.365	.395	-.398	.337	-.299
Expert systems	.226		.307	-.131	
Generalized audit software	.222	.175	.403	.523	.235
Embedded audit modules / Real-time audit modules	.175	.123	.436	.486	.139
Small business accounting software	.244	.199	.468	.474	.132
Image processing	.343	.324	-.104	-.178	.450
Electronic working papers	.346	.222	-.241	.349	-.414

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Flowcharting/data modeling	.740	.147			
Test data	.701			.147	
Database design and installation	.700			.222	
Simulation software	.660	.161	-.139		
Workflow technology	.605	.111		-.117	
Cooperative client/ server environment	.592		.144		
Application service providers	.522	.138			-.136
Database search and retrieval	.493	.125			

Computer-aided systems engineering (CASE)	.454		.126		
Enterprise resource planning	.436	.116	.243		
Firewall(software/ hardware)		.703	.171	.153	
Digital communications	.147	.592	.104	.205	.164
External network configurations		.580	.289		
Encryption software	.126	.573		.139	
Intrusion detection and monitoring		.572	.251	.126	-.165
EDI—traditional	.324	.569			
Wireless communications	.141	.544			.182
User authentication systems	.151	.521	.145	.334	
Agent technologies	.177	.367	.299	-.206	
Internal network configurations		.358	-.124	-.165	.165
Expert systems	.117	.348		-.147	.118
Internet search and retrieval		.154	.775	.173	
E-mail Alignment			.729	.281	
Image processing		.121	.666		
Groupware	.178		.584	.111	
Time management and billing systems			.526		
EDI—web based		.327	.365		
Word processing			.224	.773	
Electronic spreadsheets	.122	.197	.161	.768	
Electronic working papers Alignment				.712	
Electronic presentations Alignment	.163	.154	.157	.660	.124
Generalized audit software					.748
Small business accounting software		.138			.732
Tax return preparation software		.139	.102		.701

Embedded audit modules / Real-time audit modules					.695

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Component Transformation Matrix

Component	1	2	3	4	5
1	.567	.587	.403	.371	.182
2	-.760	.111	.510	.340	.187
3	-.208	.536	-.349	-.443	.593
4	.153	-.495	-.214	.439	.702
5	.186	-.332	.640	-.599	.295

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Appendix C2: Factor Analysis for Financial Resources

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.760
Bartlett's Test of Sphericity	Approx. Chi-Square	533.487
	df	21
	Sig.	.000

Communalities

	Initial	Extraction
hardware facilities for lecturers	1.000	.728
hardware facilities for students	1.000	.798
adequate software	1.000	.661
updated software	1.000	.490
network service	1.000	.667
support from technical staff	1.000	.651
upgrade hardware	1.000	.474

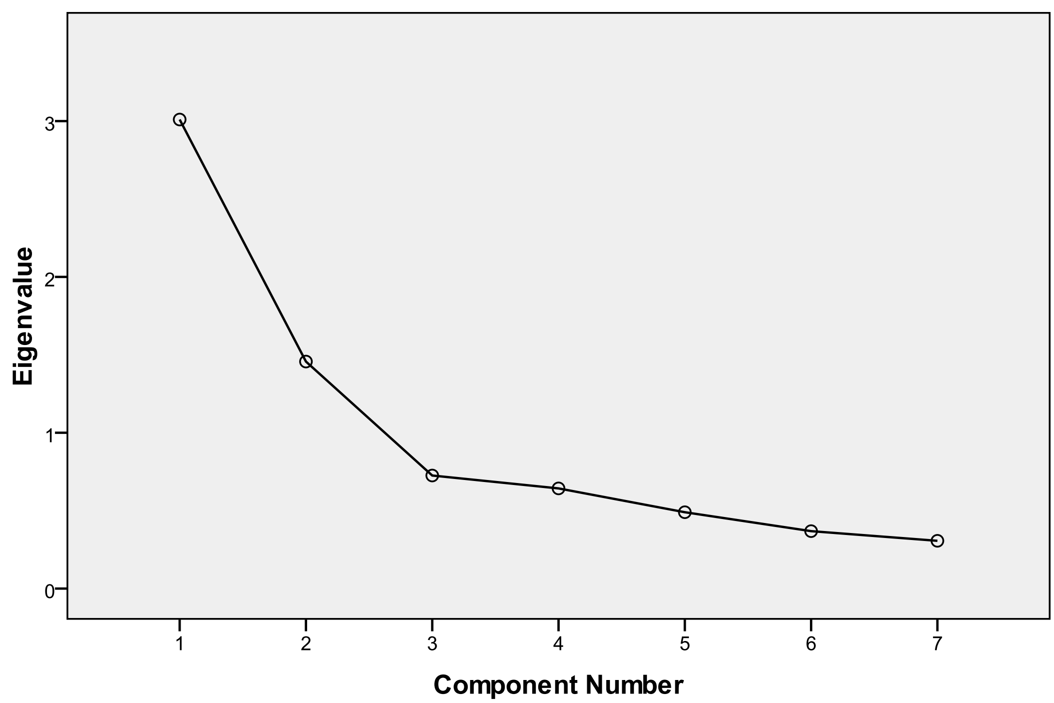
Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.010	43.000	43.000	3.010	43.000	43.000	2.240	31.994	31.994
2	1.457	20.811	63.811	1.457	20.811	63.811	2.227	31.817	63.811
3	.725	10.364	74.175						
4	.643	9.183	83.358						
5	.490	6.999	90.357						
6	.369	5.265	95.621						
7	.306	4.379	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix[a]

	Component	
	1	2
adequate software	.732	-.354
network service	.714	.395
hardware facilities for students	.704	-.549
support from technical staff	.670	.450
hardware facilities for lecturers	.641	-.562
updated software	.633	.297
upgrade hardware	.455	.517

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
support from technical staff	.792	.152
network service	.786	.222
upgrade hardware	.687	
updated software	.659	.235
hardware facilities for students	.113	.886
hardware facilities for lecturers		.851
adequate software	.270	.767

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.710	.704
2	.704	-.710

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Appendix C3: Factor Analysis for University /Faculty Support

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.735
Bartlett's Test of Sphericity	Approx. Chi-Square	2557.177
	df	45
	Sig.	.000

Communalities

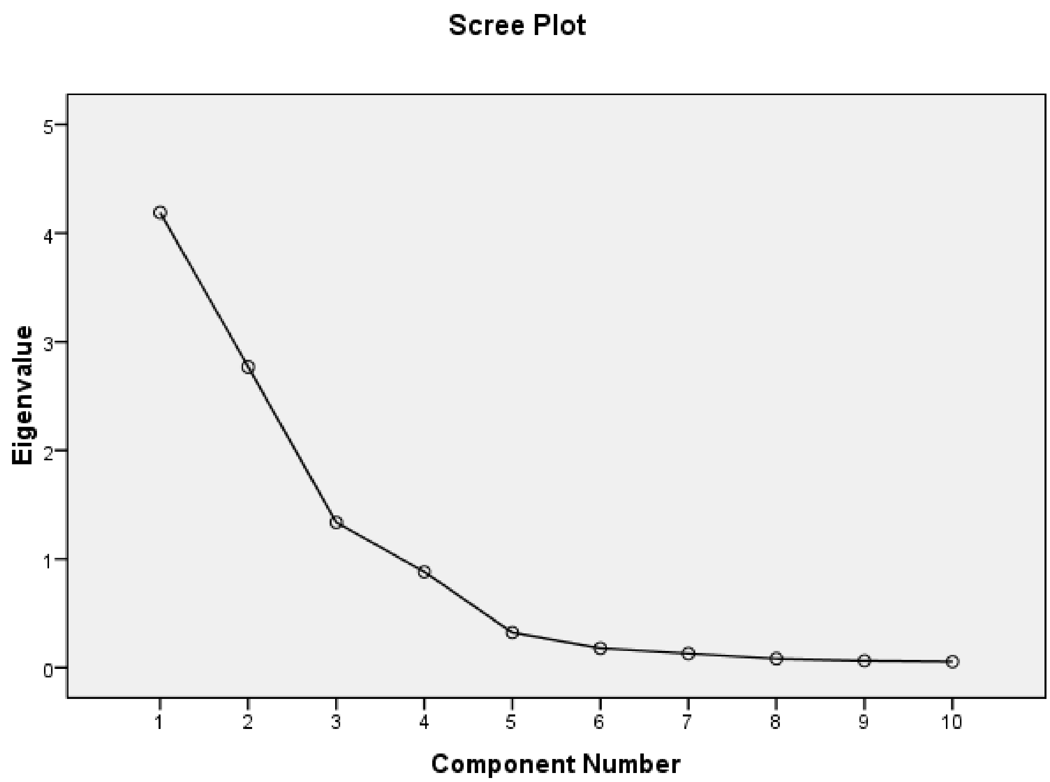
	Initial	Extraction
appreciated by head	1.000	.911
support by head	1.000	.895
appreciated by colleagues	1.000	.676
support by colleagues	1.000	.701
appreciated by students	1.000	.885
support by students	1.000	.856
effort of teaching IT	1.000	.740
university budget	1.000	.880
training for AIS sufficient	1.000	.888
training for AIS	1.000	.862

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.189	41.892	41.892	4.189	41.892	41.892	3.381	33.813	33.813
2	2.767	27.673	69.565	2.767	27.673	69.565	2.617	26.165	59.979
3	1.336	13.361	82.926	1.336	13.361	82.926	2.295	22.947	82.926
4	.881	8.811	91.737						
5	.322	3.222	94.959						
6	.176	1.764	96.723						
7	.129	1.288	98.011						
8	.082	.819	98.830						
9	.062	.624	99.454						
10	.055	.546	100.000						

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component		
	1	2	3
support by colleagues	.716	.433	
effort of teaching IT	.708	-.488	
appreciated by colleagues	.699	.431	
training for AIS sufficient	.692	-.630	.112
university budget	.681	-.641	
appreciated by head	.641	.329	-.627
support by head	.628	.349	-.616
training for AIS	.642	-.659	.123
support by students	.488	.590	.519
appreciated by students	.537	.579	.510

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix[a]

	Component		
	1	2	3
training for AIS sufficient	.939		
university budget	.934		
training for AIS	.928		
effort of teaching IT	.833		.196
appreciated by students		.937	
support by students		.923	
support by colleagues	.169	.648	.503
appreciated by colleagues	.160	.641	.490
appreciated by head	.105	.146	.937
support by head		.158	.929

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3
1	.671	.521	.527
2	-.728	.595	.340
3	.137	.612	-.779

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Appendix C4: Factor Analysis for Interest and Attitude of Academics toward IT Integration

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.824
Bartlett's Test of Sphericity	Approx. Chi-Square	784.851
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
academician aware of IT	1.000	.875
IT crucial	1.000	.875
academician receptive to learn IT	1.000	.828
academician apprehensive to learn IT	1.000	.565

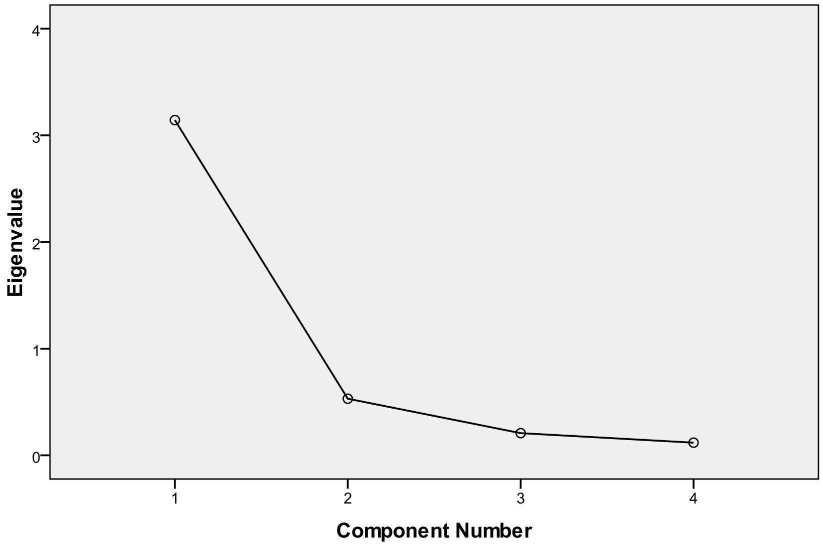
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.143	78.577	78.577	3.143	78.577	78.577
2	.531	13.266	91.843			
3	.208	5.195	97.038			
4	.118	2.962	100.000			

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix[a]

	Component
	1
IT crucial	.936
academician aware of IT	.935
academician receptive to learn IT	.910
academician apprehensive to learn IT	.752

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 C5: Factor Analysis for Market needs

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.766
Bartlett's Test of Sphericity	Approx. Chi-Square	381.587
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
IT important for work in industry	1.000	.416
IT important for work in government	1.000	.356
graduates with good IT skills get jobs easier	1.000	.628
graduates with good IT skills get good salary	1.000	.749
graduates with good IT skills success in their career	1.000	.581

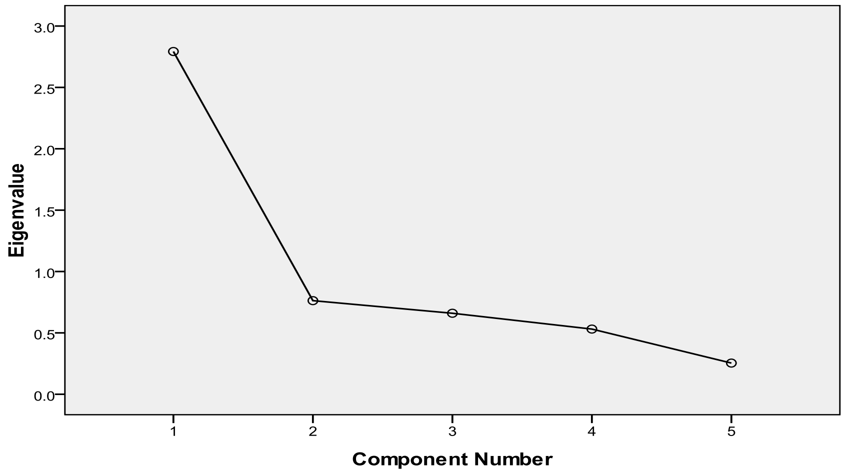
Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.730	54.599	54.599	2.730	54.599	54.599
2	.744	14.884	69.482			
3	.709	14.185	83.667			
4	.550	10.999	94.666			
5	.267	5.334	100.000			

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix[a]

	Component
	1
graduates with good IT skills get good salary	.865
graduates with good IT skills get jobs easier	.793
graduates with good IT skills success in their career	.762
IT important for work in industry	.645
IT important for work in government	.597

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 D1: The Output of Multiple Regression between System Design and Implementation (DV) And IT Satisfactory, Adequacy of Hardware and Software, University Policy, Colleagues and Student Support, Management Support, Interest and Attitude and Market needs Variables (IVs).

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	market needs, university policy, interest and attitude, IT satisfactory, colleagues , student support, adequacy hard, management support[a]	.	Enter

a. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.488[a]	.238	.216	.545	.238	10.761	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: system design and implementation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.368	7	3.195	10.761	.000[a]
	Residual	71.561	241	.297		
	Total	93.929	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: system design and implementation

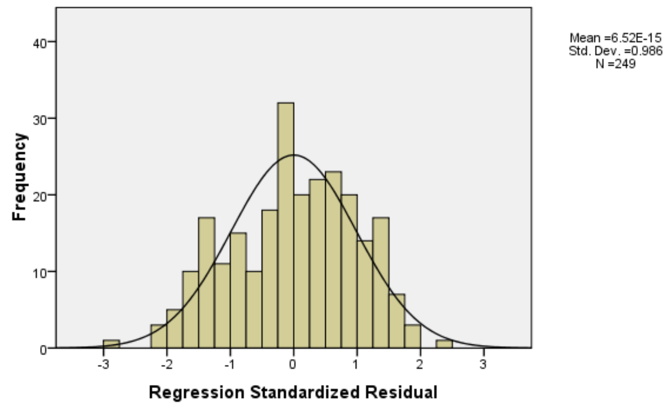
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.542	.578		6.126	.000		
IT satisfactory	.155	.069	.143	2.257	.025	.786	1.272
adequacy hard	.198	.094	.135	2.098	.037	.763	1.310
university policy	.173	.077	.131	2.227	.027	.912	1.097
colleagues, student support	.240	.059	.260	4.076	.000	.779	1.284
management support	-.016	.052	-.020	-.315	.753	.757	1.321
interest and attitude	.171	.078	.126	2.189	.030	.954	1.048
market needs	.209	.089	.135	2.356	.019	.957	1.045

a. Dependent Variable: system design and implementation

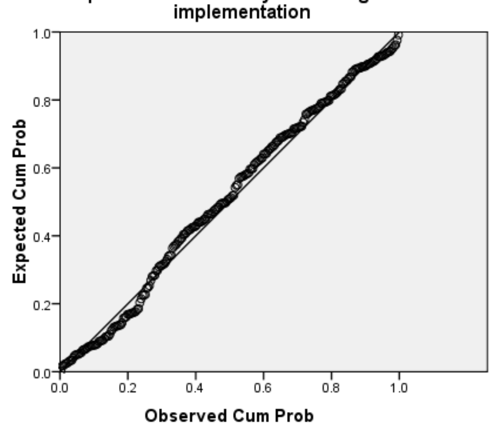
Histogram

Dependent Variable: system design and implementation



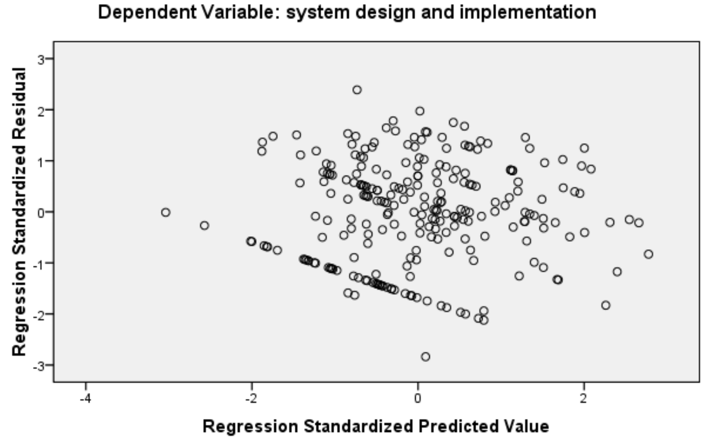
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: system design and implementation



Scatterplot

Dependent Variable: system design and implementation



Appendix D2: The Output of Multiple Regression between E-Commerce Technologies (DV) and IT Satisfactory, Adequacy of Hardware and Software, University Policy, Colleagues and Student Support, Management Support, Interest and Attitude and Market needs Variables (IVs).

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support[a]	.	Enter

a. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.556[a]	.309	.289	.545	.309	15.368	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: e-commerce technologies

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.980	7	4.569	15.368	.000[a]
	Residual	71.642	241	.297		
	Total	103.622	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: e-commerce technologies

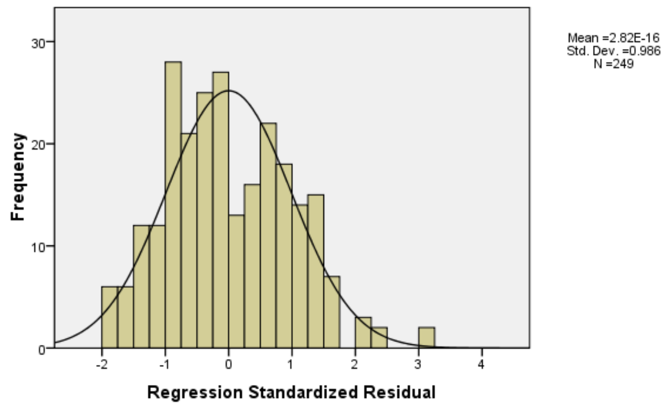
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	2.032	.578		3.513	.001		
IT satisfactory	.154	.069	.135	2.229	.027	.786	1.272
adequacy hard	.287	.094	.187	3.043	.003	.763	1.310
university policy	.193	.078	.140	2.487	.014	.912	1.097
colleagues, student support	.163	.059	.168	2.772	.006	.779	1.284
management support	-.003	.052	-.003	-.053	.958	.757	1.321
interest and attitude	.432	.078	.302	5.512	.000	.954	1.048
market needs	.211	.089	.130	2.368	.019	.957	1.045

a. Dependent Variable: e-commerce technologies

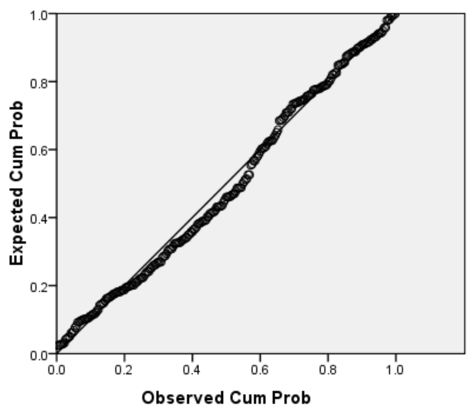
Histogram

Dependent Variable: e-commerce technologies



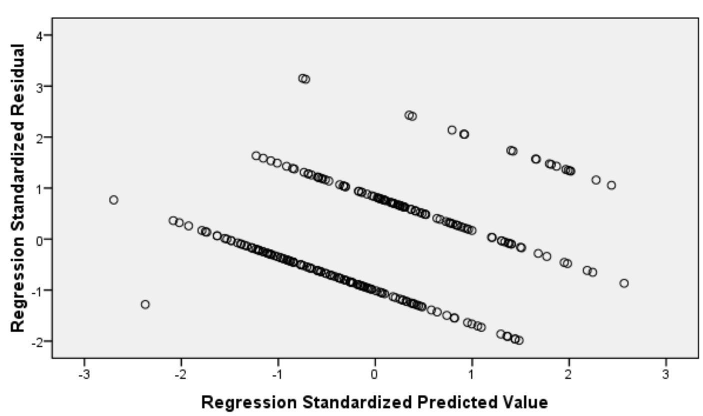
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: e-commerce technologies



Scatterplot

Dependent Variable: e-commerce technologies



Appendix D3: The Output of Multiple Regression between General Communication Technologies (DV) and IT Satisfactory, Adequacy of Hardware and Software, University Policy, Colleagues and Student Support, Management Support, Interest and Attitude and Market needs Variables (IVs).

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support[a]	.	Enter

a. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.456[a]	.208	.185	.667	.208	9.043	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general communication technologies

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.158	7	4.023	9.043	.000[a]
	Residual	107.200	241	.445		
	Total	135.357	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

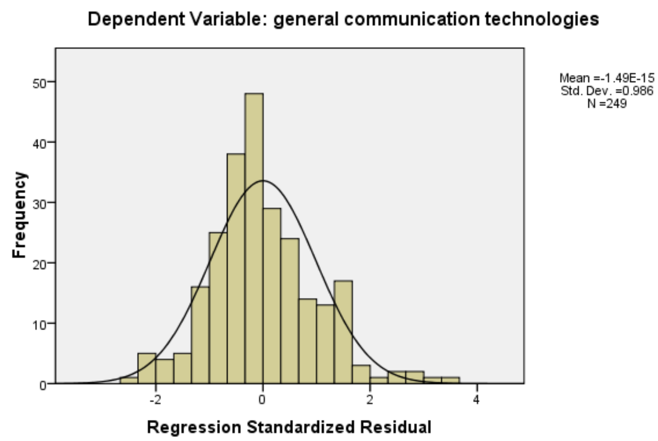
b. Dependent Variable: general communication technologies

Coefficients[a]

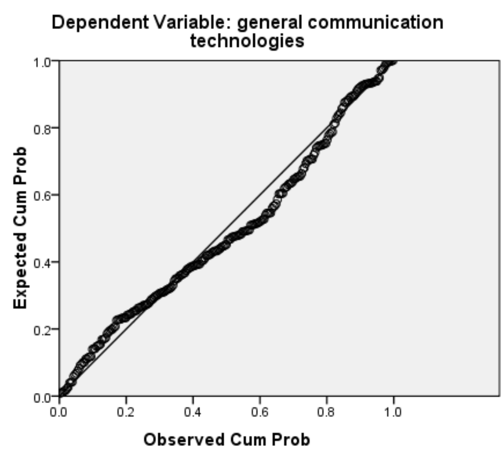
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.338	.708		4.718	.000		
IT satisfactory	.218	.084	.167	2.591	.010	.786	1.272
adequacy hard	.331	.116	.188	2.870	.004	.763	1.310
university policy	-.137	.095	-.087	-1.445	.150	.912	1.097
colleagues, student support	.012	.072	.011	.168	.867	.779	1.284
management support	.177	.063	.184	2.799	.006	.757	1.321
interest and attitude	-.046	.096	-.028	-.483	.629	.954	1.048
market needs	.384	.109	.207	3.529	.000	.957	1.045

a. Dependent Variable: communication technologies

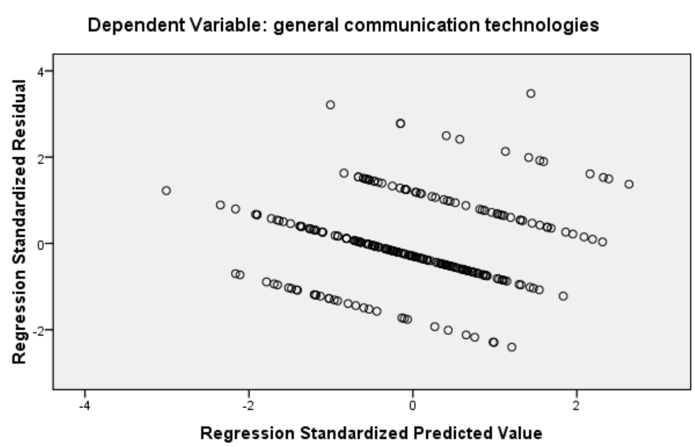
Histogram



Normal P-P Plot of Regression Standardized Residual



Scatterplot



Appendix D4: The Output of Multiple Regression between Office Applications Technologies (DV) and IT Satisfactory, Adequacy of Hardware and Software, University Policy, Colleagues and Student Support, Management Support, Interest and Attitude and Market needs Variables (IVs).

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support[a]	.	Enter

a. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.529[a]	.279	.258	.512	.279	13.343	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general office automation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.440	7	3.491	13.343	.000[a]
	Residual	63.060	241	.262		
	Total	87.501	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: general office automation

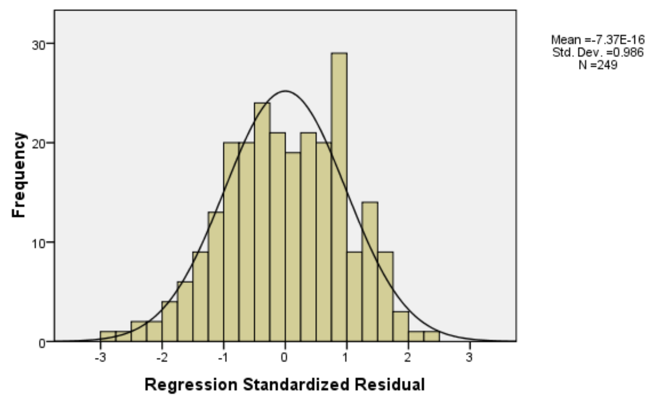
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.997	.543		7.366	.000		
IT satisfactory	.154	.065	.147	2.387	.018	.786	1.272
adequacy hard	.222	.089	.157	2.505	.013	.763	1.310
university policy	.207	.073	.163	2.841	.005	.912	1.097
colleagues, student support	.147	.055	.165	2.665	.008	.779	1.284
management support	.033	.049	.043	.687	.493	.757	1.321
interest and attitude	.197	.073	.150	2.683	.008	.954	1.048
market needs	.323	.083	.217	3.877	.000	.957	1.045

a. Dependent Variable: general office automation

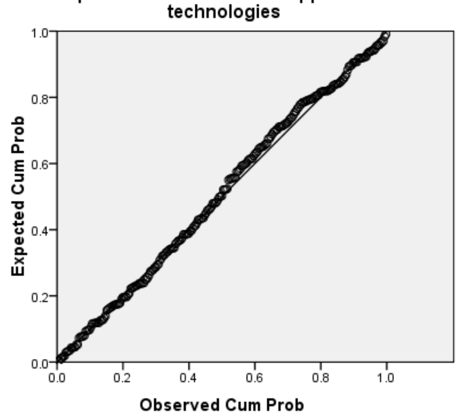
Histogram

Dependent Variable: office applications technologies



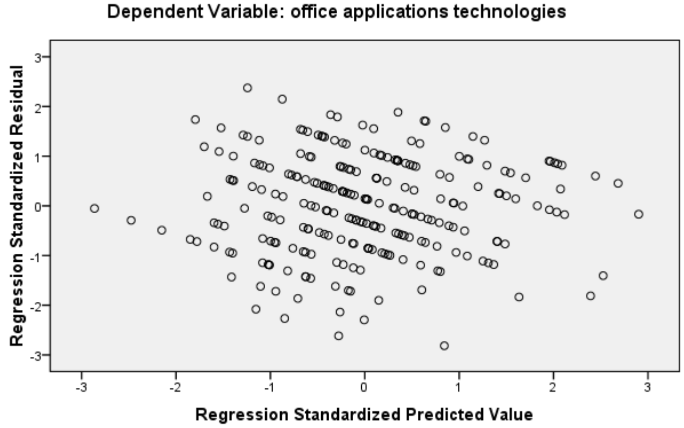
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: office applications technologies



Scatterplot

Dependent Variable: office applications technologies



Appendix D5: The Output of Multiple Regression between Accounting and Auditing Technologies (DV) and IT Satisfactory, Adequacy of Hardware and Software, University Policy, Colleagues and Student Support, Management Support, Interest and Attitude and Market needs Variables (IVs).

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support[a]	.	Enter

a. All requested variables entered.

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.383[a]	.147	.122	.575	.147	5.921	7	241	.000

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: accounting and audit automation.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.683	7	1.955	5.921	.000[a]
	Residual	79.566	241	.330		
	Total	93.249	248			

a. Predictors: (Constant), market needs, university policy, interest and attitude, IT satisfactory, colleagues, student support, adequacy hard, management support

b. Dependent Variable: accounting and audit automation.

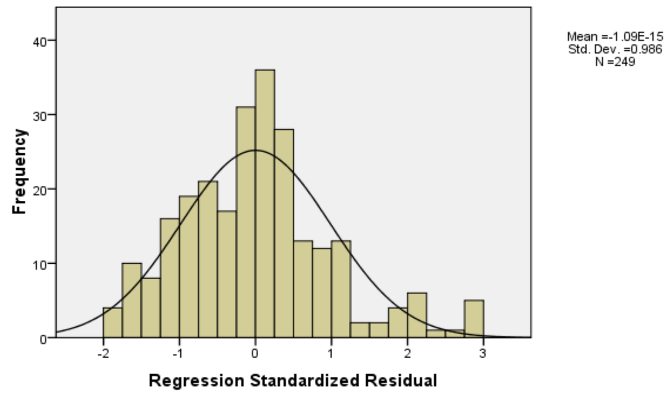
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	3.353	.610		5.500	.000		
IT satisfactory	-.009	.073	-.008	-.118	.906	.786	1.272
adequacy hard	.239	.100	.163	2.398	.017	.763	1.310
university policy	-.119	.082	-.091	-1.454	.147	.912	1.097
colleagues, student support	.206	.062	.224	3.328	.001	.779	1.284
management support	-.061	.055	-.076	-1.112	.267	.757	1.321
interest and attitude	.198	.083	.146	2.394	.017	.954	1.048
market needs	.275	.094	.179	2.935	.004	.957	1.045

a. Dependent Variable: accounting and audit automation.

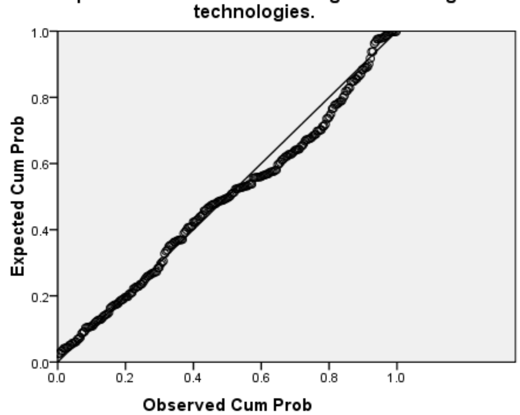
Histogram

Dependent Variable: accounting and auditing technologies.



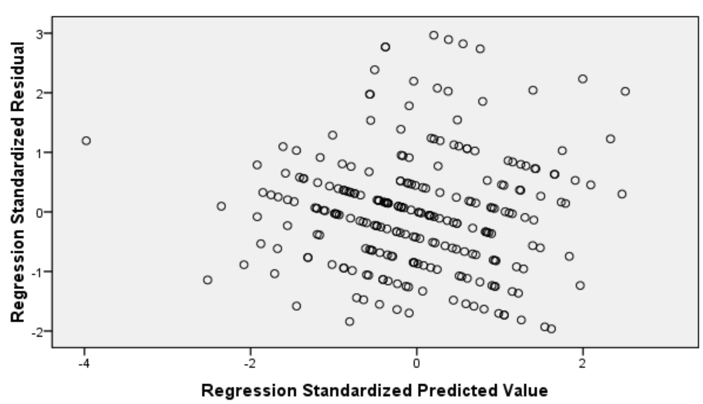
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: accounting and auditing technologies.



Scatterplot

Dependent Variable: accounting and auditing technologies.



Appendix E: Cluster Analysis for IT Alignment

Case Processing Summary[a,b]

Cases					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
249	100.0	0	.0	249	100.0

a. Squared Euclidean Distance used

b. Ward Linkage

Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	87	226	.000	0	0	15
2	109	217	.000	0	0	6
3	7	210	.000	0	0	14
4	18	194	.000	0	0	87
5	131	184	.000	0	0	88
6	70	109	.000	0	2	49
7	13	233	.003	0	0	48
8	188	198	.008	0	0	44
9	61	158	.013	0	0	45
10	111	113	.018	0	0	46
11	48	56	.023	0	0	117
12	166	182	.028	0	0	86
13	60	138	.033	0	0	47
14	7	192	.040	3	0	52
15	87	183	.046	1	0	91
16	234	244	.066	0	0	50
17	101	212	.086	0	0	43
18	90	93	.109	0	0	89
19	237	239	.140	0	0	108

20	72	215	.171	0	0	101
21	17	209	.202	0	0	105
22	36	201	.234	0	0	146
23	125	199	.265	0	0	124
24	42	181	.296	0	0	91
25	86	178	.327	0	0	64
26	1	173	.359	0	0	60
27	80	159	.390	0	0	104
28	116	117	.421	0	0	101
29	75	108	.452	0	0	61
30	43	92	.484	0	0	89
31	34	83	.515	0	0	66
32	73	81	.546	0	0	118
33	62	63	.577	0	0	133
34	21	229	.614	0	0	62
35	140	222	.650	0	0	143
36	120	214	.686	0	0	172
37	203	204	.722	0	0	186
38	31	176	.759	0	0	163
39	137	153	.795	0	0	151
40	118	127	.831	0	0	114
41	41	46	.867	0	0	129
42	14	35	.904	0	0	164
43	77	101	.945	0	17	116
44	76	188	.989	0	8	148
45	61	154	1.032	9	0	63
46	105	111	1.075	0	10	145
47	59	60	1.119	0	13	90
48	13	37	1.163	7	0	92
49	70	216	1.210	6	0	131
50	223	234	1.258	0	16	215
51	91	94	1.307	0	0	120
52	7	190	1.357	14	0	116
53	206	232	1.409	0	0	121

54	3	6	1.460	0	0	198
55	107	235	1.511	0	0	115
56	96	211	1.562	0	0	65
57	139	168	1.614	0	0	100
58	99	150	1.665	0	0	129
59	69	100	1.716	0	0	184
60	1	167	1.768	26	0	183
61	75	88	1.820	29	0	200
62	21	22	1.874	34	0	107
63	61	129	1.929	45	0	152
64	86	152	1.988	25	0	128
65	96	112	2.047	56	0	112
66	34	38	2.106	31	0	161
67	218	220	2.168	0	0	111
68	143	205	2.231	0	0	93
69	82	189	2.293	0	0	94
70	78	156	2.356	0	0	102
71	53	130	2.418	0	0	118
72	11	249	2.486	0	0	184
73	110	202	2.553	0	0	146
74	19	186	2.621	0	0	163
75	54	172	2.688	0	0	121
76	51	155	2.756	0	0	113
77	44	97	2.823	0	0	127
78	89	179	2.893	0	0	144
79	227	236	2.969	0	0	106
80	5	68	3.045	0	0	141
81	67	207	3.128	0	0	127
82	49	245	3.210	0	0	134
83	128	132	3.293	0	0	130
84	47	50	3.375	0	0	188
85	23	26	3.458	0	0	147
86	166	170	3.541	12	0	122
87	18	197	3.625	4	0	148

88	115	131	3.708	0	5	136
89	43	90	3.795	30	18	123
90	59	169	3.888	47	0	187
91	42	87	3.983	24	15	113
92	13	213	4.079	48	0	126
93	40	143	4.183	0	68	159
94	64	82	4.287	0	69	177
95	149	177	4.394	0	0	135
96	84	124	4.502	0	0	161
97	147	180	4.613	0	0	174
98	162	171	4.724	0	0	169
99	45	119	4.836	0	0	168
100	136	139	4.948	0	57	153
101	72	116	5.073	20	28	176
102	78	148	5.200	70	0	174
103	55	193	5.330	0	0	149
104	80	146	5.466	27	0	139
105	17	191	5.608	21	0	156
106	227	230	5.758	79	0	173
107	21	74	5.910	62	0	164
108	30	237	6.064	0	19	198
109	58	106	6.220	0	0	178
110	12	32	6.381	0	0	173
111	218	219	6.545	67	0	160
112	96	126	6.710	65	0	137
113	42	51	6.874	91	76	170
114	118	133	7.050	40	0	130
115	107	114	7.233	55	0	214
116	7	77	7.435	52	43	170
117	15	48	7.637	0	11	197
118	53	73	7.840	71	32	183
119	142	144	8.045	0	0	201
120	91	231	8.250	51	0	149
121	54	206	8.456	75	53	159

122	141	166	8.664	0	86	211
123	43	104	8.876	89	0	208
124	125	200	9.095	23	0	156
125	79	151	9.331	0	0	171
126	13	16	9.574	92	0	187
127	44	67	9.821	77	81	185
128	86	175	10.073	64	0	162
129	41	99	10.326	41	58	211
130	118	128	10.579	114	83	158
131	70	195	10.832	49	0	200
132	52	243	11.087	0	0	171
133	62	66	11.347	33	0	218
134	49	228	11.618	82	0	179
135	65	149	11.890	0	95	212
136	2	115	12.167	0	88	193
137	96	122	12.457	112	0	203
138	4	39	12.758	0	0	179
139	80	103	13.060	104	0	177
140	224	238	13.370	0	0	182
141	5	102	13.682	80	0	203
142	164	165	13.994	0	0	206
143	27	140	14.311	0	35	175
144	89	157	14.632	78	0	192
145	105	121	14.954	46	0	176
146	36	110	15.282	22	73	213
147	23	25	15.626	85	0	165
148	18	76	15.982	87	44	208
149	55	91	16.339	103	120	192
150	241	247	16.701	0	0	180
151	85	137	17.079	0	39	152
152	61	85	17.467	63	151	220
153	135	136	17.868	0	100	202
154	9	98	18.273	0	0	207
155	29	185	18.703	0	0	190

156	17	125	19.137	105	124	185
157	10	225	19.574	0	0	196
158	95	118	20.018	0	130	202
159	40	54	20.474	93	121	181
160	218	221	20.931	111	0	210
161	34	84	21.393	66	96	181
162	86	123	21.873	128	0	205
163	19	31	22.367	74	38	197
164	14	21	22.875	42	107	221
165	23	28	23.403	147	0	207
166	196	240	23.935	0	0	216
167	71	145	24.466	0	0	201
168	45	134	25.018	99	0	204
169	162	163	25.580	98	0	194
170	7	42	26.147	116	113	172
171	52	79	26.715	132	125	225
172	7	120	27.334	170	36	220
173	12	227	27.963	110	106	175
174	78	147	28.607	102	97	205
175	12	27	29.258	173	143	209
176	72	105	29.914	101	145	206
177	64	80	30.583	94	139	230
178	58	242	31.260	109	0	189
179	4	49	31.938	138	134	221
180	241	246	32.642	150	0	222
181	34	40	33.346	161	159	227
182	208	224	34.065	0	140	210
183	1	53	34.792	60	118	199
184	11	69	35.548	72	59	209
185	17	44	36.304	156	127	229
186	203	248	37.079	37	0	195
187	13	59	37.876	126	90	213
188	47	161	38.723	84	0	212
189	57	58	39.577	0	178	226

190	29	33	40.434	155	0	223
191	20	24	41.291	0	0	222
192	55	89	42.175	149	144	204
193	2	174	43.066	136	0	199
194	160	162	43.985	0	169	232
195	187	203	44.910	0	186	231
196	8	10	45.896	0	157	217
197	15	19	46.932	117	163	219
198	3	30	47.974	54	108	214
199	1	2	49.028	183	193	235
200	70	75	50.168	131	61	216
201	71	142	51.324	167	119	224
202	95	135	52.738	158	153	232
203	5	96	54.192	141	137	226
204	45	55	55.661	168	192	241
205	78	86	57.321	174	162	230
206	72	164	59.027	176	142	235
207	9	23	60.816	154	165	223
208	18	43	62.619	148	123	218
209	11	12	64.447	184	175	217
210	208	218	66.281	182	160	215
211	41	141	68.195	129	122	224
212	47	65	70.168	188	135	225
213	13	36	72.142	187	146	219
214	3	107	74.340	198	115	236
215	208	223	76.571	210	50	234
216	70	196	79.017	200	166	236
217	8	11	81.505	196	209	234
218	18	62	84.000	208	133	228
219	13	15	86.702	213	197	237
220	7	61	89.560	172	152	228
221	4	14	92.552	179	164	231
222	20	241	95.664	191	180	240
223	9	29	99.087	207	190	240

224	41	71	102.598	211	201	227
225	47	52	106.154	212	171	233
226	5	57	109.856	203	189	238
227	34	41	114.484	181	224	245
228	7	18	119.559	220	218	229
229	7	17	125.023	228	185	241
230	64	78	130.589	177	205	233
231	4	187	136.789	221	195	237
232	95	160	143.371	202	194	242
233	47	64	150.194	225	230	242
234	8	208	157.357	217	215	239
235	1	72	165.075	199	206	238
236	3	70	173.277	214	216	239
237	4	13	182.657	231	219	243
238	1	5	192.644	235	226	244
239	3	8	203.508	236	234	247
240	9	20	215.217	223	222	243
241	7	45	227.259	229	204	245
242	47	95	242.472	233	232	244
243	4	9	261.280	237	240	247
244	1	47	282.718	238	242	246
245	7	34	311.968	241	227	246
246	1	7	346.717	244	245	248
247	3	4	397.047	239	243	248
248	1	3	513.658	246	247	0

```
* * * H I E R A R C H I C A L   C L U S T E R   A N A L Y S I S * * *
*

 Dendrogram using Ward Method

                     Rescaled Distance Cluster Combine

   C A S E    0         5        10        15        20        25
  Label  Num  +---------+---------+---------+---------+---------+

          87   -+
         226   -+
         183   -+
          42   -+
         181   -+
          51   -+
         155   -+
         101   -+
         212   -+
          77   -+
           7   -+
         210   -+
         192   -+
         190   -+
         120   -+-+
         214   -+ |
          61   -+ |
         158   -+ |
         154   -+ |
         129   -+ |
         137   -+ |
         153   -+ |
          85   -+ |
          62   -+ |
          63   -+ |
          66   -+ |
          90   -+ |
          93   -+-+
          43   -+ |
          92   -+ |
         104   -+ +-+
         188   -+ | |
         198   -+ | |
          76   -+ | |
          18   -+ | |
         194   -+ | |
         197   -+ | |
          44   -+ | |
          97   -+ | |
          67   -+ | |
         207   -+-+ +-------+
          17   -+   |       |
         209   -+   |       |
         191   -+   |       |
         125   -+   |       |
         199   -+   |       |
```

```
200   -+   |       |
 45   -+   |       |
119   -+   |       |
134   -+   |       |
 89   -+---+       |
179   -+           |
157   -+           |
 55   -+           |
193   -+           +-+
 91   -+           | |
 94   -+           | |
231   -+           | |
143   -+           | |
205   -+           | |
 40   -+           | |
206   -+           | |
232   -+           | |
 54   -+           | |
172   -+           | |
 34   -+           | |
 83   -+           | |
 38   -+           | |
 84   -+-----------+ |
124   -+             |
142   -+             |
144   -+             |
 71   -+             |
145   -+             |
166   -+             |
182   -+             |
170   -+             |
141   -+             |
 41   -+             |
 46   -+             |
 99   -+             |
150   -+             |
 58   -+             |
106   -+             +---------------------------------+
242   -+             |                                 |
 57   -+             |                                 |
 96   -+             |                                 |
211   -+---+         |                                 |
112   -+   |         |                                 |
126   -+   |         |                                 |
122   -+   |         |                                 |
  5   -+   |         |                                 |
 68   -+   |         |                                 |
102   -+   |         |                                 |
  1   -+   |         |                                 |
173   -+   +---+     |                                 |
167   -+   |   |     |                                 |
 73   -+   |   |     |                                 |
 81   -+   |   |     |                                 |
 53   -+   |   |     |                                 |
130   -+-+ |   |     |                                 |
131   -+ | |   |     |                                 |
184   -+ | |   |     |                                 |
```

```
115   -+ | |   |     |                                  |
  2   -+ +-+   |     |                                  |
174   -+ |     |     |                                  |
164   -+ |     |     |                                  |
165   -+ |     |     |                                  |
 72   -+-+     |     |                                  |
215   -+       |     |                                  |
116   -+       |     |                                  |
117   -+       |     |                                  |
111   -+       +-----+                                  |
113   -+       |                                        |
105   -+       |                                        |
121   -+       |                                        |
162   -+       |                                        |
171   -+       |                                        |
163   -+-+     |                                        |
160   -+ |     |                                        |
139   -+ |     |                                        |
168   -+ +---+ |                                        |
136   -+ |   | |                                        |
135   -+ |   | |                                        |
128   -+-+   | |                                        |
132   -+     | |                                        |
118   -+     | |                                        |
127   -+     | |                                        |
133   -+     | |                                        |
 95   -+     | |                                        |
 79   -+     +-+                                        |
151   -+     |                                          |
 52   -+     |                                          |
243   -+-+   |                                          |
149   -+ |   |                                          |
177   -+ |   |                                          |
 65   -+ |   |                                          |
 47   -+ |   |                                          |
 50   -+ |   |                                          |
161   -+ |   |                                          |
 82   -+ +---+                                          |
189   -+ |                                              |
 64   -+ |                                              |
 80   -+-+                                              |
159   -+ |                                              |
146   -+ |                                              |
103   -+ |                                              |
 86   -+ |                                              |
178   -+ |                                              |
152   -+ |                                              |
175   -+ |                                              |
123   -+-+                                              |
147   -+                                                |
180   -+                                                |
 78   -+                                                |
156   -+                                                |
148   -+                                                |
234   -+                                                |
244   -+                                                |
223   -+                                                |
```

```
218   -+-+                                             |
220   -+ |                                             |
219   -+ |                                             |
221   -+ |                                             |
224   -+ |                                             |
238   -+ |                                             |
208   -+ +-+                                           |
 10   -+ | |                                           |
225   -+ | |                                           |
  8   -+ | |                                           |
140   -+ | |                                           |
222   -+ | |                                           |
 27   -+-+ |                                           |
227   -+   |                                           |
236   -+   |                                           |
230   -+   |                                           |
 12   -+   |                                           |
 32   -+   +---------------+                           |
 69   -+   |               |                           |
100   -+   |               |                           |
 11   -+   |               |                           |
249   -+   |               |                           |
107   -+   |               |                           |
235   -+   |               |                           |
114   -+-+ |               |                           |
  3   -+ | |               |                           |
  6   -+ | |               |                           |
237   -+ | |               |                           |
239   -+ +-+               |                           |
 30   -+ |                 |                           |
196   -+ |                 |                           |
240   -+ |                 |                           |
 75   -+-+                 |                           |
108   -+                   |                           |
 88   -+                   |                           |
109   -+                   |                           |
217   -+                   |                           |
 70   -+                   |                           |
216   -+                   |                           |
195   -+                   |                           |
 48   -+                   |                           |
 56   -+                   |                           |
 15   -+                   +---------------------------+
 31   -+                   |
176   -+                   |
 19   -+                   |
186   -+---+               |
 36   -+   |               |
201   -+   |               |
110   -+   |               |
202   -+   |               |
 60   -+   |               |
138   -+   |               |
 59   -+   |               |
169   -+   |               |
 13   -+   +---+           |
233   -+   |   |           |
```

```
 37   -+    |   |           |
213   -+    |   |           |
 16   -+    |   |           |
203   -+    |   |           |
204   -+    |   |           |
248   -+-+  |   |           |
187   -+ |  |   |           |
 14   -+ |  |   |           |
 35   -+ +--+   |           |
 21   -+ |      |           |
229   -+ |      +-----------+
 22   -+ |      |
 74   -+-+      |
 49   -+        |
245   -+        |
228   -+        |
  4   -+        |
 39   -+        |
241   -+        |
247   -+        |
246   -+---+    |
 20   -+   |    |
 24   -+   |    |
 29   -+   +----+
185   -+   |
 33   -+   |
  9   -+---+
 98   -+
 23   -+
 26   -+
 25   -+
 28   -+
```