

Association of information technology and internal controls of Iranian state agencies

Iranian state agencies

Mohammad Reza Abbaszadeh
*Faculty of Economics and Business Administration,
Ferdowsi University of Mashhad, Mashhad, Iran*

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Mahdi Salehi
*Department of Economics and Administrative Sciences,
Ferdowsi University of Mashhad, Mashhad, Iran, and*

Seyed Masoud Faiz
*Department of Accounting, Birjand Branch, Islamic Azad University,
Birjand, Iran*

Abstract

Purpose – This study aims to investigate the relationship between information technology and internal controls of state agencies in Iran.

Design/Methodology/Approach – The research population includes all auditors and managers working in public sector. Data collection instrument is a questionnaire designed by the researcher and administrated during March 5, 2016. The collected data are analyzed through descriptive and inferential statistics (binomial test).

Findings – The findings of the research show that there is a significant relationship between information technology and internal controls (administrative, financial and accounting controls, risk assessment, information and communication, control activities and monitoring). Moreover, the alteration of data collection methods (from traditional to modern) and the written instructions (in information technology) have a positive effect on the internal control and its subscales.

Originality/value – With regard to the emphasis on the development of computer application and the use of new processing facilities and the exchange of information and its specific controlling consequences, this is an innovative research.

Keywords Iran, Internal control, Information technology

Paper type Research paper

1. Introduction

Today, with the rapid growth of information technology (IT), the use of computers and other electronic equipment in organizations has increased quickly. Internal networks and systems connected to a central computer or server distribute information a large number of users. A large volume of information and data is transferred and processed in organizations with the contribution of IT, and in case of the absence of proper monitoring and control, it will be associated with some risks (Forghandust and Salehi, 2005). The weakness of internal controls system is one of the main problems of the vast majority of private and state economic entities. Each year, these entities and consequently the economy of the country incur significant losses and suffer heavy damage due to the weakness of internal controls. Meanwhile, due to the changes that are expected to occur in the structure and economic



relations of the economic entities around the world and within the country in near future, the importance of the matter and the need to emphasize it increase more and more (Nemat Pajooh, 2002).

The increasing use of computers and the remarkable progress of IT since the early 1980s have significantly affected all aspects of organizations activities. Certainly, one of the consequences of this unique and unprecedented development in IT has got to emerge in the field of controls. As the managers in charge of leading the organizations try to achieve success and such an achievement will be actually impossible without the establishment of an appropriate structure of internal controls, the new risks that have emerged through modern IT have made it necessary to look into the way of the establishment of the elements and the structure of organizations internal controls once again. It also refers to the effects of new IT on different areas of organizations and investigates the controlling effects of new risks resulting from the use of IT (Arab Mazar Yazdi, 2001).

2. Theoretical framework

2.1 Internal control

Internal control is an integral component in governing the organization affairs that will provide reasonable assurance of achieving the organization's objectives (Karbasi Yazdi, 2005). Internal control is an important part of managing an organization that includes applicable projects, methods, and techniques to achieve tasks, objectives, and goals. In other words, it is supporting the management based on performance and is the first defensive line used to protect assets, and to prevent and detect errors and fraud (Abbasszadeh *et al.*, 2011). Internal control is the process that is designed by the board of directors, management and other personnel to reasonably ensure achieving the goals in three groups (operational, reporting, and compliance) and to improve their performance. Organizations need to develop and expand their internal control systems effectively and efficiently to support their maintenance and improvement. An effective internal control system is greatly dependent on its policies, procedures, and agreements more than anything else. This requires the use of judgment. Using their own judgment, the board of directors and management decide what extent of control is sufficient. According to the working group definition of sponsoring organizations of Tread way, internal control consists of five integrated elements including control environment, risk assessment, control activities, information and communication and monitoring activities (Rahimian, 2013).

2.2 Control environment

Control environment is a set of standards, processes and structures that provide the basis for the implementation of internal controls in the organization. Board of directors and senior management create internal controls based on their importance at all levels of the organization. The controls include the expected standards to direct the actions. Management reinforces the expectations of different levels of the organization. Control environment includes integrity and ethical values of the organization; factors that enable the board of directors to carry out the responsibilities of leadership, organizational structure and delegation of authority and responsibility, to attract, develop and retain competent personnel, to protect properties and documents adequately, to improve performance metrics and to develop incentives and rewards and accountability for performance. Control environment achievements have an overall impact on the whole internal control system. In summary, it can be stated that the control environment is an environment in which organizations operate and is in fact the foundation of all other components of the control system. In the control environment, the staff qualification is considered as the proper

functioning of the internal control process. Everyone in the organization must be bound to work commitment and follow the policies and procedures of the organization. Initiatives and practices held in human resource management can affect the mindset of the staff positively and lead to the improved control environment (Forghandust and Salehi, 2005).

2.3 Risk assessment

Every organization faces various risks, including external and internal risks. Risk assessment is a dynamic and continuous process for the identification and assessment of the risks that arise on the way to achieve the goals and it deals with a variety of strategic financial and information risks particularly the ones related to automation systems and cost-benefit analysis of the establishment of an internal control system. Risk assessment requires that the management take into account the possible changes in the external environment and business model that can neutralize the internal controls (Rahimian, 2013 and Arab Mazar Yazdi, 2001). According to Forghandust and Salehi (2005) three steps are essential in the risk assessment:

- (1) determining the organization goals which are the prerequisites for internal controls;
- (2) identifying major risks including mistakes, delays and frauds; and
- (3) analyzing risks so that the more important ones could be identified and the necessary measures could be taken about them.

2.4 Control activities

Control activities are actions for policies and approaches which help to ensure that management guidelines are being run to reduce the risk of achieving the objectives. Control activities are developed at all levels, at different stages of business process and at IT environment. Control activities can be preventive or detective and include manual and mechanical activities such as licensing and approval, handling, reconciliation and review of business performance. Basically, separation of duties between the organization staff is formed during the selection and development of internal control and if the separation of duties is not practical, the management will choose and use other control methods. Information system control is an example of control activities which is divided into two groups: general control and applied control. General control is mainly associated with organizing information system environment, creation, maintenance, development, and documentation of applied systems and computer operations which affect all applications and applied control is established for each computer application system such as shopping, paying, forecasting and monitoring the budget and is studied and evaluated in relation to the same specific application. Applied control includes control of input, processing and output reports and ensures that the valid data are fully and accurately processed and the processing results are reported (Forghandust and Salehi, 2005).

Effective control activities must comply with the following principles (Noorvee, 2006):

- *The elements of a control activity:* Policies and procedures are established and notified at all levels and among units that allow the implementation of management guidelines.
- *Control activities are related to risk assessment:* Measures to address the risks of achieving financial reporting objectives have been established.

- *Selection and expansion of control activities*: Control activities are chosen and developed with regard to their costs and potential effectiveness in reducing the risks of achieving financial reporting objectives.
- *IT*: IT controls are designed and developed, where appropriate, to support the achievement of the objectives of financial reporting.

2.5 Information and communication

Information is essential to achieve the objectives and to implement internal control responsibilities. Management derives some information from internal and external sources to support, evaluate and monitor the tasks of other components of internal control. Communication is the continuous and iterative process to offer, share, and obtain necessary information. Internal communication is a tool by which information in the organization flows into high and low levels and spreads throughout the organization. Moreover, employees can receive information and messages directly from the senior management. External communications provide information for the internal communications of the organization, on the one hand, and provide some information in response to the needs and expectations of people outside the organization, on the other hand (Rahimian, 2013). Information and communication deal with the issues such as how to insert the data, method to access computer files and to update them, data processing, preparation of information and reports and how to make trades (Arab Mazar Yazdi, 2001).

Effective communication requires a proper flow of information; and relevant and reliable information from internal and external sources should be collected, stored and processed and should be available to the competent authorities in an appropriate form and within the specified time. Therefore, to assess the internal controls, it is necessary to investigate related information and communication systems in terms of quality (Forghandust and Salehi, 2005).

2.6 Monitoring activities

Monitoring activities include regular assessments, individual assessments or some combination of the two types of assessment used to determine that there are some controls over each of the five components of internal control which affect the principles available for each component. Continuous assessment is done at different levels of organizations or business to collect the necessary information at the right time. Individual assessments are done periodically with different amplitudes and frequencies and according to the management considerations. The results of the monitoring activities are evaluated based on various criteria and are reported to the board of directors if necessary.

2.7 Information technology concept

IT is one of the most complicated terms of the present era. The term was used for the first time in 1958 to express the role of computer in supporting decision making and processing information in organizations (Sarafrazi, 2011). For an accurate definition of IT, it is better to study it in both structural and functional levels. In structural definition, IT is the tool for working on information (both data and knowledge), processing, storing, and transmitting information. From the structural perspective, due to its nature of variability and flexibility, IT will ease and facilitate procedures and processes and will provide the field to achieve or not to achieve the objectives.

In today's world based on performance, IT has caused alteration and evolution of traditional structures, has created various spaces and capabilities in the business environment, and has caused profound changes in the missions and goals of the organization.

Information and communications technology of the systems is the IT of hardware, software and communications networks, especially high-tech equipment (Momeni, 2001). Computer and telecommunications are the axis of IT. Computer basically does the processing and the accumulation of information and telecommunications make it possible to broadcast and distribute the information over a wide area (Davarpanah, 2002). Moreover, IT includes research, design, development, implementation, support or management of information systems based on computers. On the other hand, technology supports activities such as creation, storage, usage and communication of information, along with their related procedures and user management (Dawra, 2003). In fact, IT refers to a set of tools, techniques, and methods of storage, processing, dissemination, and production that are performed by relying on mechanical and computerized processing (Doroudi, 2010).

2.8 The role of information technology in organizations' internal control advantages

The presence of computers in organizations during the past two decades of the twentieth century developed dramatically. At this time, the rapid growth of microprocessors and memory addressing capability of memory by the microprocessors and consequently the high quality of data processing made it possible to use the most advanced software capabilities in data input, their processing, and presenting the data. In addition, the relatively low cost of this technology with regard to its quality in comparison with other products and services caused an outbreak of using it in administrative and financial affairs and information flow in organizations. In addition to the technological development and production of silicon chips and microprocessors and their reasonable prices, the computer peripherals have also developed and their effects on the development and progress of information systems can be observed in the following cases (Arab Mazar Yazdi, 2001).

2.9 Diversity of data input equipment

Today, there are different means to input data into the computers. For example, if in the past such information as name, date of employment and employees' salary could be stored in the computer, today the finger print, voice samples, and the signature of individuals can be stored as well.

2.9.1 Tool to archive and store data. Today, a large collection of different media with different capacities is available to store and maintain the compressed data with different capacities that can be provided for the users with reasonable costs.

2.9.2 Diversity of data output equipment. Today, there are different kinds of output devices with high quality to display output data such as printers, plotter and film producer out of documentations. Aria (2006) has studied the role of IT and has stated that IT can provide good solutions in compliance with the increase of efficiency to help reduce strategic costs. These solutions are provided in three areas, including optimization of reliance on internal control systems with optimum utilization of applied control of computer systems (Aria, 2006).

The use of IT might affect all five components of internal control associated with the realization of the objectives of financial, operational, or compliance reporting, and operational parts or nonoperational functions. Furthermore, the use of IT will affect the early stages, identification and collection, processing and report of transactions. In a manual system, the organization makes use of procedures and records manually in a paper format. In such systems, controls are manual too, and might include procedures such as approval

and review of activities, reconciliation, and tracking open items. Alternatively, an organization might have information systems that make use of automated procedures to start, identify, collect, process, and report transactions. In this case, records in electronic formats replace paper deeds and documents such as purchase orders, sales invoices, shipping documents, and accounting records. Systems that benefit from IT make use of a combination of automatic and manual controls. Furthermore, manual records may be independent of IT and use produced data of IT or may be limited to monitoring the effective functioning of IT sector and related controls and dealing with the exceptions. The combination of manual and automated controls will be different according to the nature and complexity of the use of IT. IT might be followed by the increase of efficiency and effectiveness of the organization internal control because it provides the following features for the organization (Maham, 2002):

- uniform implementation of rules and performance of complex calculations in processing a large volume of transactions and data;
- promoting timeliness, accessibility and accuracy of data;
- facilitating further analysis of information;
- improving the ability to monitor the performance of the organization's activities and its policies and procedures;
- reducing the control risk of breaching controls; and
- enhancing the effective segregation of duties by implementing security controls in the applied software, databases and operating systems.

Rapid expansion of commercial applications of computers might have affected independent accounting more than any other event in the history of this profession. In addition to the development of the area of expertise of professional accountants, computer has increased the extent and value of their services, as well. Today, computer has made it possible to provide information that was not possible in the past due to the required time and cost. New computer systems process information and activities faster and more accurately than the early computers and act more quickly in the capture and extradition of information. Many advanced systems have made it possible for the users to access to large databases from remote locations. These systems process all activities one by one and with high efficiency and at the same time update accounting records. Some systems run activities automatically with little or no human intervention (Meigs, 2009).

2.10 Risks

Although IT has provided a unique position to solve the tactical and strategic problems of the companies, it is a serious threat to the issue of internal controls and endangers the credibility of accounting information systems (Forghandust and Salehi, 2005). Risks in internal control that are affected by IT include (Maham, 2002):

- reliance on systems or programs that do wrong processing, process wrong data, or both;
- unauthorized access to data that may lead to data loss or incorrect changes of data;
- unauthorized changes in systems or programs;
- lack of the necessary reforms in the systems or programs;
- improper manual intervention; and
- the possibility of losing data for various reasons.

Organizations rely on the IT department in areas such as doing business, communication and processing financial information. When IT is not designed properly or is not controlled in an appropriate manner, the organization may be at risk of fraud. Today, the computer systems that are connected to national and international networks are exposed to common threats in cyberspace and threats that may lead to numerous financial and information losses. IT is an important component of the risk management process; especially when the risk of fraud is on the agenda. IT risks include the threats to the integrity and continuity of information and threats to sensitive financial information associated with the organization business. IT risks in any way, such as computer intrusion, economic intelligence, transformation, misappropriation of information, viruses, unauthorized access to information and other IT fraud risks, may affect everyone (Bahrami, 2013).

Organizations' information systems, particularly after the growth of IT and development of automation systems, have faced various risks which are mainly associated with hardware and software aspects of the systems and among which the following can be pointed out: hardware failure; telecommunications lines and power outage; and undetectable errors in data transfer (Arab Mazar Yazdi, 2001).

3. Literature review

DeFond and Lennox (2015) showed in a research that PCAOB inspection would improve the quality of internal control system by reducing the defects of internal control audits.

Hsu (2015) showed in a research that revision of financial supervision rules and regulations is necessary to be used for internal control and audits at financial institutions.

Chang *et al.* (2014) developed an internal control framework in a research that would be applicable in the enterprise resource planning system (ERP). At first, the literature review was conducted to examine the necessary internal control forms in IT systems. Then, the control standards for internal control framework were built. Case study was conducted to examine the feasibility of the produced framework. They suggested a 12-dimensional framework with 37 controls to help the auditors carry out effective audit by examining necessary internal control points in ERP systems. The proposed framework will allow firms to increase the productivity of IT audit and to reduce the control risk. In addition, companies that refer to this framework and consider the limitations of their own IT management can make a better IT management mechanism.

D'Aquila and Houmes (2014) showed that as state agencies are always expected to improve their operations and apply new technologies, a strong emphasis is, therefore, on internal control tools that can be moderated for such needs and changes.

Wang and Huang (2013) showed that accurate financial statements are very important to regulators, auditors and investors to understand the status of a company. CFO turnover and internal financial controls play an important role in recognizing the quality of financial reports. The relationship between CFO turnover and internal controls was examined and it was concluded that companies with fewer internal controls are more likely to end up their financial micro activities. Moreover, they will have profits with lower quality. This study mainly tried to examine how the companies that have CFO turnover with lower internal control can affect the quality of their profits by changing their own controls.

Otetee *et al.* (2013) showed that as the level of financial and operational accountability increases, the controlled concepts and objectives and components of internal control will be adjusted accordingly. Some of the components of internal control such as information and communication and control methods at non-governmental activities of the state and large organizations of public sector are very different from commercial activities, but in some

components such as the control environment and risk assessment and monitoring the differences do not seem to be so significant.

Asare et al. (2012) interpreted in a research previous studies on the assessment of internal controls over financial reporting (ICOFR) that was considered under Sarbynz-Auksly rule. According to auditing standard No.5, five stages of internal control audit associated with financial reporting were identified including:

- (1) planning;
- (2) objective;
- (3) testing;
- (4) evaluation; and
- (5) reporting with regard to auditor's specifications, customer's specifications, interaction between auditor and customer, job and environment characteristics.

The key characteristics of the research included classification of the internal control audit activities associated with financial reporting, model designer determining the performance for each activity, evaluation of audit performance in the desired classification, emphasis on the findings and vacuum in caring for legislators and creating roadmaps for future research. However, reports in the professional literature point out that there is not always a harmonious relationship between these two tasks. This article shows the first phase of a.

Steinbart et al. (2012) showed that information security staff design various research programs that are designed to investigate the nature of relationship between the functions of information security and internal audit. The article presents the results of a series of relatively structured interviews with profession of information systems and internal auditors, describes the potential benefits that can be derived from the relationship and provides suggestions as guidelines for future research.

Austin (2011) showed in a research that internal auditors play an important role in evaluating organizational controls by making comments about university internal controls and reviewing their compliance with COSO.

Stoel and Muhanna (2011) showed that internal control of IT is a strategic need.

Petrovist, Shakespeare and Shih (2011) showed that if internal controls in public sector are not weak and are built up strongly, they will result in providing reliable financial reports.

Abdolmohammadi and Boss (2010) surveyed the ratio of IT audits carried out during 2003-2009. His research results showed that during the six years, the annual average time spent on IT auditing has increased by almost 1 per cent; the results also showed that there is a relationship between the auditor's certificate of the information systems and the time spent on IT audit by the internal auditor.

Altamuro and Beatty (2010) showed that the current financial crisis reveals the economic community's need to an internal control law in public sector with a strong legal backing.

Noorvee (2006) showed that the development of internal control system in smaller companies with fewer staff is easier, and personal communication in such companies is more than public communication. Furthermore, in fast growing firms, the managers primarily pay more attention to the growth and development of accounting and less to the internal development of the company's management and control systems.

Chi Chen (2003) concluded in their study that the internal audit affected the performance of Taiwanese companies, and there was a direct relationship between the rate of impact and

the poor performance of the company's board of directors. It also has played an important role in the control of senior managers who are independent and professional.

Ward and Smith (2002) found that the need for policies to control access of an information system of corporate governance guidelines and strategic stresses of the risk management to protect the information assets of an organization would be required.

Khoram and Rasouli (2013) in a research entitled "The effect of internal control and punishment on fraud" concluded that preventing fraud through the separation of duties, due to an increase in efforts for collusion to commit fraud, is more effective than punishment in internal control systems to detect fraud. They also found that if fraud occurs when there is low internal control in companies, the minimum amount that is stolen would be more than the time when there are internal controls. The overall results showed that the relative effectiveness of two types of internal controls, i.e. punishments and separation of duties, to prevent fraud would be different for managerial and non-managerial staffs.

Moeinodin and Nadi (2012) showed that IT networks and computer systems have shorten the required time for auditors to prepare and present financial information to the management.

Abbasszadeh *et al.* (2011) examined the necessity of the internal control system in public sector. The results of their research showed that the optimal design and implementation of internal controls in public sector are highly important. Therefore, public sector managers must design and implement appropriate internal control systems to relatively ensure the predicted goals achievement, good performance of activities in all areas, prevention of any embezzlement, fraud, and misuse of resources and assets and the realization of responsiveness and accountability for the performed activities.

Panahian *et al.* (2011) found in a research that the effectiveness of National Iranian Oil Company internal audit is in offering consulting and ensuring services to strengthen internal controls.

Zareie and Abdi (2010) concluded in a research that six factors have been identified as the main obstacles and restrictions of internal control systems in executive agencies. The factors include lack of efficient and practical training for financial staffs in executive agencies, lack of integrated, efficient, transparent, and standard circulars and guidelines for internal controls, inadequate skilled and efficient manpower in executive agencies, lack of providing necessary conditions by the executive agencies, failure to assess and identify weaknesses in the internal control system and lack of motivation among employees. By solving the above problems executive agencies can witness an active and efficient system that will contribute to the realization of the objectives of long-term and shorter plans within the country with better quality and shorter time period.

Mahdaviipoor and Ghafari (2010) showed that auditing nowadays requires initiative, specific training and practice, experience and skills to be able to accomplish its tasks properly in the era of IT.

Aria (2006) showed in his research that IT can provide appropriate solutions in coordination with increasing efficiency to help reduce strategic costs. The solutions are presented in three areas, including optimization of reliance on internal controls system and optimal utilization of practical controls of computer systems.

Etemadi *et al.* (2006) found that IT would affect the qualitative characteristics of information and comparability of financial information of the company (analysis of changes in financial position and its operation results) would increase. The results also indicated that despite the benefits of IT for financial reporting, the reliability of information would reduce.

Arab Mazar Yazdi (2001) showed that new risks developed by modern IT require looking at the way of establishment of elements and the structure of organizations' internal controls.

4. Research methodology

As this research deals with the status quo, it is in the field of descriptive research, and as it examines the effect of IT on internal controls, it is a survey research. Moreover, it is an applied research in objective and retrospective in terms of time. The research population consists of all managers and auditors working in public sector. The research population includes all the officials and contracted employees of the Supreme Audit Court. The sample size included 156 subjects obtained according to judgment sampling. A questionnaire was used to collect field data. At first, personal characteristics (sex, age, education, discipline, corporate position and work history) were questioned. Then some questions were raised about internal controls: office controls (9 items), financial and accounting controls (11 questions), risk assessment (2 items), information and communication (2 items), control activities (1 item) monitoring (2 items). It should be noted that a separate questionnaire was not designed for IT and the questions were presented as descriptive ones (Table I).

Each of the questions was measured based on a five-point Likert scale with scores ranging from 1 (very little) to 5 (very much). To determine the validity, the questionnaire was submitted to the supervisor and experts in accounting and auditing. After receiving their comments the necessary reforms were made to ensure that the questions asked in the questionnaire would measure and assess precisely the same features and properties desired by the researcher in the research. Cronbach's alpha coefficient for the different sections of the questionnaire was fluctuating between 0.77 and 0.94 (Table II and Table III).

4.1 Data analysis

Descriptive results showed that 125 subjects (87.40 per cent) of the statistical sample were male and 18 subjects (12.60 per cent) were female. In total, 72 subjects (49.0 per cent) were 30-40 years of age, 34 persons (23.1 per cent) were 40-50 years of age, 3 subjects (2.0 per cent) were more than 50 years old and 38 subjects (25.90 per cent) were less than 30 years old. Next, 1 subject (0.7 per cent) had associated degree and one subject had doctorate degree, 72 subjects (48.60 per cent) had bachelor's degree and 74 subjects (50.0 per cent) had master's degree. Moreover, 34 subjects (23.10 per

| Categories (components) | No. of items |
|--|--------------|
| <i>The effect of data collection method (traditional to modern) on</i> | |
| Administrative controls | 9 |
| Financial and accounting controls | 11 |
| Risk assessment | 2 |
| Information and communication | 2 |
| Control activities | 1 |
| Monitoring | 2 |
| Internal controls | 27 |
| <i>Existence of written instructions (in IT) on</i> | |
| Administrative controls | 9 |
| Financial and accounting controls | 11 |
| Risk assessment | 2 |
| Information and communication | 2 |
| Control activities | 1 |
| Monitoring | 2 |
| Internal controls | 27 |

Table I.
Categories and
related questions in
questionnaire

Table II.

Number of questions, subjects, and the results of Cronbach's alpha coefficient of the questionnaire

| Categories (components) | Alpha coefficient |
|--|-------------------|
| <i>The effect of data collection method (traditional to modern) on</i> | |
| Administrative controls | 0.90 |
| Financial and accounting controls | 0.93 |
| Risk assessment | 0.77 |
| Information and communication | 0.78 |
| Control activities | – |
| Monitoring | 0.82 |
| Internal controls | 0.97 |
| <i>Existence of written instructions (in IT) on</i> | |
| Administrative controls | 0.90 |
| Financial and accounting controls | 0.94 |
| Risk assessment | 0.76 |
| Information and communication | 0.87 |
| Control activities | – |
| Monitoring | 0.82 |
| Internal controls | 0.97 |
| <i>Internal controls</i> | |
| Number of questions = 27 | 0.94 |

cent) were graduated in management, 93 subjects (63.30 per cent) in auditing and accounting and 6 subjects (4.10 per cent) in economics. Furthermore, 14 subjects (9.5 per cent) were graduated in other courses of study, 54 subjects (38.30 per cent) of the statistical sample were auditors, 42 subjects (29.80 per cent) senior auditors, 41 subjects (29.10 per cent) head auditors and 4 subjects (2.80 per cent) were working as general auditor, IT and senior head auditor. In addition, 36 subjects (25.50 per cent) had job experience fewer than 5 years, 41 subjects (29.10 per cent) between 5 and 10 years, 1 subject (0.7 per cent) between 10 and 15 years, 36 subjects (25.50 per cent) between 15 and 20 years and 27 subjects (19.10 per cent) had job experience of 20 years or more (Table IV).

The descriptive results of research variables showed that the mean of the effect of data collection methods (from traditional to modern) on administrative controls was equal to 32.16, on financial and accounting controls 38.71, on risk assessment 6.93, on information and communication 7.13, on control activities 3.46 and on monitoring 7.15, and in general, the effect on internal controls was 95.85 (Table V).

The mean of the effect of written instructions (in IT) on administrative controls is 32.72, on financial and accounting controls is 39.25, on risk assessment is 6.94, on information and communication is 7.10, on control activities is 3.49, and on monitoring is 7.27 and generally on internal controls is 96.53.

Before testing the hypotheses, normality test was carried out and appropriate tests were used according to the normal and abnormal variables (Table VI).

The research hypotheses are postulated as the following:

H1. There is a significant relationship between IT and internal controls.

H2. Changing data collection method (from traditional to modern) has an impact on internal controls.

| Details | Subgroups | Frequency | Authentic frequency (%) |
|-------------------------|--------------------------|--------------------------|-------------------------|
| Gender | Male | 125 | 87.40 |
| | Female | 18 | 12.60 |
| | Total | 143 | 100 |
| | | Missing data = 13 (8.3%) | |
| Age | Younger than 30 years | 38 | 25.90 |
| | Between 30 to 40 years | 72 | 49 |
| | Between 40 to 50 years | 34 | 23.10 |
| | Older than 50 years | 3 | 2 |
| | Total | 147 | 100 |
| | Missing data = 9 (5.8%) | | |
| Education | Associate degree | 1 | 0.70 |
| | Bachelor degree | 72 | 48.60 |
| | Master degree | 74 | 50 |
| | PhD | 1 | 0.70 |
| | Total | 148 | 100 |
| | Missing data = 8 (5.1%) | | |
| Discipline | Management | 34 | 23.10 |
| | Audit and accounting | 93 | 63.30 |
| | Economy | 6 | 4.10 |
| | Others | 14 | 9.50 |
| | Total | 147 | 100 |
| | Missing data = 9 (5.8%) | | |
| Organizational position | Auditor | 54 | 38.30 |
| | Senior auditor | 42 | 29.80 |
| | Head auditor | 41 | 29.10 |
| | General auditor | 2 | 1.40 |
| | IT | 1 | 0.70 |
| | Senior head auditor | 1 | 0.70 |
| | Total | 141 | 100 |
| | Missing data = 15 (9.6%) | | |
| Work experience | Fewer than 5 years | 36 | 25.50 |
| | 5 to 10 years | 41 | 29.10 |
| | 10 to 15 years | 1 | 0.70 |
| | 15 to 20 years | 36 | 25.50 |
| | More than 20 years | 27 | 19.10 |
| | Total | 141 | 100 |
| | Missing data = 15 (9.6%) | | |

Table III.
Frequency and percentage of the studied sample based on demographic variables

Table IV.
Describing the effect of data collection method (from traditional to modern) on internal control and its subscales

| The effect of data collection method (from traditional to modern) | Mean | SD | Minimum | Maximum |
|---|-------|-------|---------|---------|
| Internal controls | 95.58 | 15.75 | 38 | 133 |
| Administrative controls | 32.16 | 5.47 | 13 | 43 |
| Financial and accounting controls | 38.71 | 6.83 | 11 | 55 |
| Risk assessment | 6.93 | 1.54 | 2 | 10 |
| Information and communication | 7.13 | 1.53 | 2 | 10 |
| Control activities | 3.46 | 0.82 | 1 | 5 |
| Monitoring | 7.15 | 1.50 | 2 | 10 |

H3. Written instructions (in IT) have an impact on internal controls.

Binomial test is used to test the hypotheses. At first, the sample was divided into two groups. The first group included those members of the sample whose total responses to questions about the impact of IT on internal controls were less 162 and the second group included those members of the sample whose total responses to questions about the impact

Table V.
Describing the effect of written instructions (in the field of IT) on internal control and its subscales

| The effect of written instructions (in IT) | Mean | SD | Min | Max |
|--|-------|-------|-----|-----|
| Internal controls | 96.53 | 16.38 | 38 | 132 |
| Administrative controls | 32.72 | 5.47 | 13 | 44 |
| Financial and accounting controls | 39.25 | 6.92 | 11 | 55 |
| Risk assessment | 6.94 | 1.48 | 2 | 10 |
| Information and communication | 7.10 | 1.52 | 2 | 10 |
| Control activities | 3.49 | 0.82 | 1 | 5 |
| Monitoring | 7.27 | 1.52 | 2 | 10 |

| | N | z-statistic | Sig. | Test result of distribution |
|---|-----|-------------|-------|-----------------------------|
| <i>Research variables</i> | | | | |
| The effect of data collection methods (from traditional to modern) on internal controls | 125 | 0.52 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on administrative controls | 138 | 0.50 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on financial and accounting controls | 138 | 0.47 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on risk assessment | 145 | 0.41 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on information and communication | 151 | 0.44 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on control activities | 150 | 0.35 | 0.000 | Not normal |
| The effect of data collection methods (from traditional to modern) on monitoring | 150 | 0.54 | 0.000 | Not normal |
| The effect of written instructions (in IT) on internal controls | 120 | 0.51 | 0.000 | Not normal |
| The effect of written instructions (in IT) on administrative controls | 142 | 0.51 | 0.000 | Not normal |
| The effect of written instructions (in IT) on financial and accounting controls | 130 | 0.49 | 0.000 | Not normal |
| <i>Research variables</i> | | | | |
| The effect of written instructions (in IT) on risk assessment | 145 | 0.41 | 0.000 | Not normal |
| The effect of written instructions (in IT) on information and communications | 151 | 0.44 | 0.000 | Not normal |
| The effect of written instructions (in IT) on control activities | 149 | 0.37 | 0.000 | Not normal |
| The effect of written instructions (in IT) on monitoring | 149 | 0.53 | 0.000 | normal |
| The effect of IT on internal controls | 110 | 0.52 | 0.000 | Not normal |
| The effect of IT on administrative controls | 132 | 0.52 | 0.000 | Not normal |
| The effect of IT on financial and accounting controls | 123 | 0.51 | 0.000 | Not normal |
| The effect of IT on risk assessment | 145 | 0.51 | 0.000 | normal |
| The effect of IT on information and communication | 151 | 0.53 | 0.000 | Not normal |
| The effect of IT on control activities | 148 | 0.52 | 0.000 | Not normal |
| The effect of IT on monitoring | 149 | 0.54 | 0.000 | Not normal |

Table VI.
Test results of the distribution of the studied variables in the research

of IT on internal controls were more than 162. It should be noted that each member of the sample identified their responses based on a 5-point Likert scale with scores ranging from 1 (very little) to 5 (very much) (Table VII):

$$\begin{cases} H0 : p = 0.5 \\ H1 : p \neq 0.5 \end{cases}$$

Considering the observed ratio for the first groups and the significance level of the test (0.0001) it can be concluded that the hypothesis was confirmed at 0.05 level ($\alpha = 0.05$). That is, the use of IT has a positive effect on internal controls and their subscales. In other words, the use of IT has a positive effect on administrative, financial and accounting controls, risk assessment, information and communication, control activities, and monitoring (Table VIII).

Considering the observed ratio for the first groups and the significance level of the test ($p < 0.01$) it can be concluded that the hypothesis was confirmed at 0.05 level ($\alpha = 0.05$). That is, data collection methods (from traditional to modern) have a positive effect on internal controls and their subscales. The methods did not have a positive effect only on control activities. In other words, data collection methods (from traditional to modern) have a positive effect on administrative, financial and accounting controls, risk assessment, information and communication, and monitoring (Table IX).

Considering the observed ratio for the first groups and the significance level of the test ($p < 0.01$) it can be concluded that the hypothesis was confirmed at 0.05 level ($\alpha = 0.05$). That is, written instructions (in IT) have a positive effect on internal controls and their subscales. In other words, written instructions (in IT) have a positive effect on administrative, financial and accounting controls, risk assessment, information and communication, and monitoring. The methods did not have a positive effect only on control activities.

5. Conclusion and suggestions

The results of the main hypothesis on the relationship between IT and internal controls are consistent with the findings of Etemadi *et al.* (2006), Stoel and Muhanna (2011), Ward and

Table VII.
The results of binomial test to investigate the relationship between IT and internal controls and their subscales

| Variable | Group | N | Observed possibility | Tested possibility | Sig. | |
|--|--------------|---------------|----------------------|--------------------|------|-------|
| The effect of IT on internal controls | First group | More than 162 | 97 | 0.88 | 0.50 | 0.000 |
| | Second group | Less than 162 | 13 | 0.12 | | |
| The effect of IT on administrative controls | First group | More than 54 | 114 | 0.86 | 0.50 | 0.000 |
| | First group | Less than 54 | 18 | 0.14 | | |
| The effect of IT on financial and accounting internal controls | First group | More than 66 | 104 | 0.85 | 0.50 | 0.000 |
| | Second group | Less than 66 | 19 | 0.15 | | |
| The effect of IT on risk assessment | First group | More than 12 | 124 | 0.86 | 0.50 | 0.000 |
| | Second group | Less than 12 | 21 | 0.14 | | |
| The effect of IT on information and communication | First group | More than 12 | 136 | 0.90 | 0.50 | 0.000 |
| | Second group | Less than 12 | 15 | 0.10 | | |
| The effect of IT on control activities | First group | More than 6 | 130 | 0.88 | 0.50 | 0.000 |
| | Second group | Less than 6 | 18 | 0.12 | | |
| The effect of IT on monitoring | First group | More than 12 | 137 | 0.92 | 0.50 | 0.000 |
| | Second group | Less than 12 | 12 | 0.08 | | |

| Variable | Group | No. | Observed possibility | Tested possibility | Sig. | |
|---|--------------|--------------|----------------------|--------------------|------|-------|
| The effect of data collection methods (from traditional to modern) on internal controls | First group | More than 81 | 108 | 0.86 | 0.50 | 0.000 |
| | Second group | Less than 81 | 17 | 0.14 | | |
| The effect of data collection methods (from traditional to modern) on administrative controls | First group | More than 27 | 113 | 0.82 | 0.50 | 0.000 |
| | Second group | Less than 27 | 25 | 0.18 | | |
| The effect of data collection methods (from traditional to modern) on financial and accounting controls | First group | More than 33 | 105 | 0.76 | 0.50 | 0.000 |
| | Second group | Less than 33 | 33 | 0.24 | | |
| The effect of data collection methods (from traditional to modern) on risk assessment | First group | More than 6 | 92 | 0.63 | 0.50 | 0.002 |
| | Second group | Less than 6 | 53 | 0.37 | | |
| The effect of data collection methods (from traditional to modern) on information and communication | First group | More than 6 | 106 | 0.70 | 0.50 | 0.000 |
| | Second group | Less than 6 | 45 | 0.30 | | |
| The effect of data collection methods (from traditional to modern) on control activities | First group | More than 3 | 78 | 0.52 | 0.50 | 0.68 |
| | Second group | Less than 3 | 72 | 0.48 | | |
| The effect of data collection methods (from traditional to modern) on monitoring | First group | More than 6 | 138 | 0.92 | 0.50 | 0.000 |
| | Second group | Less than 6 | 12 | 0.08 | | |

Table VIII.
The results of binomial test to investigate the effect of data collection methods (from traditional to modern) on internal controls and their subscales

Smith (2002), Aria (2006), Mahdaviipoor and Ghafari (2010), Arab Mazar Yazdi (2001) and Moeinodin and Nadi (2012). Based on the results of the above hypothesis it can be said that IT can increase the efficiency and effectiveness of internal controls in the organization because it provides the following features for the organization (Maham, 2002):

- uniform implementation of rules and performance of complex calculations in processing a large volume of transactions and data;
- promoting timeliness, accessibility and accuracy of data;
- facilitating further analysis of information;
- improving the ability to monitor the performance of the organization's activities and its policies and procedures;
- reducing the control risk of breaching controls; and
- enhancing the effective segregation of duties by implementing security controls in the applied software, databases and operating systems.

In justification of the results of the first minor premise it can be said that the effect of changing the data collection methods (from traditional to modern) on internal controls results from environmental requirements because traditional systems have gradually lost their value with the advent of new technologies and the quality of their data has reduced as well. Therefore, internal controls resulting from traditional methods are not valid enough. In justification of the failure of the effects of data collection methods (from traditional to modern) on control activities it can be said that mere reliance on changing data collection

Table IX.
The results of binomial test to investigate the effect of written instructions (in IT) on internal controls

| Variable | Group | No. | Observed possibility | Tested possibility | Sig. |
|---|--------------|--------------|----------------------|--------------------|------|
| The effect of written instructions (in IT) on internal controls | First group | More than 81 | 102 | 0.85 | 0.50 |
| | Second group | Less than 81 | 18 | 0.15 | |
| the effect of written instructions (in IT) on administrative controls | First group | More than 27 | 119 | 0.84 | 0.50 |
| | Second group | Less than 27 | 23 | 0.16 | |
| the effect of written instructions (in IT) on financial and accounting controls | First group | More than 33 | 103 | 0.79 | 0.50 |
| | Second group | Less than 33 | 27 | 0.21 | |
| the effect of written instructions (in IT) on risk assessment | First group | More than 6 | 91 | 0.63 | 0.50 |
| | Second group | Less than 6 | 54 | 0.37 | |
| the effect of written instructions (in IT) on information and communication | First group | More than 6 | 105 | 0.70 | 0.50 |
| | Second group | Less than 6 | 46 | 0.30 | |
| the effect of written instructions (in IT) on control activities | First group | More than 3 | 84 | 0.56 | 0.50 |
| | Second group | Less than 3 | 65 | 0.44 | |
| the effect of written instructions (in IT) on monitoring | First group | More than 6 | 136 | 0.91 | 0.50 |
| | Second group | Less than 6 | 13 | 0.09 | |

methods to the modern one during the environmental changes to deal with the risks that are threatening the target is very difficult. Therefore, the executives have not been able to take necessary measures to deal with threatening risks just by changing data collection methods and more serious measures are needed to fight with threatening risks. Researchers are suggested to identify such measures in future studies and return them to the executive authorities. On the other hand, the researcher thinks that the results might be due to raising just one question for control activities variable. In justification of the failure of the effect of written instructions (in IT) on control activities it can be said that updated modern instructions are needed to face threatening risks and fixed codified instructions cannot respond to new threatening risks. With regard to the results of the main hypothesis the auditors are suggested to get aligned with future developments of IT to be able to carry out their activities with the lowest cost and time and with good quality. Moreover, it is suggested that, while taking into account the new risks that have emerged in IT environment, some measures should be taken to look into the structure of internal controls to maintain the organization assets and to ensure the implementation of the management desired plans to achieve the determined goals.

With regard to the results of the first minor premise, the executive officers and auditors are suggested to equip themselves with professional knowledge and skills so that they can undertake internal controls with new data collection methods. They need to get harmonized with technology changes and related new challenges. It is suggested that in future studies the effect of data collection methods (traditional and modern) on internal controls be compared with each other. Moreover, it is suggested that the effect of written instructions (in IT) on internal controls be assessed and prioritized. Finally, it is suggested that the

advantages and disadvantages of information technologies on internal controls be examined and prioritized in future studies.

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agencies

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Corresponding author

Mahdi Salehi can be contacted at: mehdi.salehi@um.ac.ir

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