

The Impact of Internal Control System Components of the COSO Model in Reducing the Risk of Cloud Computing: The Case of Public Shareholding Companies

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Abstract

The study aimed at identifying the impact of the components of the internal control system based on the framework of the Committee of Sponsoring Organizations (COSO) in reducing the risk of cloud computing in Jordanian public shareholding companies from accountants' perception in Jordan. The questionnaire was used as a data collection tool. The sample included 190 public accountants. The questionnaires were distributed to all sample members. Only 154 questionnaires were considered usable for the statistical analysis, at 81.1% response rate. The study data were analyzed using the SPSS statistical software V.21. According to the study results, there is a real need for the Public Shareholding Companies to adopt cloud accounting techniques. Therefore, more understanding of the hardware and software and the provision of necessary resources for information technology, infrastructure and skills are required. The COSO framework also provides internal control activities that reduce the risk of adopting information systems in general and accounting information systems in particular. This study recommends to the Association of Accountants and Auditors and the Supervisory Board to develop an educational and training programs for auditors on using cloud accounting and all related risks. In addition, follow-up audit offices for local and international research and innovation related to the information technologies and cloud computing are the most important developments in the framework of the (COSO) Committee.

Keywords: *Internal Control, COSO, Cloud Computing, Public Shareholding Companies, Jordan*

INTRODUCTION

In the past, the concept of internal control was primarily based on the protection of the company's assets, the maintenance of accurate financial records, the reduction of cases of fraud and manipulation. The concept of internal control had emerged in European countries in the eighteenth century as a function of the external auditor, resulting in a focus on the financial aspects of the operations and activities of the company. Financial scandals and financial fraud allegations in recent years leading to the collapse of some global companies such

as Enron and WorldCom have demonstrated weakness in internal control systems and cloud information systems. Many researchers see this vulnerability as a result of their lack of interest in internal control and systems (Al-Ali et al., 2017). Moreover, a lack of understanding of its role as a tool for meeting the objectives of the company as a whole and access to reliable and fair financial statements in many companies led to increased attention to the efficiency and strength of internal control systems and accounting systems (Arena et al., 2015: 275). The existence of an internal control system and sophisticated

computerized accounting systems is a key line of defense against fraudulent financial reporting and ensuring an environment conducive to the achievement of the company's goals. On the other hand, some argue that effective internal control systems and advanced cloud computing systems are essential for the success of companies. Accordingly, the lack leads to the failure of the company. Therefore, the construction of internal control systems and sophisticated accounting systems is necessary to achieve the objectives of the control of the management and the efficiency and effectiveness of activities, as well as the reliability of financial reports in compliance with the rules and laws governing it. Due to the more effective internal control systems and computing systems in line with recent developments in the business environment, reliable and fraud-free financial statements have been reached to assist decision makers and users of financial statements and the requirements of users of the financial statements, including the Committee of Sponsoring Organizations (COSO). Based on the above, this study has worked on the impact of the components of the internal control system according to the framework of the COSO Committee in reducing the risk of cloud computing in public shareholding companies from the perspective of Jordanian accountants.

In recent years, attention has been paid to internal control systems for several factors, including financial scandals, corporate governance issues, investor protection and the consequent collapse of

major companies due to fraud caused by the poor structure of risk management systems and internal controls. Furthermore, many companies face problems due to the severe weakness in internal controls and the basic elements of the computing and administrative accounting, which is reflected in the functional inflation. In addition, the absence of duplicative structures, overlapping powers, lack of clarity of plans and objectives and poor accountability, and the problems experienced by companies came as a result of the formal role of the councils of their management and the consequent weakness of the control procedures. This requires establishing effective internal control systems and cloud computing systems capable of reducing fraud and manipulation and addressing the risks of cloud computing. This will ensure that the objectives of financial statements, operational efficiency and compliance with policies, laws and regulations are met. Therefore, the problem of the study lies in the following main question:

Is there an impact on the components of internal control systems in accordance with the COSO model on reducing the risk of cloud computing in Jordanian public shareholding companies?

This question is divided into the following sub-questions:

Question 1: Is there an impact of the Control Environment as a component of the COSO framework in reducing the risk of cloud computing in Jordanian public shareholding companies?

Question 2: Is there a risk assessment effect as a component of the COSO framework in reducing the risk of cloud computing in Jordanian public shareholding companies?

Question 3: Is there an impact of Control Activities as one of the components of the COSO framework in reducing the risk of cloud computing in Jordanian public shareholding companies?

Question 4: Is there an Information and Communication Impact as a component of the COSO Framework reducing the risk of cloud computing in Jordanian public shareholding companies?

Question 5: Is there a monitoring effect as a component of the COSO framework in reducing the risk of cloud computing in Jordanian public shareholding companies?

The study aims to achieve the following:

- 1- To assess the impact of applying the COSO framework in reducing the risks of fraud, in addition to assessing the internal control applied in companies and verifying the extent of implementation of these components, which must be met in internal control to create a positive environment and achieve efficiency and effectiveness according to the mentioned model.
- 2- To shed light on the basic concepts of internal control in accordance with the framework of the COSO

and its cloud computing systems, starting with the definition and development of its concept and components and with a description of the objectives that the model seeks to achieve.

THEORETICAL FRAMEWORK

The concept of internal control and its objectives according to the view of the COSO Committee.

The COSO Supervisory Committee defines internal control as the procedures applied by the board of directors and management and under their responsibilities to provide reasonable assurance that the following regulatory objectives are achieved:

1. Protection of assets, including the prevention and detection (in a timely manner) of the acquisition, use, or disposal of the company's material assets without authorization.
2. Maintenance of records in sufficient detail to accurately reflect the company's assets
3. Provision of accurate and reliable information
4. Provision adequate assurance that the financial report is prepared in accordance with the GAAP
5. Improvement of operational efficiency
6. Support to compliance with the imposed administrative policies
7. Compliance with applicable laws and regulations (Romney & Stinbart, 2012: 227)
8. Components of the internal control system according to the COSO model

The internal control structure, based on the COSO model, consists of five core components, according to Thomas (2010: 5):

- First: Control Environment
- Second: Risk Assessment
- Third: Control activities
- Fourth: Information and Communication Information
- Fifth: Monitoring

First: Control Environment

The COSO model places a great importance on the control environment as the basis for the rest of the structure of the control structure (Saheen et al., 2008: 24, COSO, 2011: 7). The control environment is the umbrella for other components. In the case of the ineffective control environment, the results of other components do not lead to effective control (Arens, Elder & Beasley, 2007: 274)

The control environment of any company is influenced by the following factors:

1. Integrity and Ethical Values
2. Commitment to Competence
3. The Board of Directors or the Audit Committee Board of Directors or Audit Committee
4. Management philosophy and method of operation Management Philosophy and Operating Style
5. Organizational Structure
6. Assignment of authority and responsibility
7. Human Resource Policies and Practices

The availability of these factors in an integrated and coherent manner will result in an appropriate control

environment of an integrated system. Any system that becomes successful requires an environment that does not affect and enable the other components of the system.

Second: Risk Assessment

All economic units, regardless of their size or nature, encounter many risks, whether these risks are inside or outside the unit (Arens and Lobak, 2002: 183; Warren, 2004; and Tamimi, 1987). The Department assesses risks as part of the design and operation of the internal control system to minimize errors and irregularities (Arens and Lobak, 2002: 385). Risk assessment involves the identification and analysis of risks, underlying the achievement of the objectives of the unit (COSO, 2003: 16; INTOSAI, 2004).

Goal setting is a precondition for risk assessment as risk affects economic unit in terms of survival and persistence in the context of intense competition (Romney & Stinbart, 2012: 385). By assessing the risk, we can overcome or mitigate it, and, accordingly, improve chances to achieve the company's future objectives without hindrance, as well as the continuation of the internal control system. In this way, it is possible to anticipate what will happen and take action before the risk occurs.

Third: Supervisory activities

They are also called control procedures. The control activities are the policies and procedures determined by the administration to achieve the objectives of the economic unit. (Arens, &

Loebbecke, 2000: 295). In addition to those policies and procedures for other components that ensures that the necessary actions are undertaken to identify the risks that hinder the achievement of the unit's objectives. (Arens and Lubeck, 2002: 385).

COSO and Audit Standard 94 (SAS 94) have identified oversight activities as focusing on four categories of control measures (Arens et al., 2007: 278):

1. The appropriate separation of functions
2. Operating the information
3. Physical control over assets
4. Performance evaluation

Fourth: Information and Communication Information are essential means to achieve internal control objectives. Information is necessary and required at all levels within the unit to ensure effective internal control and achieve its objectives. Therefore, a set of relevant and credible information must be identified in an appropriate form and time frame so that staff can perform internal control and other responsibilities (INTOSAI, 2004: 26).

In order for management to be effective, all information must be appropriate, specific, timely, accurate, designed, usable and comparable, as well as accessible (Alslihat et al., 2017). This information may be financial or non-financial and related to operations, internal, external, or related to a particular circumstance. (Wilkinson et al., 2000: 240)

The researchers argue that here lies the purpose of internal control; more

precisely, how to communicate information about what has been achieved of the objectives of the company established and the result of internal control of the Governing Council to make the necessary decisions.

Fifth: Monitoring

Monitoring activities are related to the continuous or periodic evaluation of the quality of the internal control performance. The management is responsible for determining the extent of implementation of the control in light of the design and determining the possibility of activating it in accordance with the change in the surrounding circumstances. Evaluation and adjustment information is obtained from a variety of sources, including the internal control study, internal auditor reports, and feedback from staff (Arens and Lobak, 2002, 388). Furthermore, GAO 5 specifies: Performance quality and ensure its effectiveness over time. (GAO, 2003: 59-60). In order to ensure that internal controls are effective in achieving the objectives, the researchers must provide a set of basic components.

CLOUD COMPUTING, ITS CONCEPT, BENEFITS, AND OBSTACLES:

The emergence of computing programs has led to a significant improvement in computing practices. Given the enormous amount of information and time needed to process them, computing software has become a very useful tool for accountants to perform their work

faster and more efficiently. Although computing programs have existed for decades, they have continued to develop their capabilities over the years, and this development continues (Dimitriua, O. & Mateia, M. 2015).

The 20th century saw great progress in the transfer of information, and the technology, in addition to the emergence of social networks. The Internet has gradually become faster, more reliable, less expensive and has expanded in almost every area. Most importantly, these developments challenged the foundations of traditional business models. Moreover, smartphones have facilitated the spread of cloud services. Relevant and constantly updated information is critical to any economic decision-making process, especially in a contemporary competitive environment today. Companies can grow or disappear at the same speed, depending on their ability to evolve and adapt to the best existing technological frameworks, as traditional frameworks are no longer sufficient. The software of cloud computing has gradually become increasingly popular, which has led major computing firms, as well as computing organizations, including the American Institute of Certified Public Accountants (AICPA), to increase the level of interest in cloud technology by providing a wide range of services and guidance based on cloud technology. Computing practice takes a systematic approach to risk assessment, including developing effective cloud application policies and a risk response plan to enable companies to test the

effectiveness of this new technology and increase operational efficiency with regard to their computing (Dimitriua, O. & Mateia, M., 2015).

Cloud computing can be defined simply as the storage, processing, and use of data on multi-site computers by accessing it over the Internet. Accordingly, users of these data can take advantage of the high capacity of computer downtime, which does not require large capital investments to meet their needs, and that they can access their data from anywhere as long as they connect to the Internet.

The availability of financial information from anywhere in the world and at any time has become an urgent necessity. Data processing of costs, revenues, sales, corporate finance over the Internet provides access regardless of space and time (Wyslocka, E & Jelonek, D. 2015). The basic requirement for exploiting the benefits of cloud computing is to fill the gaps in judgments, improve the conditions for users, solve information security problems, encourage the public sector to benefit from the services of these systems and support further research and development in cloud computing. The rapid growth of cloud computing is considering the need to work on the implementation of a legal framework for data protection and the development of unified standards governing the process of processing, which is necessary to increase the integrity of the provision of this service. Cloud computing enables companies to quickly deliver new products to the market through more effective

collaboration with international partners and advanced, low-cost computing resources (Alali, et al., 2016). The operations performed through the cloud service allow close cooperation between different service providers and increase the possibility of cooperation and access to information between different companies, which enhance the internationalization of operations and economic activities. However, on the other hand, the barriers to cloud computing are the fear that data stored by users and transmitted via the Internet could be used or detected in unexpected ways. Moreover, companies need confident and reassuring service providers about the security of information. This aspect is one of the most important considerations by business owners who want to take advantage of new solutions. Data transfer through the internal network (LAN) provides confidence to business owners by intercepting any unauthorized person to obtain data.

The impact of effective computing techniques in cloud computing:

- Database (for data analysis).
- Expert systems (to assist in the analysis of deviations and risk analysis).
- Neural Network (Prediction Tools).
- Data storage (to provide specific information to users).
- Decision support programs (assistance in data analysis and decision support).
- High connection (to improve access to information).

- Digital confirmations and signatures (ongoing audit).
- Artificial intelligence (the possibility of change in reports according to circumstances).
- Synchronization in both search and data analysis (data analysis and decision support) (Marand Ertal, 2013: pp. 2836-2846)

Corporate risk management in accordance with IT governance for cloud computing: Risk management is defined as the process of identifying vulnerabilities and threats through the structure of the organization, as well as designing appropriate measures to reduce their impact on IT resources. Risks at the company level cannot be eliminated permanently; however, the company's management has a responsibility to reduce these risks to the minimum acceptable level. The risk management process is an ongoing process that begins by assessing the level of exposure of the company to risks and identifying the main risks. When risks are identified, they should be minimized using controls and tools.

IT governance practices with respect to risk management are:

- A. Analysis and evaluation of information technology risks
- B. Monitoring and monitoring the efficiency of internal controls
- C. Implementing and applying the necessary controls to reduce the risks of information technology

D. Establishing necessary procedures to ensure transparency regarding the risks of importance to the institution

E. Taking into account that a proactive approach to risk management is a competitive advantage

F. Insisting that risk management is an integral part of the company's operations

G. Ensuring that IT services are sound, withholding information about persons without authority, that the transactions are correct and can be trusted. In the opinion of the researchers that companies are currently relying on information technology in the decision-making process rather than guessing based on what has been accomplished in the past, the process of control of information technology and maintenance of information security has become of utmost importance. The success of IT operations in companies and the control of risks help to protect the reputation of companies and avoid crashes, both now and in the future.

RESULTS AND DISCUSSIONS

Table (1) presents the values of the means and deviations of the components of the internal control systems according to the COSO model. By reviewing the values of the means, the highest mean assessed on the basis of the opinion of the study sample was the control component. The average of this mean was 4.37 with a standard deviation of 0.37. On the contrary, the risk assessment component represents the lowest components according to the

sample, with an average of 4.16 and a standard deviation 0.29.

Table 1 The means and standard deviations of the components of internal control systems according to the COSO model

Number	Ingredients	Mean	Standard deviation
1	The regulatory environment	4.29	0.25
2	Risk assessment	4.16	0.29
3	Control activities	4.22	0.34
4	Information and communication	4.33	0.33
5	Monitoring	4.37	0.37
Total components of internal control systems		4.27	0.25

The sample estimates of all the components of the internal control system were calculated according to the COSO model with a mean of 4.27 and a standard deviation of 0.25. It is noted that the values of the standard deviation are small, indicating that the responses and estimates of the sample for each component of the internal control are based on the COSO. The value of the standard deviation if zero indicates the complete agreement in the assessment of a certain component of the study sample.

Table 2 Means and standard deviations of the risk of cloud computing

Number	Risks	Mean	Standard deviation
1	Identity and Access Management	4.43	0.34
2	Data protection	4.23	0.60
3	Virtual operating risk	4.42	0.42
4	IT support	4.52	0.43
5	Organization	4.64	0.33
	Cloud risks	4.45	0.34

Table (2) presents the values of means and deviations of the risk of cloud

computing. By reviewing the values of the means, the mean of the organization management dimension was estimated as the highest mean by the study sample. The average of this mean was 4.64 with a standard deviation 0.33. Besides, the protection of the data was the least dimension according to the estimates of the study sample, as it achieved a mean of 4.23 and a standard deviation 0.60.

The sample estimates of all dimensions of the risk of cloud computing were estimated at 4.45 and with a standard deviation 0.34. It is noted that the values of the standard deviation are small, indicating the concentration of the responses and estimates of the sample members for each dimension of the risk of cloud computing. The standard deviation, if zero, indicates complete agreement in estimating a specific component within the study sample.

HYPOTHESIS TESTING

H01: There is no impact of the components of internal control systems, according to the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

In order to test this hypothesis, simple linear regression analysis was used to examine the effect of the components of internal control systems according to the COSO model in reducing the risk of cloud computing in the Jordanian public shareholding companies. The regression model represented by the influence of internal control system components according to the COSO model in

reducing the risk of cloud computing in Jordanian public shareholding companies is statistically acceptable. Hence, the value of f from the analysis of variance analysis of 125.88 is at a significant level (0.000) (less than 0.05). This value is considered to accept the effect model.

The value of R^2 expresses the amount of variance or difference in dependent variable values because of the independent variable. It, therefore, expresses the independent variable's ability to predict the dependent variable. The higher value usually indicates a better value. For this model, the R^2 was 57.8%. As for the value of the components of the internal control systems according to the COSO model in reducing the risk of cloud computing, it was expressed as the value of the coefficient β , where it is noted that the value of independent variable effect in the subsidiary amounted to 1.048.

The value of the T-test of the linear regression in the regression model is statistically significant. The significance of the independent variable is realized if the value of the test indication level is less than 0.05. Therefore, the value of the influence of the components of the internal control systems reached is statistically significant because the value of the mean level was less than 0.05. With this result, depending on the level of significance, the null hypothesis is rejected i.e., the alternative hypothesis is accepted; there is an impact of the components of internal control systems according to the COSO model in reducing the risk of cloud computing in

Jordanian public shareholding companies.

computing in Jordanian public shareholding companies.

H02: There is no impact of risk assessment as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

To test this hypothesis, simple linear regression analysis was used to examine the impact of risk assessment as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies. The regression model represented by the impact of risk assessment is one of the components of the COSO model in reducing the risk of cloud computing in the Jordanian public shareholding companies. This is based on the value of f from the analysis of variance of 106.84. The value of R^2 is 53.7%. It expresses the risk assessment ability to predict the risk of cloud computing in Jordanian public shareholding companies, as for the value of the control effect as a component of the COSO model in reducing the risk of cloud computing. The value of the T-test of the linear significance of the independent variable in the regression model is statistically significant. The significance of the independent variable is realized if the value of the test significance level is less than 0.05. With this result, depending on the level of significance, the null hypothesis is rejected, i.e., the alternative hypothesis is accepted; there is an impact of risk assessment as a component of the COSO model in reducing the risk of cloud

H03: The impact of regulatory activities as a component of the COSO model does not affect the risk of cloud computing in Jordanian public shareholding companies.

To test this hypothesis, simple linear regression analysis was used to examine the effect of control activities as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies. The regression model represented by the impact of control activities, as a component of the COSO model in reducing the risk of cloud computing in the Jordanian public shareholding companies is statistically acceptable based on the value of f (76.73) from the analysis of variance analysis. This value is statistically significant because the p -value (0.000) was less than 0.05, and thus, this value is considered as acceptance of the effect model. The value of R^2 is 45.5%. It expresses the regulatory activities ability to predict the risk of cloud computing in Jordanian public shareholding companies. As for the value of the control effect as a component of the COSO model in reducing the risk of cloud computing, it was expressed as the value of the coefficient β where it is noted that the value of the effect of the independent variable in the dependent has reached 0.686. Therefore, the value of the effect of the control activities reached is statistically significant because the value of the mean level

(0.000) was less than 0.05. With this result, depending on the level of significance, the null hypothesis is rejected, i.e., the alternative hypothesis is accepted; the impact of regulatory activities as a component of the COSO model affect the risk of cloud computing in Jordanian public shareholding companies.

H04: There is no impact of information and communication as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

To test this hypothesis, simple linear regression analysis was used to examine the effect of information and communication as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies. The regression model representing information and communication effect as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies is statistically acceptable based on the value of f from the 254.53 analysis of variance analysis. This value is statistically significant because the value of its significance level (0.000) was less than 0.05, so this value is the acceptance of the influence model. The R^2 value is 73.5%, it expresses the information and communication ability to predict the risk of cloud computing in Jordanian public shareholding companies. As for the value of the impact of control as a component of the COSO model in reducing the risk of

cloud accounting, it expressed the value of the coefficient of β , where the value of the effect of the independent variable on the dependent variable has reached 0.886. The T-test value of the linear significance of the independent variable in the regression model is statistically significant. The significance of the independent variable is realized if the value of the test indication level is less than 0.05. With this result, depending on the level of significance, the null hypothesis is rejected, i.e., the alternative hypothesis is accepted; There is an impact of information and communication as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

H05: There is no control effect as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

To test this hypothesis, simple linear regression analysis was used to examine the effect of monitoring as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies. The regression model representing the effect of monitoring as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies is statistically acceptable based on the value of f from the analysis of variance analysis (134.21). The p -value less than 0.05, represents the acceptance of the effect model. The value of R^2 reflects the

amount of variation or difference in the associated dependent variable values because of the independent variable (thus, expressing the independent variable's ability to predict the dependent variable), whereas the R^2 is 59.3%. It expresses the control effect ability to predict the risk of cloud computing in Jordanian public shareholding companies. The value of the control effect as a component of the COSO model in reducing the risk of cloud computing was expressed by the value of the coefficient $\beta = 0.712$. The value of the T-test of the linear significance of the independent variable in the regression model is statistically significant. The significance of the independent variable is realized if the value of the test indication level is less than 0.05. With this result, depending on the level of significance, the null hypothesis is rejected, i.e., the alternative hypothesis is accepted; There is control effect as a component of the COSO model in reducing the risk of cloud computing in Jordanian public shareholding companies.

CONCLUSIONS

1. The COSO framework is a global framework that provides guidance on the use of best practices to assess internal control systems in companies.
2. The COSO framework provides effective internal control activities that reduce the risk of using technology in corporate information systems in general and

accounting information systems in particular.

3. Adoption of cloud accounting techniques and the framework of the COSO Committee requires the provision of the appropriate environment to understand the hardware and software and to provide appropriate resources for information technology, infrastructure, and skills required.
4. It is necessary to inform the departments of companies about the benefits of using IT cloud accounting and the framework of the COSO Commission, as well as the risks associated with the adoption of these technologies. It is also needed to analyze them so that they can design effective internal control activities.
5. There are advantages of cloud accounting if applied by the Jordanian public shareholding companies. Hence, it is possible to access technical and technological innovation, which will lead to the arrival of industrial companies to the competitive advantage.

RECOMMENDATIONS

1. It is necessary to contribute to the Association of Accountants and Auditors and the Supervisory Board of the profession of auditing the accounts and universities by developing practical training programs for auditors using cloud accounting and all the risks associated with it

2. Follow-up of audit offices for local and international issues related to information technology, cloud computing and its risks, and the most important developments related to the framework of the COSO Commission
 3. The management of the Jordanian Public Shareholding Company shall have full transparency to disclose all risks associated with the use of its cloud computing systems to limit the disclosure of information of interest.
 4. Activating the role of oversight activities in accordance with the framework of the Commission in general to ensure the implementation of the appropriate and timely response to reduce fraud in the financial statements of the company.
 5. Providing open communication channels between the management of the company and employees about the need for an information system for cloud accounting applications and efficient and appropriate communications in the company to enable staff to carry out their responsibilities to reduce the risks associated with them.
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