

أثر تكنولوجيا المعلومات على جودة التدقيق الداخلي في البنوك التجارية الأردنية  
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الملخص

تهدف هذه الدراسة إلى معرفة تأثير تكنولوجيا المعلومات (أجهزة الحاسوب، تطبيقات البرمجيات، أنظمة التشغيل، إدارة البيانات وتخزينها، الشبكات والاتصالات، شبكات الإنترنت، وخدمات تكامل الأنظمة) على جودة التدقيق الداخلي في البنوك التجارية الأردنية (التخطيط والإجراءات التحليلية وتدقيق جودة الأداء). وإنشاء إطار مفاهيمي لجودة التدقيق الداخلي وتكنولوجيا المعلومات.

استخدمت الدراسة المنهج الوصفي التحليلي. حيث يتكون مجتمع البحث من موظفي دائرة التدقيق الداخلي من كافة المستويات الإدارية في البنوك التجارية الأردنية. وقد تم إعداد استبيان وتوزيعه بشكل عشوائي لتحقيق ذلك. تم تقييم المعلومات التي تم جمعها من ١٦٧ استبياناً من أصل ٢٢٠ باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS).

من أهم النتائج التي توصلت إليها هذه الدراسة هو أن اعتماد تكنولوجيا المعلومات يؤثر بشكل كبير على جودة التدقيق الداخلي إحصائياً. وتتمثل التوصيات الأساسية للدراسة في أن تستمر البنوك الأردنية في الاستثمار في البنية التحتية لتكنولوجيا المعلومات ومكوناتها مثل أجهزة الكمبيوتر والبرمجيات والتطبيقات.

الكلمات المفتاحية: تكنولوجيا المعلومات، جودة التدقيق الداخلي، البنوك التجارية، الأردن

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### The Effect of Information Technology on Internal Auditing Quality in Jordanian Commercial Banks

#### Abstract

The purpose of this study is to investigate the impact of information technology (computer hardware, software applications, operating systems, data management and storage, networks and telecommunications, internet networks, and system integration services) on the internal auditing's quality in Jordanian commercial banks (planning, analytical procedures, and auditing performance quality). Create a conceptual framework for internal audit quality and information technology as well.

The study employed an analytical descriptive methodology. The population of the research consists of internal audit department employees from all levels of management in Jordanian commercial banks. A questionnaire was prepared and randomly circulated in order to achieve this. The information gathered from 167 out of 220 questionnaires was evaluated using the Statistical Package for Social Sciences (SPSS).

The key finding of this study is that adopting information technology significantly affects internal auditing quality statistically. The study's primary recommendations are that Jordanian banks continue to invest in information technology infrastructure and components such computers, software, and applications.

**Keywords:** Information Technology, Internal Auditing Quality, Commercial Banks, Jordan.

## Introduction and Theoretical Background:

Tan et. al. (2011) briefly described information technology is an implementation of information and communication technology tools, including a computer network, software, and hardware required to connect to the Internet. But, (Beig et al., 2012) divided technology into a group of interconnected parts that are divided into four different elements (Technical tools, users, documents, and organizational environmental tools). Therefore, study use figure 1 to illustrate information technology functions as the following:

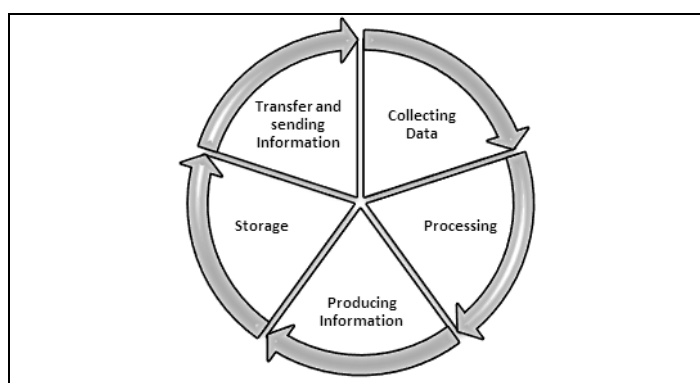


Figure 1: Information Technology Functions

Within the era of cloud communication, cloud accounting systems' vulnerabilities, interruptions, and confidentiality risks (Al-Nsour et al, 2021)

The continuous and rapid developments in the field of technology, information systems and the business environment that the world is witnessing, have led to an increase in the amount of digital data that is directly related to the importance and strategy of organizations and business institutions, and has become a means to achieve the goals of these organizations.

Information technology currently has become a major component of economic development, and the backbone of economies due to its significant impact on the results of operations, the quality of service delivery and productivity; therefore, the optimal use of information technology is one of the most important challenges faced by developing countries and their organizations. All current evidence supports the role

and impact of information technology in enhancing the competitiveness of nations, industries, sectors and organizations (Oluwatolani et al., 2011).

Banking is one of the booming industries that focus on technological innovation, as online banking services emerged as the largest focus area in the digital transformation process for banks, as digital transformation began to meet the needs of beneficiaries such as: (facilitating matters, reducing time and effort, and providing the service on the widest scale Personal interaction, better and faster advice, and regulation of financial spending) (Nirala and Pandey, 2017).

The rapid advancements in information and communication technology have allowed the banking and financial industries to expand their services and electronic banking businesses to encourage banking products. This has had a positive impact on the quantity and quality of banking services as well as increased competition between banks (Nawafleh, 2015).

Commercial banks' primary contribution to the nation's economic growth comes from giving investors access to capital, which is vital in the distribution of economic resources in nations (Duraj and Moci, 2015). As a result, (Kadioglu et al., 2017) found a substantial negative correlation between loan non-performance and bank profitability, which is measured by return on equity (ROE) and return on assets (ROA). Also (Sheefeni.2015) emphasized that Academic scholars as well as management of banks and financial markets are interested in the elements that affect the profitability and performance of the banking industry.

In addition to advancing and gaining a competitive advantage through the use of technology, organizations also seek to maintain control over their business operations and interest in achieving the organization's goal, as well as managing relationships with stakeholders such as the board of directors and shareholders (Khan, 2011). Given the vital role that technology plays in daily life in making institutions more transparent and effective through what they do to increase the efficiency of governance, accountability, and improve service delivery (Alam, 2012). While (Thomas and David, 2012) illustrated that There are several signs that the scientific and technical divide between industrialized and developing nations is expanding in the banking sector, and the divide still persists with regard to information technology.

This means the integration and linking of information systems and technologies to achieve integrated and harmonious systems between different media (Karimi and modiri, 2011). Therefore, every bank needs an automation system to perform most of the daily tasks, as the banking field has become one of the highly complex branches in the software market. This is because of its need for advanced techniques and mechanisms to build and integrate their systems, and this complexity comes from the need to develop different systems to cover diverse needs (Riad et al., 2008).

Based on that, the role of internal audit within banks processes became more vital especially within new information technology. The internal audit evaluation process is an integral part of the internal audit process; therefore, the evaluation process must be carried out periodically, in order to describe the efficiency and effectiveness in addressing and achieving the specified goals (Dubis et al., 2010) Although internal auditing systems provide a reasonable but not absolute guarantee of the organization's and departments' performance (Shamki & Alhajri, 2017). Also, (Weshah, 2020) revealed that internal auditors experience within Enterprise Resource Planning (ERP), as one of information technology tools, plays a main role on internal auditor's operational performance.

Product features and characteristics, quality improvement activities, product technical durability, product specification, and product function are all used to assess quality performance. (Kurniawan et. al., 2020).

Information technology is frequently followed by an increase in internal audit procedures, according to (Vinatoru and Calota, 2014). As a consequence, the company may increase its level of business process integration and raise the standard of its reports.

The effects of the use of information technology on the efficiency of the internal audit can be clarified through: documenting the time of audit procedures, the impact of some internal audit features that exist with manual audit, the possibility of some workers manipulating data from other sites without being detected, and specifications and characteristics of a computer, which can be relevant Impact of auditors on the nature and ease of work (Al Refaee and Siam, 2013).

This study achieves a new addition in the field of information technology and its impact on the quality of internal audit, which can be

considered a reference for internal audit managers and audit committees in Jordanian commercial banks.

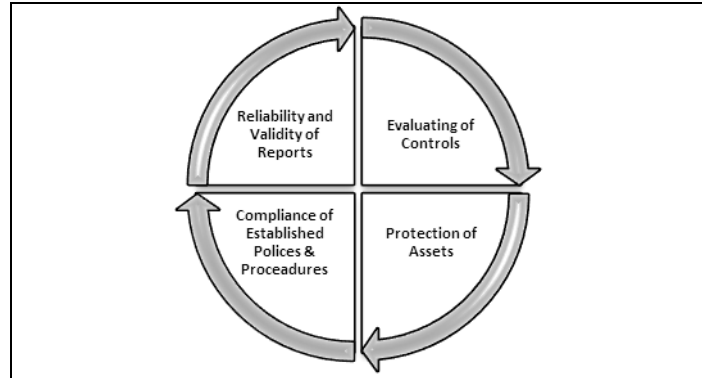


Figure 2: Internal Audit Functions

The internal audit functions within information technology environment based on functions mentioned on Figure 1 and Figure 2, the internal audit functions focusing on information technology applications, software, operating systems, data management and storage, and networks and telecommunications beside general controls upon information technology.

### Research Problem

The problem of the study is to try to answer the following question: What is the impact of information technologies on the quality of internal auditing (planning, analytical procedures, auditing performance quality) in Jordanian commercial banks?

The following questions arise from this question:

1. What is the impact of information technology on internal audit planning in Jordanian commercial banks?
2. What is the impact of information technology on the analytical procedures of internal auditing in Jordanian commercial banks?
3. What is the impact of information technology on the quality of internal audit performance in Jordanian commercial banks

**Methodology:**

The study relied on the descriptive and inferential approach, in order to identify the impact of the use of information technology on the quality of internal auditing in Jordanian commercial banks. It is also based on the facts associated with it, as This method encompasses data analysis, measurement, and interpretation, as well as accurate description of the phenomena or issue and its outcomes, as well as solutions and recommendations to solve it. It is not confined to the act of describing the phenomenon.

The study population included all employees of the internal audit department in Jordanian commercial banks within the public administration in the capital, Amman, which numbered (13) commercial banks (11 banks only cooperated). One of the reasons that prompted the researcher to choose commercial banks as one of the most important economic sectors in developing countries, and as per association of banks in Jordan, the banking sector in Jordan is one of the main sectors, which contribute significantly to supporting the national economy, as the total assets of banks operating in Jordan increased at the end of (2018) by ( 2.1%) of its value at the end of (2017) to reach (46.40) billion dinars, which is distributed by (35.4) billion dinars for Jordanian commercial banks, or (76.3%) of the total assets of banks in Jordan, and (7.7) billion dinars for banks Islamic banks at a rate of (16.6%) of the total assets and (3.4) billion dinars for foreign commercial banks, at a rate of (7.3%) of the total assets.

(220) questionnaires were distributed to them to ensure the greatest representation of the study community, and (183) questionnaires were retrieved (83%), and (16) questionnaires were excluded due to the incomplete response of the respondents to them, where the questionnaires subject to analysis amounted to (167) questionnaires (76%).

**Results, Conclusions and Recommendations:****Table 1: Names of the banks that cooperated, preparing employees in the Internal Audit Department, preparing and percentages of distributed and retrieved questionnaires that are valid for the purposes of statistical analysis**

No.	Bank	Number of Internal Audit Employees	Distributed		Retrieved		Subjected	
			Count	%	Count	%	Count	%
١	Al-Ahli Bank	١٥	١٥	7%	١٣	6%	13	6%
٢	Jordan Bank	٢٠	20	9%	١٩	9%	18	8%
٣	Amman Cairo Bank	٣٠	28	13%	24	11%	١٩	9%
٤	Housing Bank	٣٥	34	15%	26	12%	21	10%
٥	Jordan Kuwaiti Bank	٢٥	24	11%	21	10%	١٨	8%
٦	Commercial Jordan Bank	٢٠	٢٠	9%	14	6%	١٣	6%
٧	AJIB	١٥	١٥	7%	١٤	6%	١٤	6%
٨	ABC Bank	١٥	١٥	7%	١٠	5%	١٠	5%
٩	Jordan Investment and Finance Bank	١٥	١٥	7%	١٣	6%	١٣	6%
١٠	SGBJ	١٥	١٥	7%	١٤	6%	١٤	6%
١١	Capital Bank	٢٠	19	9%	١٥	7%	١٤	6%
<b>Total</b>		<b>٢٢٥</b>	<b>٢٠٠</b>	<b>١٠٠%</b>	<b>183</b>	<b>83%</b>	<b>١٦٧</b>	<b>76%</b>

**Table 2: Dimensions of the independent variable: the use of information technology**

Computer hardware		Software applications		Operating systems		Data management and storage		Networks and telecommunication		Internet Networks		System integration services	
Para-graph	Corre-lation	Para-Graph	Corre-lation	Para-graph	Corre-lation	Para-Graph	Corre-lation	Para-Graph	Corre-lation	Para-Graph	Corre-lation	Para-graph	Corre-lation
١	٠,٦٣٠	٥	٠,٨١٥	٩	٠,٦٤٧	١٣	٠,٨١٥	١٧	٠,٧٧٩	٢١	٠,٦٠٦	٢٥	٠,٦٩٠
٢	٠,٧٤٢	٦	٠,٨٥٠	١٠	٠,٧٥٦	١٤	٠,٧٨٦	١٨	٠,٨٠٥	٢٢	٠,٧٩٠	٢٦	٠,٧٤٩
٣	٠,٦٧٠	٧	٠,٨٥٤	١١	٠,٧٤٧	١٥	٠,٧٦٤	١٩	٠,٨٠٠	٢٣	٠,٨٤٤	٢٧	٠,٧٨٢
٤	٠,٦٦٧	٨	٠,٥٢٣	١٢	٠,٧٤٧	١٦	٠,٥٦٢	٢٠	٠,٧٤٢	٢٤	٠,٨٣٤	٢٨	٠,٧٧٥

**Sig.  $\alpha = 0.01$** 

Table (2) indicates the coefficients for distinguishing items using information technology ranged between (0.523-0.854) and it is a function at the level of significance ( $\alpha = 0.01$ ), which items have excellent distinction as being higher than (0.25), and thus this dimension is considered true for what was set to be measured.



Planning phase		Analytical procedures phase		Auditing performance quality phase	
Para-Graph	Correlation	Para- Graph	Correlation	Para- Graph	Correlation
٢٩	٠,٧٦٠	٣٦	٠,٦٨١	٤٢	٠,٧١٠
٣٠	٠,٧٣٣	٣٧	٠,٧٢٨	٤٣	٠,٧١٨
٣١	٠,٥٤٧	٣٨	٠,٥٤٧	٤٤	٠,٦٩٩
٣٢	٠,٦٦٧	٣٩	٠,٥١٣	٤٥	٠,٦٣٩
٣٣	٠,٥٣٣	٤٠	٠,٥٧١	٤٦	٠,٤٩٩
٣٤	٠,٥٣٢	٤١	٠,٦١٠	٤٧	٠,٤٩٨
٣٥	٠,٧٤٨				

**Sig.  $\alpha = 0.01$**

Table 3 indicates the coefficients for distinguishing the internal audit quality items ranged between (0.498 -0.760) and are significant at a significant level ( $\alpha = 0.01$ ), which are items that have excellent distinction as being higher than (0.25), and thus this dimension is considered true for what was set to be measured.

The result of the Cronbach Alpha coefficient for the final sample ranged between (69.4%-78.8%), so the study tool can be described as stable, and that the data obtained through it is suitable for measuring variables, and is subject to a high degree of reliability. Also, Skewness values, which indicate that if the values of the skewness parameter are  $<1$ , it means that the data is dispersed normally (Hair et.al.2011).

Variable	Computer hardware	Software applications	Operating systems	Data management and storage	Networks and telecommunications	Internet Networks	System integration services
Computer hardware	١,٠٠						
Software applications	٠,٦٧٧	١,٠٠					
Operating systems	٠,٤١٠	٠,٤٧٣	١,٠٠				
Data management and storage	٠,٤٧٥	٠,٤٧٥	٠,٦١٥	١,٠٠			
Networks and telecommunications	٠,٤٧٠	٠,٤٤٨	٠,٤٦٢	٠,٤٧٠	١,٠٠		
Internet Networks	٠,٤٩٢	٠,٤٤٥	٠,٤٣٧	٠,٤٢٧	٠,٥٩٤	١,٠٠	
System integration services	٠,٥٥٠	٠,٥٠١	٠,٤٩٨	٠,٥٥٩	٠,٥٦١	٠,٦١٦	١,٠٠

**Sig.  $\alpha = 0.01$**

The values of the correlation coefficient between the other independent variables were  $<1$ , and this implies that the phenomenon of strong multiple linear correlation between the independent variables is absent from the sample since their values were less than (80%) (Dodge, 2010).

Dependent Variable	Model Summary		ANOVA			coefficients				
	R	R <sup>2</sup>	F	F Sig	Df	Independent Variables	Std. Error	Beta	T	T Sig
Internal Audit Quality	0,874	0,764	73,339	0,000*	7/159	Computer hardware	0,049	0,234	4,120	0,000*
						Software applications	0,036	0,301	0,438	0,000*
						Operating systems	0,030	0,183	3,508	*1 0,000
						Data management and storage	0,041	0,210	3,906	0,000*
						Networks and telecommunications	0,033	0,066	1,200	0,211
						Internet Networks	0,034	0,036	0,660	0,507
						System integration services	0,034	0,101	2,648	*9 0,000
* $\alpha \leq 0,05$						F Scheduled = (2.01)      T Scheduled = (1,96)				

Table 5 indicates that there is a statistically significant effect of the use of information technology on the quality of internal auditing, through the value of  $F = (73.339)$ , which is greater than its tabular value (2.01) and significant at the level of significance ( $\alpha \leq 0.05$ ), which also represents the significance of this model at the degree of Freedom (7/159) and the value of  $R^2$  of (0.764) indicates that the use of information technology in its dimensions has explained (76.4%) of the change in the quality of internal auditing in Jordanian commercial banks. The correlation coefficient reached  $R = (87.4\%)$ , which indicates a strong Information technology utilization and the effectiveness of internal audits quality in Jordanian commercial banks.

This effect is due to several reasons, the most important of which is the use of information technology in the application of quality control procedures to increase confidence in the audit profession in the information

technology environment, and to improve the process of documenting work papers by following certain documentation policies and the use and application of information technology in documenting banking business, and improving relationships with customers. By showing more accuracy and attention during work, and using information technology to communicate with customers, it provides a fertile ground for attracting new customers, increasing its market share under competition conditions, imposing advertising restrictions and the development of information technology.

**Table 5: Results of testing the effect of the use of information technology in its dimensions in the planning phase of the internal auditing in Jordanian commercial banks**

Dependent Variable	Model Summary		ANOVA			Coefficient				
	R	R <sup>2</sup>	F	F Sig	Df	Independent Variables	Std. Error	Beta	T	T Sig
Planning phase	.835	.679	52.371	.000*	159/7	Computer hardware	.066	.491	7.667	.000*
						Software applications	.049	.268	4.277	.000*
						Operating systems	.048	-.082	-1.398	.164
						Data management and storage	.055	-.001	-.023	.982
						Networks and telecommunications	.045	-.072	-1.217	.225
						Internet Networks	.046	-.067	-1.094	.276
						System integration services	.046	.356	5.532	.000*
* $\alpha \leq 0.05$										
F Scheduled = (2.01)			[T Scheduled = (1.96)							

The table indicates that there is a statistically significant impact of the use of information technology in the planning stage of the internal audit, through the value of  $F = (52.371)$ , which is greater than its tabular value (2.01) and significant at the level of significance ( $\alpha \leq 0.05$ ), which also represents the significance of this model when Degree of freedom (7/159) and the value of  $R^2$  of (0.679) indicates that the use of information technology in its dimensions has explained (67.9%) of the change in the internal audit's planning stage in Jordanian commercial banks. The correlation coefficient reached  $R = (83.5\%)$ , which indicates a strong relationship between the use of information technology and the planning stage of the internal audit in Jordanian commercial banks.

This is probably due to the role played by the auditor through reviewing information systems to obtain adequacy, credibility and compatibility to

achieve audit objectives, and thus planning for the audit mission by confirming confidence, taking into account the extent of congruence between planning and standards for achieving audit quality. , This result agrees with (Mazza et. al., 2014).

Dependent Variable	Model Summary		ANOVA			Coefficient				
	R	R <sup>2</sup>	F	F Sig	Df	Independent Variables	Std. Error	Beta	T	T Sig
Analytical procedures phase	.826	.682	48.688	.000	159/7	Computer hardware	.166	.13	.200	.842
						Software applications	.049	.064	8.762	.000*
						Operating systems	.048	.020	6.903	.000*
						Data management and storage	.056	-.069	-1.110	.269
						Networks and telecommunications	.040	.008	.132	.890
						Internet Networks	.046	-.044	-.697	.487
						System integration services	.047	.049	.743	.389
* $\alpha \leq 0.05$										
F Scheduled = (2.01)			T Scheduled = (1.96)							

The table 7 indicates that there is a statistically significant impact of the use of information technology in the analytical procedures for internal auditing, through the value of  $F = (48.688)$ , which is greater than its tabular value (2.01) and significant at the level of significance ( $\alpha \leq 0.05$ ), which also represents the significance of this model when Degree of freedom (7/159) and the value of  $R^2$  of (0.682) indicates that the use of information technology in its dimensions has explained (68.2%) of the change in the internal auditing's analytical procedures in Jordanian commercial banks. The correlation coefficient reached  $R = (82.6\%)$ , which indicates a strong relationship between the use of information technology and the analytical procedures for internal auditing in Jordanian commercial banks.

This is probably due to the accuracy of predicting the results from the application of the analytical review, or a good assessment of the inherent risks and control risks, or because the auditor is well aware of the nature of the client's work and the circumstances surrounding it.

The significance of control to lower risks that hinder the facility's goals from being met and that further contribute to ensuring management directives are followed (Pistina and Mjaku, 2019)

Dependent Variable	Model Summary		ANOVA			Coefficient				
	R	R <sup>2</sup>	F	F Sig	Df	Independent Variables	Std. Error	Beta	T	T Sig
Auditing performance quality phase	.897	.804	93.470	.000*	109/7	Computer hardware	.050	.030	.679	.498
						Software applications	.037	-.071	-1.401	.163
						Operating systems	.036	.177	3.737	.000*
						Data management and storage	.042	.661	13.492	.000*
						Networks and telecommunications	.034	.263	5.541	.000*
						Internet Networks	.030	.027	.550	.583
						System integration services	.030	-.068	-1.307	.193
* $\alpha \leq 0.05$										
F Scheduled = (2.01)			T Scheduled = (1.96)							

The table indicates that there is a statistically significant impact of the use of information technology on the quality of the performance of internal audit work, through the value of  $F = (93.470)$ , which is greater than its tabular value (2.01) and significant at the level of significance ( $\alpha \leq 0.05$ ), which also represents the significance of this model. At the degree of

freedom (7/159), the value of  $R^2$  of (0.804) indicates that the use of information technology in its dimensions has explained (80.4%) of the change in the internal audit's quality of the performance in Jordanian commercial banks. The correlation coefficient reached  $R = (89.7\%)$ , which indicates a strong relationship between the use of information technology and the quality of performance of internal audit work in Jordanian commercial banks.

This is probably due to the presence of skills represented in the technical training of the human element, the availability of auxiliary technical departments, the availability of electronic networks, and perhaps due to the availability of good accounting systems.

(Ismail, 2015) also found that information systems have an impact on internal audit quality in Jordanian organizations' ERP environment. Moreover, according to Alawaqleh (2021), internal control and employee performance are positively correlated, and the accounting information system is a key factor in both internal control and employee performance.

In light of the results of the study that was reached, the researcher recommends decision-makers to provide computers whose specifications are commensurate with the nature of the work, and this recommendation came based on the paragraph that reads "The specifications of the devices used in the bank are commensurate with the nature of the work" in the dimension of computer equipment, which has the lowest arithmetic average, which amounted to (3.77%). Also, provide special programs for managing internal audit work, as this recommendation came based on the paragraph "The internal audit work is managed using special programs for this purpose" in the software and applications dimension, which has the lowest arithmetic average, which amounted to (3.76%). In addition, paying attention to information security and protection by continuing to update and apply security controls to operating systems operating in the bank" in the operating systems dimension, as this recommendation came based on the paragraph "follow-up to update and apply security controls to operating systems operating in the bank to maintain information security and protection And it obtained the lowest arithmetic average, which amounted to (3.82%) and establishing an internal information network linking all the different units and sections Intranet with an interest in monitoring their performance on an ongoing basis, as this recommendation came based on

the paragraph “The bank is linked to an internal information network between all the different units and sections Intranet whose performance is continuously monitored” in the dimension of networks and communications, And it obtained the lowest arithmetic average, which amounted to (3.72%).

In addition, the study emphasize the recommendation of (Weshah, 2021) and recommend educational institutions to employ faculty members who have the capabilities to teach and use information systems in the practical fields of accounting or auditing to provide practical fields with accountants and auditors have and ready to deal with information systems.

As well, providing information technology-related infrastructure, such as modern applications and programs that keep pace with technical progress to maintain the security and confidentiality of banking information, and the establishment of an internal banking information network for the use of the Internal Audit Department to ensure the availability of information and reporting easily and completely confidentially, and to enhance the technical and technical skills related to banking for the employees of the Internal Audit Department Through specialized training programs, and the use of information technology to enable a good assessment of control risks and increase market share.

#### **Limitations:**

The study was limited to measuring the impact of the information technology in its dimensions on the quality of internal audit. The study recommends the necessity of conducting future studies related to the advantages, disadvantages and obstacles of using information technology in commercial banks. (Future prospects for research: Obstacles to the use of information technology in Jordanian commercial banks, the use of information technology between advantages and disadvantages, and the extent to which information technology is used by Jordanian commercial banks).

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