The Role of Information Security on Enhancing Cloud Computing Effectiveness in Jordanian Commercial Banks

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Abstract

This study aimed to test the role of information security on enhancing cloud computing effectiveness in Jordanian Commercial Banks. The study adopted a five-dimensional scale to measure information security (confidentiality, physical security, application security, availability, identity management), while the cloud computing effectiveness was measured through six dimensions: control, transmission costs, accuracy, performance, reliability and privacy. To achieve study aims, a descriptive-analytical method was used equal random sample. The study was conducted on a sample of (212) employees working in these banks. This study found that there is a high-level average for information security dimensions and cloud computing effectiveness dimensions. Also, the results showed a significant impact of information security dimensions (confidentiality, physical security, application security, availability, identity management) on cloud computing effectiveness. It was also evident that there a significant impact of information security on cloud computing effectiveness dimensions (control, transmission costs, accuracy, performance, reliability and privacy).

Keywords: Information Security, Cloud Computing Effectiveness, Commercial Banks, Jordan.

1. Background to the Study

Internet and information technology have took a place in this era. The amount of data and information available on the Internet grows tremendously while files accumulate inside public and private computers. Users need to obtain information in a system that allows them to access and view it at any time, starting with individuals to institutions in all sectors.

With the increasing of storing information costs, organizations and institutions have faced many challenges in recovering data and preparing backup copies of them. And here comes the importance of cloud computing effectiveness which aims at protecting and managing data effectively and more efficiently. It also improves the work and increases the possibility of completing it, and facilitates the participation and cooperation among colleagues in a flexible manner with no space or time restrictions. Cloud computing technology represents the new solution for managing and storing various data and information, it reduces the chances of losing files, and it gives the user great work potentialities. Because of the widespread use of technology and cloud computing, the number of people who need protection from m threats is constantly increasing, large international companies and small startups need strong and powerful information security system. Cloud computing helps technology user to manage their business and avoid security breaches. Cloud computing is a collective method that protect the information from all dangers such as hacking, unauthorized access, unauthorized use,

spying, destruction, editing, inspection, copying, distribution, and publishing. The information security system is the nervous system of any company, and any damage in this system will cause harm in many sections. Cloud computing is a tool that guarantees the confidentiality, availability and reliability of information, which reduces the risk of acute crisis in the company, and refers to the set of processes and tools designed and used to protect sensitive business information. Cloud computing is a set of processes and tools designed to protect sensitive business information.

2. Study Problem and Question

In the age of the Internet, the age of information technology, the amount of data and information available on the Internet grows tremendously and files accumulate inside public and private computers, and a large segment of society needs to obtain that information in a system that allows them to access and view it at any time, starting with individuals From information seekers to institutions to show the importance of cloud computing as cloud computing technology represents the new solution for managing and storing various data and information, which allows individuals and institutions to access applications from anywhere, anytime and from any device connected to the Internet. As storage costs continue to rise, organizations are facing the challenges of data recovery and backing up. The need also appeared to protect data and manage it effectively, more efficiently and easily, both for individuals and institutions, but in a catastrophic manner for companies in various fields and sectors due to their greater information and a higher level of importance, thus maintaining information security has become an imperative necessity such as preserving the security of homes, institutions and properties Important in the modern era, so the researcher believes that information security would lead to high efficiency in cloud computing and its applications. Therefore, the study problem can be identified by the following main question:

- Is there an impact of information security on the effectiveness of cloud computing in Jordanian Commercial Banks?

3. Study Importance

The importance of this study stems from the importance of the researched variables, where the effectiveness of cloud computing is considered one of the fundamental and modern topics because of the benefits that can be obtained from the use of cloud computing services and its importance increases with increasing its effectiveness, and the most important of these benefits and advantages is to reduce cost: where it is possible to limit the purchase of devices Different programs and use of cloud computing services instead, which will contribute to reducing purchase, setup and maintenance expenses. In addition to speed where many things can be done via cloud computing with great speed and with the click of a button. As well as doing business, the use of this type of service may eliminate the need to rely on business management and information technology programs, as it obviates the need for a place to store various documents. Also, information security is an important topic that must be taken care of and shed light on it because it contains a set of ways and ways and means through which information can be secured from all dangers such as protecting information from penetration, unauthorized access, unauthorized use, spying and access by intruders. Destruction, amendment, inspection, copying, registration, distribution and publication, and its specialists shall search for the necessary protection of the information. On the other hand, there is a practical importance for this study, which is the possibility of benefiting Jordanian Commercial Banks from the results that will be reached, in relation to the concept of information security, and the concept of the effectiveness of cloud computing in Jordanian Commercial Banks. Moreover, this study is expected to increase awareness of the need to focus on the application of information security (confidentiality, physical security,

application security, availability, identity management). Finally, this study will present proposals and recommendations that would urge Jordanian Commercial Banks.

4. Objectives
The study seeks to achieve the following objectives:
- Knowing the level of information security in Jordanian Commercial Banks.
- Knowing the level of cloud computing effectiveness in Jordanian Commercial Banks.
- Knowing the impact of information security on the effectiveness of cloud computing in Jordanian Commercial Banks.
- Provide the necessary recommendations, in light of the results of the study.

5. Literature Review
In a study by Wang and Rabah (2014) indicated that cloud computing has sufficient capacity in terms of storage and processing capacity to flexibly handle large-scale data and by using analyzes to achieve added value. In another study conducted by Olushola (2020) it was demonstrated that the security of cloud services became very necessary for the large demand for cloud services due to its versatile applications. It has been observed that the cloud factor in cloud computing is the most important factor in cloud computing as it has the most influence on cloud operations. Cloud computing insurance strategies include formal, informal, and technical strategies. They include confidentiality strategies, integrity, availability, privacy, compliance, trust, incident response, governance, and security awareness strategies. As for Al-Dakr (2017), it is believed that the most used cloud computing services by researchers is the cloud of social networking services, followed by a cloud of scientific research tools, which indicates the importance of cloud computing and its role in enhancing the information culture and scientific research capacity of researchers. Al-Khasawneh (2019) focused on the legal aspects of the use of cloud computing, as it showed that cloud computing contracts are formulated according to the conditions laid down by providers, and therefore they indicate that they are compliance contracts, and that self-regulation and policies that are developed by internet sites are insufficient and tend towards the interests of computing services providers. Msarhed (2019) indicates the need to put mechanisms and controls in the framework of governance is to adopt a cloud computing policy, and the adoption of a governance body for cloud computing that will develop standards and laws governing and follow up their implementation, in addition to adopting an infrastructure for computing as data centers to avoid the risks of storing data in service provider centers. Munawar (2019) indicated that the application of cloud computing helps in the effectiveness of the performance of the educational process, and that there is a great interaction between students and teachers with the system, which enhances the speed in the widespread use of cloud computing technology. On the other hand, Bizan (2019) explained that cloud computing applications lead to cost savings, in addition to the ability to expand due to the huge capacity and the speed of loading and storage on demand, as well as the strength of cooperation and building a unified virtual presence on the Internet, but at the same time organizations provide many one of the most important challenges is the adoption of the latest technology systems and the possession of highly qualified cadres. Al-Arifi (2019) showed that there is an effect of the use of cloud computing in developing, flexibility and speed of driving performance. As for Al-Jawiri (2018), she concluded that the use of the cloud computing system has contributed to improving the level of skills and cognitive process, and the completion of projects through the web using cloud computing applications. In another study conducted by Al-fadl (2016) she explained that the basic elements of cloud infrastructure (operating systems and applications, physical devices) contribute to supporting databases and facilitate many daily procedures, and give clear flexibility to human resources in dealing with databases. Also, the use of cloud computing will not threaten the security and integrity of databases. As for Mahmoud study (2015), it confirmed the possibility of benefiting from cloud storage in all organizations, and cloud storage is one

of the pillars of cloud computing, and it reduces the costs of use for individuals and organizations, and it saves time and effort in obtaining data and information from anywhere in The world without being restricted to specific devices.

6. Theoretical Background
6.1. Information Security

It is a wide range of policies, technologies, and controls to protect data, applications and its infrastructure, which is the merger and integration of information security areas such as network security, systems security, and application security in a new way where each part depends on the other and there is complete harmony between these types, (Onyema, Eucheria, Nneka, Afriyie, & Nwoye, 2020). Also, it's the science which provide protection for information from the threats it threatens or attacks on, by providing the tools and necessary means to protect the information from internal or external risks, and providing a set of standards and measures taken to prevent information from reaching from unauthorized persons through communications and ensuring the authenticity and correctness of this Telecommunications (Chang, Abdel-Basset, Ramachandran, 2019). The information security term expresses the degree of ability to trust data storage operations on the Internet, and the degree of compromise the data privacy and ownership, and the level of service which expresses the availability of these services (Khan,& Qazi, 2019). Olushola, (2020) indicated the Information Security as a set of strategies for managing operations, and necessary policies, tools to prevent, detect, document, and counter threats to digital and non-digital information, and this includes protecting information from modification, disruption, destruction, and inspection, and There are many solutions provided to ensure the security and protection of sensitive data in the cloud, and the most important of them in the following technologies: Firewalls, Encryption and Key Management, Mask or De-Identification of Data, Centralized indenting Management. When choosing solutions to ensure security and protect data, you must consider the set of implementation risks and costs involved. Data encryption is the easiest solution to protect data from unauthorized access in the cloud environment, where data may be encrypted at the collection time or before it is transferred to another cloud environment, but the most common solution Convenience is using both options of firewalls with encoding rather than limited to one solution (Ravindran, 2019). Security programs are built around the fundamental goals and principles of the so-called Trinity (CIA), which includes the following three pillars: "Confidentiality" it means not to disclose sensitive information except to authorized parties and prevent anyone from unauthorized access to another person's data. "Integrity" it means preserve the data from modification or change by persons who are not authorized to access it, such as if a person intentionally or unintentionally want to access the data that he is not allowed to access. "Availability" it means ensuring the accessibility of data by authorized parties when they are needed, and it must be complete, correct and accurate, unaltered or incomplete, which makes the system elements work properly (Olushola, 2020).

The researcher relied on the following dimensions to measure information security:

1. Confidentiality: Olushola (2020) indicate confidentiality as process of Not allowing unauthorized persons to access data and systems that do not belong to them. Users need to make sure that the quality of their connection to the Internet is strong, and they have already stored the files on the network and, their account information is known only by them, when they performing any processing and storing data. Also, the service provider should store the information and not leaking it by preventing any third party from entering the account. this is done through a set of steps to achieve cloud security if taken by the users, and these basic steps are: first starting to achieve cloud security and planning early to achieve it, second: identifying the weakness of Cloud services you use, whether you are an individual or an institution, third protect the data in the data

transfer process, while the user journey (while it's transferring from one to another), secure your base system, the choice of a reliable cloud service (Chang, Abdel-Basset, Ramachandran, 2019) &(Mahmoud, 2015).

2. Physical security: The service provider must ensure that the devices and equipment are sufficiently safe and inaccessible in any way and that they are restricted by an integrated and reliable access system, and it's indicated by (Mahmoud, 2015). as the quality of the network, applications, and servers that the service provider uses And to make sure that there are no security holes, and he can always do that by (Penetration Test) and related things, which examines all devices and systems with a view to discovering their weaknesses and vulnerabilities that any hacker can take advantage of in order to obtain information (alFadl, 2016).

3. Application security: Cloud computing users rely on a set of software interfaces (user interfaces) and application programming interfaces to manage and control cloud services. The security and availability of public cloud services depend on the security of application programming interfaces, so there is an urgent need to design them in a manner that ensures protection from accidental and malicious attempts to circumvent data security (alFadl, 2016). In cloud computing that provide data processing tools and software tools to help users in developing any program code and try it, these tools should always be highly efficient, as their performance should be characterized by smoothness and not to save unimportant data and distract the user, where These tools can be a tool for leakage the important data to the user, so it must carry out tests and implement policies, procedures, and multi-layer protection systems (Onyema, Eucheria, Nneka, Afriyie, & Nwoye, 2020).

4. Availability: It's the guarantee that users' have continual service access, and ability permanent to access their data, systems, and applications on a regular basis (Chang, Abdel-Basset, Ramachandran, 2019). Bizan (2019) indicated availability, as provides the resources that users need in a more dynamic way, at any time and more effectively, as it does not matter where the equipment is, but ensuring the availability of service to users is more important. The availability also expresses the during-time which a service or a system is running, for example, 100%, represents a system that works all the time without ever stopping, while 99% of the availability within one year indicates that the system will work throughout the year with the possibility of an interruption in Service (total) at 1%, representing (3 days, 15 hours, and 36 minutes) of 365 days. These ratios are set based on several factors, including, the periods of scheduling and emergency maintenance, and the needed time to restore the system normality when its event an error.

5. Identity Management: It is an information system that aims to control access to information sources and service resources by verifying the identity of the user and making sure that it is the true owner of the account. To increase protection, these systems must be integrated with the systems used in the organization, whether traditional or advanced. Identity management is referred to the process by which the identity owner is authenticated with the service provider to access resources, and there are many systems that identify and define the user identification to control the way, type And the amount of information and services provided by the system, the identity management system identifies users Based on a set of settings such as (name, email address and credit card number) (Bizan, 2019)& (Mahmoud, 2015). The most important advantages of identity management system lie in maintaining secure access through traditional central computers, or server-based systems and the other applications of organizations that choose to work on them which all based on the cloud, it also provides users with the opportunity to move seamlessly between traditional systems and cloud

applications, it's also prevent the unauthorized access to the digital resources (alFadl, 2016) & (Chang, Abdel-Basset, Ramachandran, 2019).

6.2. Cloud Computing Effectiveness

It is a technology that relies on transferring the processing and storing the information's to the cloud, and it's a server device that accessed via the Internet, so the IT programs are transformed from products to services. This technology helps in removing the problems of maintenance, development of programs, and information from the companies that use them. Cloud computing needs an infrastructure that relies on advanced data centers which offered a large storage space to users also provides the program as services to users, and all the above are depends on the Web 2 technologies capabilities that provided. Cloud computing is one of the new and innovative approaches that contribute to improving information services and ensuring their quality and it has a great role in rationalizing costs (Bizan, 2019). It is also a technical service system that allows organizations to use applications and store data and information on cloud computing servers in the form of files that can be accessed via the Internet at any time and place with the possibility of sharing them with others and conducting discussions and time and asynchronous communication (Arifi, 2019). also, Msarhed (2019) referred to cloud computing as a modern IT service, which provides users with a set of resources, services, and applications with ease in exchanging and sharing data quickly and high flexibility. Onyema, Eucheria, Nneka, Afriyie, & Nwoye (2020) pointed to cloud computing as a way to increase capacity and add capabilities without the need to increase costs, as it is based on the principle of uploading software, databases, applications, and support systems in a central external server that can be accessed via the network. As it is a large group of virtual resources that are easy to access and use such as the physical infrastructure, advanced platforms, and services that allow the optimal use of these resources and applications Zafar, Khan, Malik, Ahmed, Anjum, Khan, Javed, Alam &,Jamil,2016). Cloud computing expresses the set of computer systems and resources that are available on-demand over the network and it provides a number of integrated computer services without being restricted to local resources in order to facilitate the services such as the capacity of data storage and backup, the capabilities of software processing, task scheduling, and remote printing for users. The effectiveness of cloud computing lies in the ability of these systems to achieve goals and objectives and perform their tasks at the required level, effectively (Al Tayeb, Alghatani, El-Seoud, & El-Sofany, (2013). In other words, cloud computing effectiveness transferring the data processing, storage capacity, maintaining and developing information technology programs in an optimal, quickly and at the lowest cost, way. and within specified structures and policies, and being able to detect negative and positive deviations, identify the causes of these negative deviations and address it to not repeat them in the future, and provide suggestions that support the continuation of positive performance, to be able to use time in the right place, where the main aim of cloud computing is to shorten time and speed of delivery and take advantage of capabilities and capabilities without the need to buy interfaces An expensive costume (alFadl,2016). The effectiveness of cloud computing also indicates the ability to provide a number of integrated computer services without being restricted to local resources, provide high storage capacity for data , backup and self-synchronization, programmatic processing and scheduling capabilities for tasks, e-mail payment, and remote printing, in order to facilitate the work to the user. while the users are connected to the network, they can control In these resources through a software interface which facilitates all tasks and ignores many details and internal operations, finally, when the ability of these systems is high to perform the previous services, the effectivity of system will be in the highest level (Saleem, 2016). Cloud computing is the way to improve enterprise quality services in the future. by participating in using the same devices, services, and data, so it reducing the total costs. One of the cloud computing benefits is in providing good information services that meet the needs and requirements of users. thus achieving the benefit from current and emerging technology, confidentiality of full participation, increase the accessibility of groups (by enabling them to reuse information and

gather information about them), and reduce duplication between information facilities in the work, ensuring and streamlining the groups, and manage the Workflow with high quality (Zhang, Xiong, Huang, Li, Choo, & Jiangtao, 2019). In order for organizations to enhance the quality of their services, they must follow the modern methodologies represented in cloud computing systems and raise the levels of effectiveness for these systems and applications, to get fundamental changes in the information, improving the quality of information services, and meeting the user requirements in the knowledge society, the researcher relied on the following dimensions to measure the effectiveness of cloud computing.

1. Control: it means the degree of control by organizations that use cloud computing in their work platforms and operation designs (Bizan, 2019). Where some companies worried about the cloud computing providers because they have full control over the platforms. Also, cloud computing providers do not usually design specific platforms for companies and their business practices but rather are of general use (alFadl, 2016).

2. Transmission costs: the company's use of a cloud computing system enables them to save the money wasted on hardware and software, as it is not necessary to buy the fastest or best computers in terms of memory or hard disk capacity. Where any regular computer with any web browser can access different cloud services (editing documents, storing files, editing photo) (Olushola, 2020). And there is no longer a need to purchase expensive equipment such as servers to provide email, or high volumes storage to get data or information backup. However, it can bear high charges for transferring the data to networks and it depends on the rate of transferred data. The cost of transfer data may be low for small Internet applications, which do not contain intensive data, but it increased by using applications which contain an intensive data, so the cost depends on the rate of transformed data (Ismail, 2018). Cloud computing is one of the new and innovative approaches that contribute to improving information services and ensuring their quality and which have a great role in rationalizing costs (Bizan, 2019). Cloud computing technology is a virtual technology that reduces the number of machinery and saves energy where is no need to purchase server hardware to use it in internal applications, as well as reduce operating expenses where applications do not need internal maintenance (alFadl, 2016).

3. Accuracy: the cloud computing readiness that depends on the current infrastructure and its ability to complete services that based on cloud, and some cloud services have the ability to support the existing technology, and increase its effectiveness. In terms of its ability to add accounts, add virtual storage capacity, and compatibility with the organization infrastructure (Saleem, 2016). Accuracy also indicates the partnership relation between the customer and the service provider as each of them has a very important role in it. Where the customer's need to make sure that the quality of internet connection is strong, they also need to make sure that they have uploaded the files on the network. Also, users have to secure their accounts and not letting anybody else to login to his account. The service provider tasks are to save the files and information that the customer uploaded and not allow it to leak to anyone (Bizan, 2019)& (Ismail, 2018).

4. Performance: the performance of cloud computing is measured by the access time to all applications and information, and the level of remote users' satisfaction from cloud providers over the performance of these systems through their high delay and inactivity (Ravindran, 2019) & (Atta, 2018). Cloud computing systems are considered to be of the high-performance systems as they allow all users to access applications and services from anywhere and anytime via the internet. because the information is stored on the company servers which is providing the service, that is, it is not stored on the user's hard disk, and also corporate clouds such as Google And Amazon allows to perform complex calculations in minutes or hours that take years to be performed on normal computers because their clouds contain thousands of servers linked together (alFadl, 2016).

5. Reliability: its refers to ensuring that the service is working permanently while providing a lot of time and cost to the user, as the company that providing service cloud storage is committed to ensuring that the service works around the clock, and in the best possible way, and the company that providing service is committed to fixing any emergency malfunctions As soon as possible (Ravindran, 2019). without any interruption even if there is something wrong with the system. What is cloud computing characterized by, and it seeks to deliver that to the highest levels. Where cloud computing have a support team that always helps if something goes wrong and the help is guaranteed On 24 hours and every day. If the server fails in hosting, you can easily transfer the file and services to be hosted on other servers are available and work will not be affected where the tasks can be followed smoothly (Onyema, Eucheria, Nneka, Afriyie, & Nwoye, 2020) & (Ismail, 2018).

6. Privacy: is a set of appropriate policies and procedures taken in order to preserve the user rights and the service provider, as it generally gives a clear message about the professionalism and strength of the service provider in lacking tolerance in reserves of tampering attempts. Privacy is measured by relying on the ability to penetrate and obtain user information, or sell the user information or use it one another way (Saleem, 2016). Ismail (2018) indicate that data privacy that the data is able to move from a site to another, and to be encrypted by best technologies. And separate it, and protect it from the mixture between users.

7. Hypotheses

Based on the results of previous studies, the following hypothesis can be determined:

H1: There is impact of information security on cloud computing effectiveness in Jordanian Commercial Banks.

8. Procedures

8.1. Sample

The population of this study was represented by employees in the operations divisions of the Jordanian commercial banks, which number (13) banks. Due to the difficulty of determining the number of employees in these departments due to the lack of ready data, the researcher then used the method of equal random sample by distributing (20) questionnaires to employees in this section for each bank, where (260) questionnaires were distributed, by conducting organized visits to these banks in times agreed upon with the management of each bank, at a time that is appropriate for employees, to avoid confusion. After completing the distribution process, (212) questionnaires valid for analysis were returned, and this represents (81%) of the number of distributed questionnaires.

8.2. Instrument

To measure the variables of the study and its dimensions, the researcher relied on measuring information security on the scale mentioned in the study Chang, Abdel-Basset &Ramachandran (2019), which consists of (25) items distributed on five dimensions: confidentiality, physical security, application security, availability and identity management. With regard to the scale of the cloud computing effectiveness, it was adopted on the scale used in the study alFadl (2016), consisting of (24) items distributed on six dimensions: control, transformation cost, accuracy, performance, reliability and privacy. Table (1) shows the reliability values of the Cronbach Alpha for the approved items, which were all greater than (0.70) which is the minimum value that can be accepted for the scale for the purpose of conducting the statistical analysis. Likert scale, which ranged strongly agree (5) and strongly disagree (1), was used to answer the two measures items.

9. The Results of Testing

Table (1) shows the results of descriptive analysis of the variables, using the mean and standard deviation. With regard to the dimensions of information security, it was the highest value of physical security with an average score of (4.105), while the lowest value for application security with an average score of (3.741) was all at high levels. With regard to cloud computing effectiveness, it was the highest value of performance with an average (4.093), while the lowest value was for Transmission cost with an average (3,829), all of which are high.

Table 1:   Descriptive Statistics Results

Variable	Items	Alpha	Mean	Std.
Confidentiality	5	0.830	3.821	0.719
Physical Security	5	0791	4.105	0.652
Application Security	5	0.809	3.741	0.831
Availability	5	0.853	3.769	0.639
Identity Management	5	0.781	3.782	0.683
Control	4	0.862	3.941	0.741
Transmission Cost	4	0.829	3.830	0.811
Accuracy	4	0.873	3.848	0.682
Performance	4	0.799	4.093	0.745
Reliability	4	0.805	4.004	0.774
Privacy	4	0.842	3.962	0.678

Table (2) presents the results of the analysis of stepwise multiple regression of the effect of information security dimensions on cloud computing effectiveness. In the first model, it was found that there was a significant effect of application security, as the value of (R^2=048.2), this means that application security explained (48.2%) of the variance in of cloud computing effectiveness with a level of significance (0.000). In the second model, after adding availability, the ratio of two dimensions of application security and availability has increased the percentage of interpretation in the variance in the effectiveness of cloud computing to (50.1%). In the third model, when confidentiality was added to applications security and availability, the percentage of variance in cloud computing effectiveness increased to (52.1%). Looking at the fourth model, adding identity management to security applications, availability and confidentiality, the percentage of variance in cloud computing effectiveness has increased to (54.7%). With regard to the impact of physical security, it was found not to have a significant impact on cloud computing effectiveness.

Table 2:   Stepwise Multiple Regression

Model	Variable	B	F	Sig.	R^2	T	Sig.
1	Application Security	0.710	10.117	0.000	0.482	102.350	0.000
2	Application Security	0.568	6.672	0.000	0.501	56.386	0.000
	Availability	0.272	2.869	0.004			
3	Application Security	0.748	7.300	0.000	0.521	41.671	0.000
	Availability	0.289	3.083	0.002			
	Confidentiality	0.279	3.071	0.002			
4	Application Security	0.648	6.226	0.000	0.547	35.832	0.000
	Availability	0.219	2.328	0.020			
	Confidentiality	0.433	4.255	0.000			
	Identity Management	0.356	3.689	0.000			

10. Summary and Concluding Remarks

This study attempted to verify the effect of information security on cloud computing effectiveness in Jordanian Commercial Banks. After collecting the necessary data for the study and subjecting it to statistical analysis, the results of the descriptive analysis showed that there are high levels of all

dimensions of information security advanced by physical security. Where employees in the operations department of Jordanian Commercial Banks see that the information systems devices and equipment are sufficiently safe and difficult to access and the competent authorities in these banks are working on taking the necessary tests to discover their weaknesses in order to avoid their penetration. The results also indicated that all dimensions of cloud computing effectiveness came high, advanced by performance, where employees emphasize the ease and speed of their access to all applications, which reflects positively on the satisfaction of beneficiaries of the service, and this is what banks seek to achieve. The results showed that there is a significant effect of four dimensions of information security on cloud computing effectiveness, led by application security. Where employees in the operations department of Jordanian Commercial Banks believe that the security of applications has the greatest impact on cloud computing effectiveness, as the security and availability of public cloud services depend on the security of application programming interfaces, so there is an urgent need to design them in a manner that ensures protection from attempts to penetrate the security of information that the system contains it and the great importance of this information as it relates to the money of the clients of these banks. The second rank in terms of impact was for availability, as having a high degree of availability provides beneficiaries with fast access to the service and the lowest possible time. Confidentiality came third in terms of affecting cloud computing effectiveness, as cloud computing was able to secure high confidentiality of beneficiary accounts and prevent unauthorized persons from accessing it. In the last place, the effect of identity management, which is related to checking the identity of the user of the system and the fact that he/she is the owner of the real account, which increases the effectiveness of cloud computing.

References

[1]   Al-Arifi, Hassa Bint Saad (2019). A vision based on cloud computing to develop the performance of university leaders. Journal of the Islamic University of Educational and Psychological Studies, 27(3), 165-188.

[2]   Al-Dakr, Metwally Ali Muhammad (2017). The role Cloud computing in enhancing information culture and research capabilities at Minia University: a survey study. Journal of the Arab Center for Research & Studies in Library & Information Sciences, 4(8), 34-67.

[3]   Alfadl, Ali Abdul-Hussein. (2016). Effectiveness of cloud computing in strengthening the banking databases an analytical study of a sample of IT specialists in Iraqi banks. Al-Qadisiyah Journal of Administrative and Economic Sciences, 18(3), 246-268.

[4]   Alfadl, Ali Abdul-Hussein (2018). The cloud computing effectiveness in supporting banking databases: Analytical study in Iraqi Banks. AlQadisiyah Journal of Administrative and Economic Sciences, 18(3), 247-26.

[5]   Al-Jawiri, Siham Bint Salman Muhammad (2018). The effect of a proposed technology concept based on some cloud computing applications in developing practical and cognitive skills among students of the College of Education, Princess Nourah bint Abdul Rahman University. Journal of Educational & Psychological Studies, 26(3), 54-84.

[6]   Al-Khasawneh, Aladdin (2019). The extent to which the general rules regulating the protection of intellectual works are applied to those stored through cloud computing: a study in Emirati legislation. Journal of Sharia and Law, 33(78), 223-261.

[7]   Al tayeb, A., Alghatani, K., El-Seoud, S., & El-Sofany, H. (2013). The impact of cloud computing technologies in e-learning. International Journal of Emerging Technologies in Learning, 8(2), 79-98.

[8]   Atta, Othman (2018). Cloud storage: Cloud computing and social media to utilizing selective dissemination of information service. AL-Qadisiyah for Computer Science and Mathematics Journal, 10(2). 27-46.

[9]   Bizan, Hanan Al-Sadiq (2019) cloud computing Systems and the information services provision, analytical view. Journal of the Arab Center for Research & Studies in Library & Information Sciences, 6(12), 133-161.

[10]   Chang, V., Abdel-Basset, M., & Ramachandran, M. (2019). Towards a reuse strategic decision pattern framework–from theories to practices. Information Systems Frontiers, 21(1), 27-44.

[11]   Ismail, Othman (2018). Cloud Storage: Cloud Computing and Social Media to utilizing Selective Dissemination of Information Service. Journal of AL-Qadisiyah for computer science and mathematics,10(2),65-78.

[12]   Khan, I. A., & Qazi, R. (2019). Data Security in cloud computing using elliptic curve cryptography. International Journal of Computing and Communication Networks, 1(1), 46-52.

[13]   Mahmoud, Mamdouh Ali. (2015). Uses of cloud storage for data in libraries and information centers and information security. The Jordanian Journal for Library and Information Science, 185(3114), 1-33.

[14]   Monower, Manal Monower Ali (2019). Design an electronic system for management educational process by using cloud computing, case study: College of Postgraduate, Faculty of Mathematical and Computer Sciences, Jezira University. Journal of Engineering Sciences and Information Technology, 3(3), 120-133

[15]   Msarhed, Bilal (2019). Concept of cloud computing governance in government institutions. Journal of Strategy and Development. 9(3), 175-198.

[16]   Olushola, Omoyiola Bayo (2020). Strategies for securing cloud services. Journal of Computer Engineering, 22(1), 13-19. DOI: 10.9790/0661-2201031319.

[17]   Onyema, E. M., Eucheria, N. C., Nneka, U. A., Afriyie, R. K., & Nwoye, O. U. (2020). Cloud security challenges: Implications on education. International Journal of Computer Science and Mobile Computing, 9(2), 56-73.

[18]   Saleem,Tayseer (2016). Cloud computing between theory and practice. Cybrarians Journal, (42), 1-21.

[19]   Wang, Duncan, & Rabah, Kefa (2014). Environmental conditions' big data management and cloud computing analytics for sustainable agriculture. World Journal of Computer Application and Technology, 2(30, 73-81, DOI:10.13189/wjcat.2014.020303.

[20]   Zafar, Faheem, Khan, Abid, Malik, Saif, Ahmed, Mansoor, Anjum, Adeel, Khan, Majid, Javed, Nadeem, Alam, Masoom, & Jamil, Fuzel (2016). A survey of cloud computing data integrity schemes: Design challenges, taxonomy and future trends. Computers & Security, (65), 29-49. DOI:10.1016/j.cose.2016.10.006

[21]   Zhang, L., Xiong, H., Huang, Q., Li, J., Choo, K. K. R., & Jiangtao, L. I. (2019). Cryptographic solutions for cloud storage: Challenges and research opportunities. IEEE Transactions on Services Computing.