



Research Article

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The Impact of Cloud Computing and Its Applications on Libraries and Information Centers

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Abstract

This study aims to know to what extent Iraqi Universities libraries made use of cloud computing services in providing its services on one hand, and what are the challenges that face it on the other hand. Also, the study aims to discover the technological skills of the librarians which enable them to use the cloud computing technique. The study sample consists of all librarians in university libraries, 80 female and male employees. The questionnaire was used for collecting information and analyzing information and SPSS package. The study concluded that librarians are aware of cloud computing technique and own technological skills enable them to use it. However, the decision of this technology application should be made by the higher administration. Thus, flexible plans and strategies must be made to help make changes and modifications to cope up with developments of new technologies in general and cloud computing in particular.

Keywords: Cloud Computing, Information Services, University Library

1. Introduction

Internet and information technology emergence participated in developing library services and information centers and creating new ones, so, many tended to participate in computing projects and its technologies, starting from participation in databases and digitizing its stocks to cloud computing which is considered one of the new technology fruits in its various applications. Cloud computing term is admired and loved much by many users individually and institutionally as this technology provides transparently-managed systems and applications and it enables users to have access to it without having knowledge or experience according to the available technological and material possibilities. Using cloud computing in libraries is considered one of the most important modern approaches which paid its attention as it represents one of the solutions suitable for developing libraries, overcoming its financial and storage problems and elevating the level of service quality and ameliorating outputs. As the increase of intellectual product size and variety of its topics, sources, forms and languages was a reason for the emergence of many problems faced by researchers and information institutions, most outstanding of which are the problems relating to providing storage capacity for information, variety of processing methods, and the problems relating to flow of information and ways of its transmission and participation in benefiting from it.

Libraries also benefited from the technologies; some libraries tended to participate in computing projects which let some institutions dedicate its services to the libraries such as the university libraries

project. Like the university libraries, the other libraries have been influenced by changes witnessed by the world. However, achieving amelioration and quality depends today on frameworks with technological and technical skills, and accrediting and adopting new techniques and technologies to provide its services.

2. Background of the Study

Many libraries and information centers face many problems which hinder its development and growth, and make it useless owing to diversity of information and contents. Additionally, cloud computing came to light to increase the growth of these libraries and make good and rapid use of it. Factors of cloud computing are as follows: (possibilities of cloud computing application, drawbacks of cloud computing application, information and data security). Extensive use of it in libraries and information centers was as follows (librarians awareness and technological skills of librarians).

3. Significance of the Research

This study is significant as it provides a group of expected additions which may benefit researchers in the academic field and it can actually be tackled as follows:

- Identifying new concept known as cloud computing.
- To know the role played by cloud computing in developing information services and how to use it.
- To know the cloud computing applications in libraries.

4. Research Questions

In this research we will try to know to what extent our university libraries are ready to benefit from cloud computing services and the most important challenges facing its application. Hence, the following main question can be posed: to what extent the Iraqi libraries benefited from cloud computing services in providing its own services? Which challenges facing this?

To answer this main question we attempt to answer the following questions:

- Are Iraqi university librarians aware of cloud computing technique?
- Do Iraqi university librarians own technological skills enable them to use cloud computing technology?
- Are possibilities of benefiting from cloud computing services available in Iraqi university libraries?

5. Research Objectives

The research objectives can be summarized as follows:

- Identifying the cloud computing applications used and the ability to invest it in libraries and information centers.
- Focusing on the importance of cloud computing and how to use in providing information services.

6. Theoretical Background

6.1 Cloud computing

6.1.1 Cloud computing concept

Cloud computing: a technology depends on transferring computer storage and processing to what is called cloud; it is a server to which one can get access via internet. Thus, information technology programs are turned from products into services. The infrastructure of cloud computing depends on

developed data centers which provide big storage spaces for users and provides some programs as services to users. So, it depends on possibilities provided by technologies of web 2.0 (Demissie, Dahiru, 2017).

6.1.2 The main characteristics of cloud computing

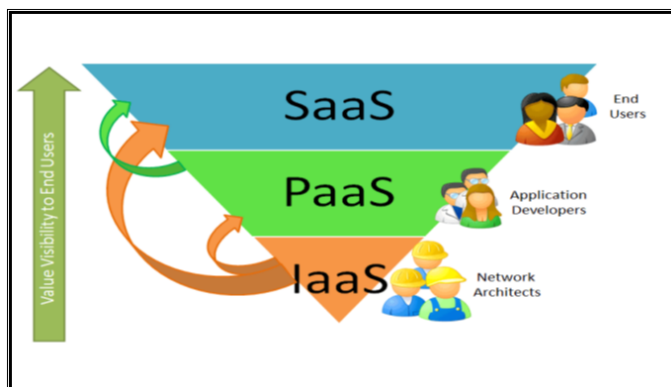
One of the most important characteristics of cloud computing (Kumar, Murthy, 2017):

- On-demand self-service upon request: the user can automatically provide computing possibilities from one side if needed without any necessity to interact with each service provider.
- Broadband network connection: possibilities are provided via network and can be accessed through standard mechanisms which enhance the use via customer platforms of varying characteristics (for example: mobile phones, tablets, laptops, workstations).
- Resources collecting: computing resources of service provider are collected in order to serve many users by using the a multi-tenant model in addition to different virtual and physical resources which can be appointed and effectively reappointed upon request of users. One feels website independence as the user usually has not control or awareness of the actual site of resources provided.
- Rapid flexibility: possibilities can be automatically provided and disseminated in some cases so that an internal and external improvement suitable for request can be achieved. Regarding user, the available possibilities can often be unlimited and to which one can get access whenever.
- The service estimated according to criteria: the clouding systems control automatically the resources and attempt to use it well by make use of the measure of possibilities and abilities on a particular level of abstraction which suit the service type (such as storage, processing, bandwidth and active user records). Additionally, use of resources can be monitored and controlled and a report can be written about this issue, the fact which provides transparency for service provider and user.

6.1.3 Types of cloud services

Cloud Computing technology services can be widely divided into three types (Ogbu and Lawal,2013):

- Infrastructure as a service
- Platform as a service
- Software as a service

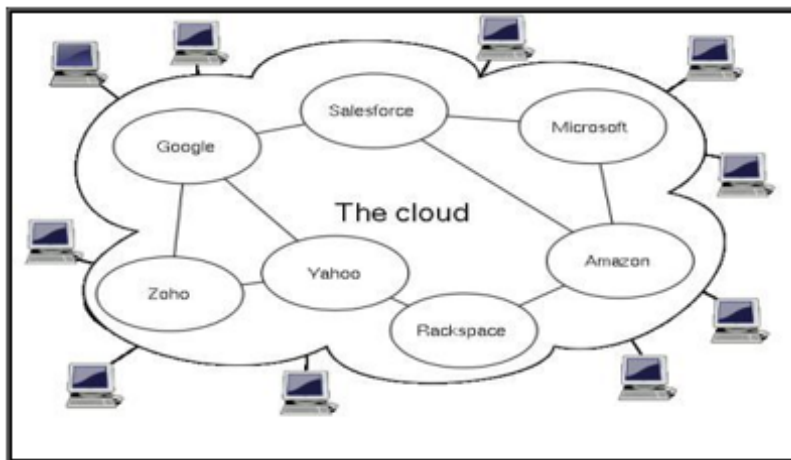


Shape (1): Cloud Computing Services

- Infrastructure as a service: the basic layer of cloud computing.
- Platform as a service: such as the service of environmental computing or platform is the next level of cloud. It is often used for organisations which develop or amend applications of its programs. Environmental computing supports program development operations including the prototypes, developing, testing, publishing and hosting programs. Platform of cloud services is usually prearranged with a particular operating environment such as Windows or Linux.
- Software as a service: it is the highest level of cloud as software apps or data of library are hosted online. This level of cloud is the easiest to be accessed by non-profit organisations and libraries but it requires development and relatively little training in the organisation to get and operate it.

6.1.4 Elements of Using Cloud Computing

In cloud computing five main elements are needed, and this can be clarified through the next diagram: (Published and Journal,2017)



Shape (2): a simplified explanation of cloud computing

- a- Personal computer: any computer with intermediate or sub-intermediate possibilities used only for internet connection.
- b- Operating system: any system allows internet access. This property is roughly available in all recently found operating systems.
- c- Web browser: no condition is imposed upon the browser type used in cloud computing provided that it is compatible with big websites. It is also used for using cloud computing with no drawbacks.
- d- Availability of internet access: in this case, internet access is preferred to be high-speed. It connects between the user and all its information and all programs used.
- e- Cloud computing service provider: it is similar to webhosting service provider but it provides additional properties allow all developers and users to use available resources in servers efficiently.(Kamila,2013)

In other words, it can be understood that computer for the ordinary user is just a transit to server which contains storage space enable it deal with its programs and edit its files via internet. (Sadeh, 2017).

6.2 Cloud computing applications in libraries and information

6.2.1 Cloud computing applications in libraries

Nowadays libraries find itself developing inside a distinguished technological space, and by depending on information technology particularly Cloud computing technology, services provided are continuously developed (Demissie, Dahiru, ,2017). In fact, libraries resorted to the cloud computing services a decade ago such as online catalogues and databases. Libraries can use everything provided by cloud computing including applications to enhance cooperation between them to include all libraries worldwide and from these applications we find (Tritt, Kendrick,2014)the e-lending service from cloud library: it allows users to view position of reservations on physical materials, in addition to borrowing and reading e-books. As for librarians, statistics will be collected about e-books in real time including lending reports.(Demissie, Dahiru, 2017).

- Webhosting: libraries can host its websites by cloud computing technology which can be considered the first cloud computing application in the field of libraries as it prefers to host it as a service provided by the suppliers instead of hosting and keeping its servers. For example, websites as an example of hosting websites out of the library servers and allow a number of Google Sites Service, Google for Publishers to have access to these websites from different locations.
- Setting up digital library (repositories): every library needs to build a digital library to make its resources, information and services provided with a high level and effective to ensure easy access to everything provided via network which provides integral solutions to develop Dura cloud by using any software for this purpose (Sadeh, 2017), for example, software of digital libraries with open-source standard interfaces and symbols of software equally. This service focuses on providing services of keeping and having access to digital groups, technical support, digital preservation, availability of repositories for, conversion of a very big group from photos into digital photos. (Pandey,Kushwaha,2015).

6.2.2 Reasons for using cloud computing in libraries

Several years ago, libraries use many cloud computing-based applications such as email, but it is clear that cloud computing develops very rapidly into model of data storage and exchange, and also helps save money and time and simplify workflow.

Ways of libraries benefiting from cloud computing (Singh, Sahu, 2017):

Many universities in general and libraries in particular use internet many cloud computing-based applications such as email and always adopt modern technologies as it has many characteristics. Libraries can also make use of it as follows:

- Cost reduction: as applications does not require maintenance internally.
- Cost reduction: as no need to buy servers to be operated in internal apps.
- Overcoming license restrictions by operation for every user.
- Support of the green information technology by using the least number of devices which lead to power consumption reduction.
- Better flexibility to overcome the work climax and ensure flexible performance.
- Help with storage operation of a big amount of data and information which can easily be accessed.
- Keeping up-to-date and having the state-of-the-art software and applications updates.

6.2.3 Fields of benefiting from cloud computing apps in libraries

The cloud computing capabilities support and keep abreast with the strategy of internal information technology management in library. Also, migration of library from the workplace environment to cloud

is constituted through the following stages: (Tritt, Kendrick, 2014):

- Setting the goal of library by turning to cloud for the purpose of improving performance and functions of internal information technology of library and upgrading the level of services.
- Developing the knowledge base around cloud computing: it is considered an important step before turning to the cloud environment by making a teamwork attempting to participate in scientific dialogues, conferences and discussions around researches in the domain to understand the mechanism of cloud computing functions in libraries.
- Identifying the security risks of cloud: before turning to cloud computing environment it is necessary to ensure the certificates for data security protection and storage location and its safe coding. (Shiferaw, 2016).
- Updating internal policies of the library: before turning to cloud computing environment it is necessary to update all policies and current operation procedures according to new operation requirements for the case of cloud environment.
- Specifying the financial requirements for turning to cloud: the library should consider that decision of turning to the cloud is only a material decision in the first place owing to cost reduction and financial obligations. (Han, 2015).
- Specifying the technical requirements for turning to cloud: by identifying to what extent cloud computing software of library is suitable and in the long or short term.
- Evaluating the technical stage of library: in this operation, specifying service levels, performance and current usage of apps and networks etc. can be done. Also, a thorough study of the current position in library can be performed.
- Selecting service provider: library chooses suitable computing service provider before use.
- But before selection, the following considerations must be taken into account (Kumar, Murthy, 2017):
 - a- Risk management.
 - b- Laws and standards.
 - c- Auditing.
 - d- Storage and virtualization.
 - e- Data centers policies.
 - f- Transferability.
- Selecting the cloud computing solution.
- Implementation and administration of cloud computing solution.

6.2.4 Merits of using cloud computing in libraries

Cloud computing has many different merits which provides source of benefit to libraries as follows: (Goyal, Jatav, 2012)

- Economic merits help gradual choices which come side by side with cloud computing to skip the problems of reduced operation budgets in libraries, the library will obtain the following merits as soon as it paid the subscription fees:
- Providing the cost of starting operation as the library does not need to establish an infrastructure.
- Reduction of operation cost according to the size of growth or decrease of applications and services of the library as cloud computing is flexible.
- Reducing the cost, buying, assembly and maintenance of devices and saving the power consumption of electricity and air conditioners and the necessities of devices and servers operation.

6.2.5 Demerits of cloud computing in libraries

- Worries of insecurity and trust loss by putting library data in a network outside its walls.

- Worries of not ensuring the compliance of the service supplier company with providing it properly to users.
- Worries of the weakness of means of securing data transfer and show it on network.
- Worries of not executing what is agreed upon.
- Worries of data management means are subject to the supplier (Singh, Sahu,2017).

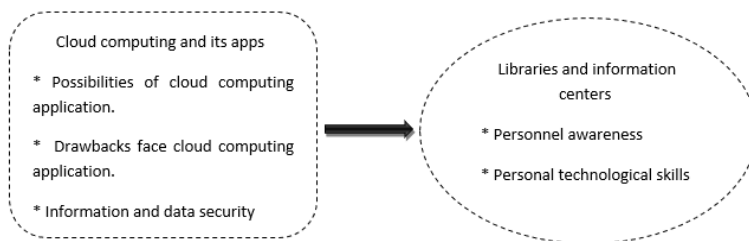
6.2.6 Models on cloud computing services in libraries

Many libraries believe that librarians have already benefited from cloud computing apps maybe before this concept widely used for computer and internet users. Many libraries rely on programs installed on farther servers to perform all library operations including cataloging and classification, and some models which represent cloud computing apps in libraries (R. C. Ogbu and A. Lawal,2013).It is a hosting service focusing on providing its services to libraries and this service uses servers Dura Cloud: its own farther service to provide local services to libraries which subscribed to this service to save charges of device maintenance and focus on providing services of keeping digital groups and having access to it. (Tritt, Kendrick,2014).

7. Research Methodology and Theoretical Framework

7.1 Conceptual Framework

As the researcher specified cloud computing (independent variable) and libraries and information centers (dependent variable) as hypothetical study plan: having read many literature review related to variables under consideration by the researcher enable her to build a hypothetical plan as mentioned in the shape (3) shows the relation nature between main variables



Shape (3): Research model

7.2 Research Hypothesis

- Impact of awareness of Iraqi university librarians on the cloud computing technology.
- Impact of technological skills of librarians in Iraqi university libraries enable them to use the cloud computing technology.
- Impacting data security and not trusting being put on external websites is the most important challenge which Iraqi university libraries face to make use of cloud computing.

7.3 Research Methodology

The research methodology is the objective way adopted by the researcher when performing study or tracing a particular phenomenon to specify its dimensions comprehensively, and to be able to identify it, its merit, knowing its reasons, indicators, and factors affecting it to get to limited results. Also, we

refer to it as group of general rules set by the researcher to have access to the reality about knowledge.

The study attempted to collect data from library directors, supervisors and teachers who directly or indirectly participate in libraries and information centers. The second group consists of the low level persons in charge working in different departments of libraries. This study depended on using questionnaire tools to collect preliminary data from librarians employees and teachers. The methodology of sample taking makes it easy to have access to all target participants in spite of the fact that most respondents have an overcrowded schedule to perform their works and daily duties in their workplaces. The main side of the methodology of survey requires face to face communication with respondents. Through the first communication we introduced ourselves for the first time and explained the aim of our study as stated in introduction of questionnaire. Then we left the questionnaires with the respondents and then promised to go back two weeks later to choose them. However, there are other cases in which we cannot find respondents either in their offices or workstations. We considered a two-week grace period regarding that most inquirers do not find any time to respond to questionnaires within a short period of time.

7.4 Research Design

The survey design allows investigate in the probable relations between variables. In this study the dependent variable was libraries and services of information centers while the independent variable was the cloud computing and its applications. The targets for this study were some libraries from Al-Mustansiriya University, which are the College of Administration and Economics, the College of Law, the College of Education, and some colleges of the Iraqi University (College of Administration and Economics, College of Law and College of Engineering. This sample was selected on the basis of participation in libraries. Some of librarians in university libraries in Iraq which contains employees, directors, officials and top executives, supervisors and teachers are targeted by the study. Stratified sample taking was applied to ensure the representation of limited groups including the community sufficiently in the sample. A sample of 80 thousand employees was selected. Preliminary data was collected using survey questionnaire to ensure a high response rate. Using questionnaire is accredited because it ensures unity of data as every respondent got the same question and in the same coordination. Questionnaires are organized according to research questions. Around 100 questionnaires are distributed to different employees, and they are given two week to fill questionnaires and 80 of them are returned. Questionnaires are constituted using the Likert Scale of five points from 1 to 5 (1= I totally agree, ... 5= I do not totally agree).

7.5 Research Procedures

Questionnaire is previously selected prior to final distribution. This is usually done to discover the weaknesses in designing research. A test was performed before 27 (pilot tests) aiming to refine and improve the questionnaire to ensure its authenticity and validity. A test is performed to ten respondents of research community who were excluded from the final study to keep bias away. KMO test was performed using an experienced arbitrator research supervisor.

7.6 Data Analysis Methods

Data Analysis is a process to edit the accumulated data and reduce it to a size can be controlled, developing summaries, researching for types and using statistical styles. Questionnaires are coded before inserting data in Statistical Package for the Social Sciences SPSS 24 for analysis. Data Analysis contains a descriptive analysis, meaning, testing, correlation, declination, ANOVAs test, analysis of an effective factor in the form of cross tabulation to discover the relation between different variables which were selected in current study. Data have been provided in the form of tables and numbers.

7.7 Data Analysis

Data Analysis has been conducted by process of coding to results. Data Analysis starts from data cleaning, codification, insertion, and analysis. Questionnaire is distributed to number of managers and employers working for Iraqi Libraries based on targets nature. Questionnaire is collected and data have been entered, processed and analyzed in SPSS to understand the relation between cloud computing and its apps, increasing libraries, information centers and then extracting the final results of research.

7.8 Demographic of Respondents

7.8.1 Gender of Respondents

The study attempted to identify the gender of respondents by supposing that difference of gender cannot affect opinions because out of 80 employees of different groups, 35 females only and 45 males were respondents. Table refers to 56% were males and 44% were females.

Table 1: Gender of Respondents

Gender	No. of respondents	Total population	Percentage(%)
Male	45	80	56%
Female	35	80	44%

7.8.2 Age group

The study attempted also to identify the age groups of respondents. Table (2) indicates that most respondents whose ages were between 25 and 34 their percentage was 42%, who exceed 45 years of age were 13%, between 35-40 were 29% and who are under the age of 25 were 16%.

Table (2): Age group

Age Group	No. of respondents	Total population	Percentage (%)
Below 25 years	13	80	16%
25-34 years	34	80	42%
35-44 years	23	80	29%
Above 45 years	10	80	13%

7.9 Tests of Stability, Honesty, and Natural Distribution of Research Variables

7.10 Reliability and Validity of the Research Measurement Tool

Reliability of Scale means its stability and consistency, then it gives the results themselves in case it is applied again to the same sample, meaning reliability means Stability and Consistency of Scale.

It is one of the most famous scales used in measuring reliability of questionnaire questions. (Validity) means that scale measures already what is measured. In other words, does the scale measure the phenomenon under discussion not anything else. (Validity is divided into types, the researcher used (Content Validity) it is a (Judgmental) Scale) relies upon the accurate determination of the researcher for the variables of study subject. Certainly, this depends on the size of information studied in regard to the subject. Mathematically, Validity Scale equals the square root of Stability Coefficient. The following table states the Stability and Validity Coefficient of Study Variables.

Table (3): Values of Stability and Validity Coefficient of study variables dimensions

Serial number	Dimensions	Reliability of scale	Validity of scale
1	Possibilities of Cloud computing application	0.70	0.86
2	Drawbacks of Cloud computing application	0.20	0.87
3	Data and information security	0.80	0.79
Cloud computing and its applications (independent variable)		0.57	0.84
1	Personnel awareness	0.60	0.80
2	Technological skill of personnel	0.29	0.77
Libraries and information centers services (dependent variable)		0.45	0.79

Table (3) states that all values of all Stability and Validity Coefficient including the statistically approved limits which means that the scale used to measure the research items has high validity which enable the researcher to depend upon results which will be obtained to make a sound decision.

7.11 Natural data distribution test

After the researcher made sure of data collection tool after being subjected to the previously mentioned tests, and because testing hypotheses in the current study depends on the Parametric statistics which relies on a main hypothesis stating that the data to be analyzed must be normally distributed. In case the parametric styles of data not subject to normal distribution, the results of these tests cannot be reliable.

Though statisticians indicated that in case of using a large sample by the researcher similar to the study community, no worry about the normal distribution of data, but because the researcher is caring about accuracy of study results, he applied the data obtained from questionnaire form to one of the most important tests of normal distribution of data; Kolmogorov-Smirnov test which denotes that if the sample size is bigger than (35) items, value of testing can be calculated through the following law:

$$D = \frac{1.22}{\sqrt{n}}$$

As n refers to sample size. And as the size of study sample is (80) respondents, then (D) value is the standard value will reach (0.136). In case the statistical value Kolmogorov-Smirnov is bigger or near the standard value (D) with a moral level (0.10), then the data which are normally distributed at the mentioned level. Consequently, parametric statistical analysis tools were used and results can be assured. In case data are not normally distributed, the researcher will use the Non-Parametric analysis tools.

7.11.1 Test the normal distribution of data for Cloud computing and its applications.

Table (4): Test of normal distribution of data of independent variable of Cloud Computing and its applications

Serial number	Dimension	Kolmogorov-Smirnov	Standard value D	Comparison	Decision
1	Possibilities of Cloud computing application	0.200	0.136	Calculated is bigger than standard	Normally distributed
2	Drawbacks of Cloud computing application	0.235	0.136	Calculated is bigger than standard	Normally distributed
3	Information security	0.198	0.136	Calculated is bigger than standard	Normally distributed
Cloud computing and its applications		0.210	0.136	Calculated is bigger than standard	Normally distributed

Table (4) indicates that data of independent variable (Cloud computing and its applications) at the secondary or total level is subject to normal distribution because the test value Kolmogorov-Smirnov of all dimensions of political skills variable were bigger than standard value (D) which makes it applicable to parametric analysis tools.

7.11.2 Test the normal distribution of libraries and information centers

Table (5): Test of normal distribution of data of dependent variable related to libraries and information services center

Serial number	Dimension	Kolmogorov-Smirnov	Standard value D	Comparison	Decision
1	Personnel awareness	0.110	0.136	Calculated is bigger than standard	Normally distributed
2	Technological skill of personnel	0.190	0.136	Calculated is bigger than standard	Normally distributed
Libraries and information centers services (dependent variable)		0.150	0.136	Calculated is bigger than standard	Normally distributed

Table (5) indicates that data of dependent variable Libraries and information centers services is applicable to normal distribution because test value Kolmogorov-Smirnov was bigger than standard value (D) which makes it subject to parametric analysis tools.

8. Data Analysis

8.1 Description of the data

This paragraph aims at presenting, analyzing and interpreting the results of answers of study sample individuals regarding paragraphs mentioned in questionnaire form by presenting the values of weighted arithmetic means, relative importance, standard deviations, difference coefficients of every paragraph of study variables. The arithmetic mean, standard deviation, difference coefficient, response intensity, and its approach to opinions of the researched sample according to their answers will be depended upon. The research depends on the Fifth Likert Scale in answers of questionnaire sample, the level of every variable will be between (1-5) of four levels as clarified in Table (7) below:

Table (7): Clarifies this and includes two levels in case of being bigger than the hypothetical

Weighted mean	Answer scale	Answer level
From 1 to 1.79	I do not totally agree	Very bad
From 1.80 to 2.59	I do not agree	Bad
From 2.60 to 3.39	Biased	Medium
From 3.40 to 4.19	I agree	Good
From 4.20 to 5	I totally agree	Very good

This aspect will be tackled according to the following paragraphs:

8.1.1 View, analyze, and interpret the responses of the study sample individuals regarding cloud computing and its applications

Paragraphs of this variable will be tackled by analyzing and explaining the questions of dimensions of the first variable meaning the cloud computing and its applications as follows:

Table (8): View, analyze, and interpret the responses of the study sample individuals

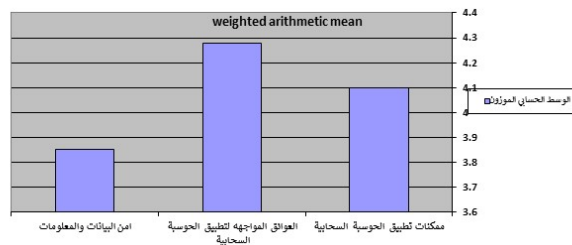
Serial number	Dimension	Weighted arithmetic mean	Standard deviation	Difference coefficient %	Response intensity %	Response level
1	Possibilities of Cloud computing application	4.10	0.84	19.55	83	Good
2	Drawbacks of Cloud computing application	4.28	0.83	21.47	84	Good
3	Information security	3.85	0.79	25.88	78	Good
Cloud computing and its applications		4.07	0.82	22.03	81.66	Good

Noting the results mentioned in table (9) as follows:

- 1- Dimension of Possibilities of Cloud computing application weighted arithmetic mean of (4.10) good level has been achieved, value of intensity response reached (83%), value of standard deviation was (0.84), while percentage of difference coefficient reached (19.55%) which denotes that possibilities of Cloud computing application are applicable.
- 2- The dimension of drawbacks of Cloud computing application achieved a weighted arithmetic mean reached (4.28) i.e. it enjoys a response level (good), while the response intensity reached (84%), but standard deviation value was (0.83), while the percentage of difference coefficient (21.47%). Based on the above results it is clear that Drawbacks of Cloud computing application are removed upon usage of this application through the web of Cloud Computing.
- 3- The dimension of data and Information security achieved a weighted arithmetic mean reached (3.85) i.e. it enjoys a response level (good), while the response intensity reached (79%), but standard deviation value was (0.78), while the percentage of difference coefficient (25.88%). Based on the above it is clear that security and confidentiality of data and information used through Cloud Computing application to be better, faster, and easier for using, retrieving and maintenance and security of information is necessary.

By and large, the first variable (Cloud computing and its application) achieved a weighted arithmetic mean reached (4.07) with a standard deviation of (0.82) while response intensity of sample individuals around the variable (81.66%), and percentage of difference coefficient was (22.03%). The mentioned results support the results concluded on the secondary dimensions including recognition of the research sample for availability of dimensions of Cloud computing and researched its applications variable.

The following shape clarifies the arrangement of dimensions of Cloud computing and its applications variable and the most important dimension including the other dimensions depending on the percentage of answers of research sample individuals:



Shape (4): the descriptive comparison between dimensions of Cloud computing and its requirements

Concerning Shape (4) it is clear that dimension of drawbacks of Cloud computing application has got

the first rank regarding the degree of recognizing its availability for the research sample and then possibilities of Cloud computing and at last information and data security.

8.1.2 View, analyze and interpret the responses of the study sample individuals regarding libraries and information centers

Paragraphs of this variable will be handled through analysis and explanation of the questions of dimensions of second variable (libraries and information centers) as follows:

Table (9): Weighted arithmetic means, standard deviations, percentages of difference coefficients, response intensity and its levels of dimensions of libraries and information centers n=80

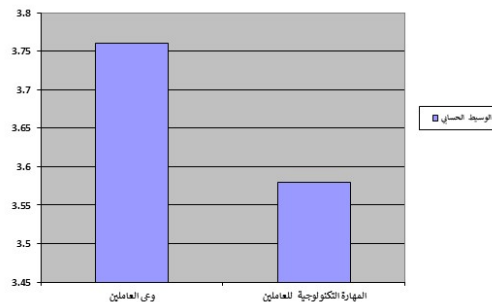
Serial number	Dimension	Arithmetic mean	Standard deviation	Difference coefficient %	Response intensity %	Response level
1	Personnel awareness	3.76	0.97	25.200	75	Good
2	Technological skill of personnel	3.58	1.01	28.02	71	Good
Libraries and information centers		3.67	0.99	26.61	73	Good

Noting the results mentioned in table (9) as follows:

- 1- Dimension of Personnel awareness a weighted arithmetic mean of (3.76) good level has been achieved, value of intensity response reached (75%), value of standard deviation was (0.97), while percentage of difference coefficient reached (25.200%). Therefore, it is clear that when personnel awareness relates to benefit from cloud computing, work will be better and easier.
- 2- The dimension of technological skill of personnel achieved a weighted arithmetic mean reached (3.58) i.e. it enjoys a response level (good), while the response intensity reached (71%), but standard deviation value was (1.01), while the percentage of difference coefficient (28.02%). Based on the above results it is clear that technological skills of personnel are considered one of the important things which is prone to development and change to computing and how to benefit from it.

By and large, the second variable (Libraries and information centers) achieved a weighted arithmetic mean of (3.68) with a standard deviation of (0.99) while response intensity of sample individuals around the variable (74%), and percentage of difference coefficient was (26.71%). The mentioned results support the results concluded on the secondary dimensions level including recognition of the research sample for availability of researched dimensions of libraries and information centers variable.

The following shape clarifies the arrangement of dimensions of libraries and information centers variable and the most important dimension including the other dimensions depending on the percentage of answers of research sample individuals:



Shape (5): the descriptive comparison between dimensions of libraries and information centers

Concerning shape (5) it is clear that dimension of the market share of the Libraries has got the first rank as for the level of recognition of availability of research sample, then the dimension of positive social silence and at last the dimension of product sale as a whole.

8.2 Test hypotheses influence between research variables

It aims to test the influence relationships between research variables, where the impact relationships will be tested at the level of sub-hypotheses that have emerged from the main hypotheses

8.2.1 Testing the main hypothesis which states: (Cloud computing and its applications increase the effectiveness of libraries and information centers).

Four hypotheses are subdivided as mentioned below:

- 1- Moral influence of Possibilities of cloud computing application on libraries and information centers and its dimensions.
- 2- Moral influence of drawbacks which face application of cloud computing on libraries and information centers and its dimensions.
- 3- Moral influence of information and data security on libraries and information centers and its dimensions.

Table (10): Estimate of information of simple liner regression model to measure the effect of secondary dimensions of political skills in libraries and information centers

Independent secondary variables	libraries and information centers					
	B	R ²	T	T table 1%	F	F table 1%
Certified variable						
Possibilities of Cloud computing application	0.50	0.20	4.20	2.62	16.55	6.95
Drawbacks of Cloud computing application	0.47	0.15	3.85		13.85	
Data and information security	0.60	0.25	5.69		30.99	
Cloud computing and its applications	0.52	0.20	4.58		20.43	

8.2.2 The first sub-hypothesis: There is a significant impact of cloud computing capabilities on libraries and information centers in its dimensions.

From the table (10) the following is clarified:

- 1- Regression coefficient reached (0.50) which means that if the dimension changes with the estimate one unit, the variable of libraries and information centers will increase by the estimate (0.20), knowing that the effect was moral because the calculated value (t) of (4.20) is higher than its table example at the moral level (1%) which reaches (2.62).
- 2- Coefficient of determination of R squared (R²) reached about (0.20) which means that the dimension is explained with the proportion (20%) of variables which happens to libraries and information centers, and the remaining percentage will come back to other factors not included in the model.
- 3- We find out that the calculated value (F) of (16.35) is higher than its spreadsheet example of (6.85) at the moral level 1%, thus it is noted that the estimated model is moral in totality.

Therefore, the researcher concludes from the analysis of results of table (10) approval of alternate hypothesis which states (there is a moral effect of the dimension of possibilities of Cloud Computing application in libraries and information centers and its dimensions).

8.2.3 The Second Sub-Hypothesis: The effect of obstacles facing the application of cloud computing in libraries and information centers was found in its dimensions.

From table (10) the following is clarified:

- a- Regression coefficient reached (0.37) which means that if the dimension changes with the estimate one unit, the variable of libraries and information centers will increase by the estimate (0.37), knowing that the effect was moral because the calculated value (t) of (3.85) is higher than its spreadsheet example at the moral level (1%) which reaches (2.62).
- b- Coefficient of determination of R squared (R^2) reached about (0.15) which means that the dimension explained the proportion (15%) of changes which happen to libraries and information centers, and the remaining percentage s based on other factors not included in the model.
- c- We find out that the calculated value (F) of (13.95) is higher than its spreadsheet example of (6.85) at the moral level 1%, thus it is noted that the estimated model is not moral in totality.

Therefore, the researcher concludes from the analysis of results of table (10) approval of alternate hypothesis which states (there is a moral effect of the dimension of drawbacks of Cloud Computing application in libraries and information centers and its dimensions).

8.2.4 The third hypothesis: There is a moral impact of data and information security on libraries and information centers in all its dimensions

- a- Regression coefficient reached (0.50) which means that if the dimension changes with the estimate of one unit, the variable of libraries and information centers will increase by the estimate (0.60), knowing that the impact was moral because the calculated value (t) of (5.69) is higher than its spreadsheet example at the moral level (1%) which reaches (2.82).
- b- Coefficient of determination of R squared (R^2) reached about (0.25) which means that the dimension explained the proportion of (25%) of changes which happen to libraries and information centers, and the remaining percentage is based on other factors not included in the model.
- c- We find out that the calculated value (F) of (30.96) is higher than its spreadsheet example of (6.85) at the moral level 1%, thus it is noted that the estimated model is moral in totality.

Therefore, the researcher concludes from the analysis of results of table (10) approval of alternate hypothesis which states (there is a moral impact of the dimension of data and information security in libraries and information centers and its dimensions).

9. Results and Recommendations

9.1 Results

Most workers in Iraqi universities libraries are aware of the basics of Cloud Computing, so they know that it is not based on the techniques of modern programming and material resources only, but it is a technology based on web techniques.

It is highly essential to resort to Cloud Computing world as needed by current stage requirements thanks to the tremendous knowledge explosion and rapid technological progress sweeping the world.

Most workers in Iraqi universities libraries believe that Cloud Computing technology is the best choice of libraries for rationalizing costs.

Cloud Computing is highly participating in developing and improving library services by overcoming pressures known by different library authorities in particular the borrowing authority and bibliographical research regarding the use of traditional or mechanical research tools as this technology enables the availability of tools online.

Using the Cloud Computing technology in providing e-services to develop technological skills for personnel. It also will make the library do without computer problems and its maintenance as this technology is considered ready solutions attempting to cope up with changes in the field of programming and information security.

9.2 Recommendations

- The necessity to develop and enhance libraries in all educational environments. Programs, educational methodologies and strategies to execute it must be reconsidered for apprehension of the concepts of technological and electronic revolution.
- Making use of experiments and experiences of the countries which started and applied Cloud Computing technology.
- The necessity to amend all old rules which hinder the process of using technology, modernizing the infrastructure, adopting new ways to grow innovation and modernization whenever and wherever to improve and upgrade education.
- Cloud Computing technology application decision must be made by the higher administration of universities. Thus, flexible plans and strategies allow the procedures of making changes and amendments must be adopted to cope up with developments in the field of benefit from new technologies in general and Cloud Computing in particular.

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