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Evaluating the Factors Influencing on Adoption of Cloud Computing Services in the Health Sector

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Abstract - Cloud Computing provides great opportunities especially for government ministries. The purpose of this research study is to evaluate the factors influence on adoption of cloud computing in the health sector. The study followed quantitative methodology in analyzing the data that was gathered. The primary data was collected through a self-designed questionnaire. A conceptual model was developed with the independent variables are perceived usefulness, security and privacy risk, compatibility, reliability, and the demographical characteristics. The dependent variable was the adoption of cloud computing services. The intended participants are IT employees in the Ministry of Health in Kingdom of Bahrain. The data of the questionnaire were collected from 45 respondents. The results showed that perceived usefulness, compatibility, reliability, and security and privacy risk dimensions have a significant influence on the adoption of cloud computing. The compatibility is the most important issue raised by respondents which needs enhancement. Demographical characteristics such as nationality, job title, qualification, experience, and age have no statistically significant differences on the adoption of cloud computing services, while the gender has statistically significant differences on the adoption of cloud computing services

Keywords : *cloud computing, compatibility, privacy risk, security*.

INTRODUCTION

Nowadays, the trend of the world is moving towards information technology (IT) utilized in all aspects of life. IT innovation makes life more effective and productive. One of the most prominent sectors in IT is the healthcare information system. This system brings a lot of efficiency in processing and providing information about chronological data of patients from database systems that can be retrieved at any time, thus assisting physicians to make better judgements. These databases can be stored in any platform including cloud database. Cloud computing (CC) has emerged as one of the most important platforms in the IT field. Cloud computing allows institutions to store and use files, data, e-mail, applications, and software in a virtual platform through cloud servers.

CC is not related to owning a dedicated network which is attached to the storage hardware at your work place or residence. Rather it involves accessing and storing data over the internet or have the information synced over the web [1]. Cloud computing has the potential to improve the capacity of the business infrastructure without investing money on buying a new infrastructure, training employees or struggle for the licensing of new software [2]. IT professionals are eager to accept the cloud computing models as they provide desired return on investment.

The health sector is always looking for novel technologies to increase the speed and ease of patient care services, thus enhancing management performance. Cloud computing (CC) is one of the latest technology in the field of information technology, which can help in improving the healthcare information system in the health sector. This technology provides the physicians with flexibility, accessibility, and portability of the health system anytime and anywhere. In 2018, e-government in Bahrain signed a contract with the Amazon company to provide cloud computing services. One of the main ministries that will get benefit from that was the Ministry of Health (MOH), however, the MOH till now has not used the facilities of cloud computing. Identify and evaluate the factors influencing the adoption of cloud computing are essential.

The main significance of this research study is to identify the factors that effect the adoption of cloud computing and Decision-makers in MOH can design an effective strategic plan to encourage a successful adoption of cloud computing services by information technology employees.

THEORETICAL BACKGROUND

A. Cloud Computing Definitions

Many scholars have defined the term cloud computing (CC) over the past few years. Reference [1] explained the term cloud as a metaphor for the internet. At the same time, [2] explained CC as the means to access and store programs or data online instead of on the computer's hardware. Reference [3] defined cloud computing is a paradigm that focuses on sharing data and computation over a scalable network of resources. Reference [4] defined CC as a set of network-assisted services offering QoS guaranteed, scalable, personalised, cost-effective computing on-demand infrastructure that could be accessed in an easy and pervasive manner. Today, cloud computing is not only a buzzword that is creating ripples in the information and technology world; rather, analysts in every organization now prefer this advanced form of utility.

Cloud computing is an internet-based technology that helps store data on servers that provide services to clients on demand. Cloud computing allows organizations to rent computing power, including the software, hardware and storage in the latest version from the service provider. They can then pay for the service on demand just as they do for other utilities like electricity [5]. This feature enables organizations to save cost while having a profound impact on creating new jobs within the ICT industry, generate business, and improve macroeconomic performance. Cloud computing is quickly gaining the interest of organizations as it helps companies in providing competitive advantage and remains an innovative tool to increase the creativity and productivity of businesses [6][7]. Thus, cloud computing technologies provide increased flexibility, agility, scalability, and higher efficiencies with reduced costs.

B. Cloud Computing Advantages

Various studies have been conducted to introduce the benefits of cloud computing platforms, in which the cloud's advantages have been generally examined. Reference [8] shows that one of the ways cloud computing is cost effective is through its pay-as-you-go cost structure that saves cost of unnecessary resources. Reference [9] also advantageous in the implications of electronic health records (EHR) to store, secure, access, and exchange patient information from remote locations to ensure quality health while adhering to highly efficient and integrated system. Cloud computing ensures that hosted applications are available anytime when needed and reduces downtime. Reference [10] introduced that the collaboration and information transfer lead to improve the quality of services and introduces the reduction of service costs by cloud providers as the most significant advantages of the cloud.

C. Cloud Computing in Healthcare Context

The healthcare sector, just like any other service operation, needs systematic and continuous innovation; which is timely, cost effective and renders high-quality services. The cloud offers the capability of simple access to electronic medical records. Reference [11] explains that the real issues in biomedical research data management and analysis are the data-handling complexities, costs and the unavailability of computational solutions for problems. Cloud computing can possibly solve these problems. Although, others in 2010 proposed a cloud solution for the Greek National Health Service based on emergency medical system that embedded this system to personal health records, that lead to a quick access to data at anytime from anywhere with a lowest cost[12]. Reference [13] concluded that cloud computing is a superior solution for sharing healthcare information. They presented various solutions for sharing healthcare information based on cloud computing in Sweden.

In 2016, they discovered the opportunity to implement a cloud computing service to improve health care services in India [14]. Reference [10] presented the cloud computing implementation advantages in the health industry of Iran. Using cloud infrastructures, hospitals are not required to have major investment in infrastructures. They are able to save the expenses of the hardware and datacenter and pay only for the operations while transferring data management responsibility to the providers. Cloud computing architecture can be used to create a central database in the healthcare context. The structure of the cloud computing features makes it possible for healthcare institutions to be integrated with each other and can be exchange major information efficiently.

D. Literature Review and Related Studies

All the related studies are aimed to investigate and evaluate the factors influencing the cloud computing services and followed quantitative research methodology. In Taiwan (2011) find that compatibility have no significant difference to adopt cloud computing. The reason for this insignificant result could be that the immaturity of the cloud computing and the unclear charging mechanism. This correlation implies that the compatibility of cloud computing implementation can be a barrier to cloud computing adoption [15].

While in Saudi Arabia (2012) find that gender has no significant differences on the employees' attitude towards cloud computing [16] . The intention to use cloud computing services has significant effect by perceived usefulness. Also, that reliability, security, privacy, and compatibility are statistically significant on the intention to adopt cloud computing [17]. Also, study results showed that the highest challenging factor which will impact on the organization decision to approve the technology of cloud computing are availability, reliability, security, compliance, and privacy respectively [18].

In Malaysia (2015) find that the compatibility correlated positively to the adoption of cloud computing. The study illustrated that when technology is recognized as compatible with the organization's information systems, then organization are likely to consider the adoption of this new technology [19]. Reference [20] indicated that perceived usefulness significantly influence users' intention's to use cloud computing solutions.

Assessing the security threats and challenges of cloud computing, the findings analyzed that a security risk is regarded as a critical challenge that has been affecting the behavioral intentions causing a delay to adopt CC services [21]. While, in Saudi Arabia, study find that strongest direct effect on CC adoption was with compatibility, relative advantage, innovativeness, and support and

demonstrated that technological aspect has a predominent influence on the intention to adopt CC by hospitals [22]. Also, In Sri Lanka, research concluded that the study's findings have significantly impacted the willingness of private hospitals to follow the cloud computing technology Units [23].

RESEARCH METHODOLOGY

This study follows a quantitative research methodology to accomplish its objectives. The quantitative methodology includes a questionnaire instrument to examine the proposed research hypotheses and the conceptual model. By distributing the questionnaire to the IT employees in the public health sector, the results were converted to statistical analysis figures and tables. To achieve the objectives of the study and to test the hypotheses, a questionnaire was designed as an instrument to measure the adoption of cloud computing service in the healthcare context. The design of the questionnaire is based on knowledge gathered from surveying several studies. This questionnaire consisted of 25 statements divided into four sections; demographic characteristics, general information, statements related to cloud computing divided into 4 dimensions and adoption of cloud computing services, and the last section was two open questions for suggestions and opinions. The questionnaire designed as two styles, first multi-items questions in the first part, and second rating Likeart scale from 1 to 5, where one indicated strongly disagree and five indicated strongly agree. The questionnaire was presented to the participants by hand and was distributed within the IT department in the Ministry of Health in Bahrain in the locations; Salmaniya Medical Complex, Ministry of Health (Aljuffer) and Dar Ruffada.

A. Model Development and Research Hypotheses

The variables of the adoption of cloud computing services conceptual model are driven from the literature review and the related studies. The variables are classified into independent variables and a dependent variable. Independent variables are the perceived usefulness, security and privacy risk, compatibility, reliability, and demographic characteristics (gender, nationality, job title, qualification, experience, and age). The dependent variable is the adoption of cloud computing services.

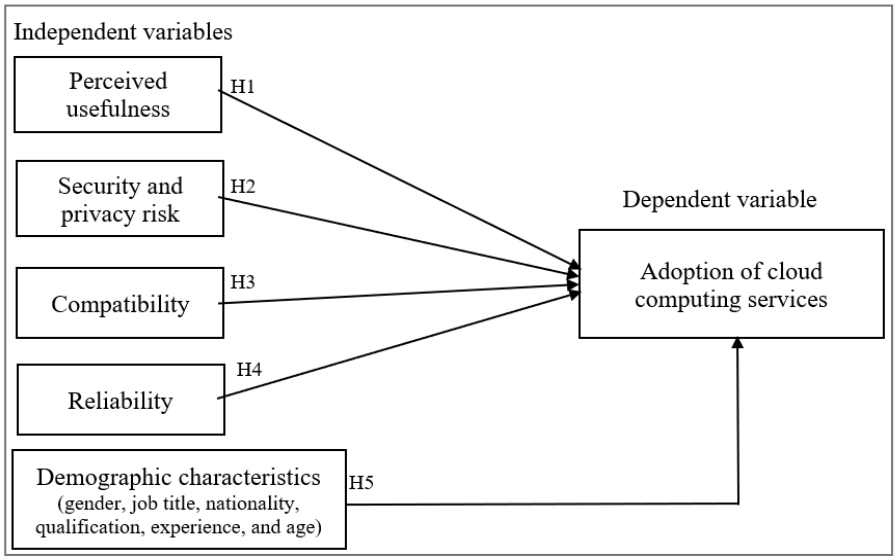

Figure 1. Research Conceptual Model

Reference [24] discussed that perceived usefulness is the degree to which an individual has a perception that utilizing specific system could augment the job performance. While in the healthcare context, it is defined as the degree to which a healthcare professional believes that the healthcare industry will be improved by using new technology in tracking patient conditions [25]. People who believe the use of technology will lead to positive results will perceive the technology as useful [26].

Security is defined as the level of security procedures in place to protect information or the system. Privacy is defined as confidentiality of data, where only authorized users can access it. Having secure transactions over the Internet is essential to service quality. Security concerns in relation to external data storage. High reliance over public internet, lack of autonomy, integrity, and multi-tenancy are some of the critical security concerns of CC [27]. Using technology dependent on the internet carries a level of uncertainty. Security issues are the most challenging problems in the context of a distribution environment and environment incorporating CC is not an exception [28][29] . Security is regarded amongst chief dominating aspects affecting CC adoption. Health information and data require a more secure condition for storage and recovery to ensure no breach in patient confidentiality [30]. On other hand, privacy issues are also a critical concern in the healthcare industry.

Compatibility is defined as the capability of an already existential application to bear compatibility with another system, within a cloud-based setup [17]. Within an organizational setting, application's compatibility within cloud setting is real-time challenge which the firm needs to carefully acknowledge when integrating the cloud usage. This aspect was pinpointed by the model proposed by Rogers in an attempt to understand CC along with its anticipated advantages and costs, firms generally assume that compatibility is integral for the adoption of new technology [15]. The biggest concern lies in how well the cloud-service

providers' solution scales up the capabilities while complying with the internal resources [31]. The true value of cloud computing is likely to be achieved if the process is successful.

Since CC is available round the clock, it is highly reliable. Reliability is centered on guaranteeing premium quality services to the end-users along with high rate of transmission, minimal error rate, and prompt recovery [17]. Employees can even call the cloud center instead of depending on the in-house IT staff [32]. CC exhibits a well-structured infrastructure with minimal downtime providing prompt response to the end-users demands and [33][34].

As the number of users over the internet increases, so does the probability of probing viruses, worms, and cyber-attacks. The threat of adopting cloud computing in business includes security concerns, data stealing, unclear return on investment; integration issues, compliance, and vendor lock-ins [34]. Data privacy remains a key concern for users of cloud computing. Despite the disadvantages, cloud computing allows its users to think of computing as limitless, having lower cost, and trustworthy [35]. The data is quickly accessible, reliable with limitless storage capabilities. Due to the reasons mentioned, CC has become a promising and most common technology in recent times in the healthcare context.

The hypotheses for testing the effect of the independent variables on the adoption of cloud computing services are;

H1: Perceived usefulness of the cloud computing services has a significant influence on the adoption of cloud computing services.

H2: Security and privacy risk of the cloud computing services has a significant influence on the adoption of cloud computing services.

H3: Compatibility of the cloud computing services has a significant influence on the adoption of cloud computing services.

H4: Reliability of the cloud computing services has a significant influence on the adoption of cloud computing services.

H5: There are statistically significant differences of the IT employees demographic characteristics (gender, nationality, job title, qualification, experience, and age) on the adoption of cloud computing services.

B. Research Population and Sample

The population of interest for this research and from whom the primary data was collected is represented by employees in the Information Technology (IT) department who work in the Ministry of Health in the Kingdom of Bahrain in the three locations; Salmaniya Medical Complex, Ministry of Health (Aljuffer), and Dar Ruffada is 51 employees exclusive the secretaries, the research population being 48. The population was chosen because IT employees are the admin and the administrators those with the best understanding of the cloud computing services advantages. The minimum sample size calculated by the following equation (see Eq. 1 & 2) [36]:

$$N = m/[(S\text{^}2(M-1))/pq + 1 \quad (1)$$

Where:

N: the sample size, m=48; total population,

p= 0.5; the proportion belongs to the specific category

q=0.5; the proportion not belongs to the specific category

$$S = e/z \quad (2)$$

Where:

z=1.96; the value corresponding to the level of confidence required

e=0.05; acceptable margin of error

S = 0.05/1.96=0.02551

The sample size for IT employees' questionnaire is 43, which calculated by the equation;

N=48/ [{0.025512 (48-1)/ (0.5)(0.5)}+1]=43

Table I. Distribution of questionnaire responses

Population size	48			
locations	Salmaniya Medical Complex	Ministry of Health (Aljuffer)	Dar Ruffada	Total
No. of distributed questionnaires	30	8	10	48
No. of received responses	29	7	10	46
No. of valid responses	29	7	9	45
No. of reject responses	0	0	1	1
Valid percentage of responses	100%	100%	90%	97.8%

C. Validation and Reliability Analysis

For the validity of the questionnaire, the statements of the questionnaire were written with the help of previous studies. Before the questionnaire was distributed to the participants and to validate the clarity of the questionnaire statements, it was validated by a panel of academic professors in Arabian Gulf University and Information Technology Department employees in the MOH. They were asked to evaluate the contents of the questionnaire regarding the language, accuracy, completeness, relationship to the objectives of the study and clarity. The statements were modified several times, based on their great experience and knowledge in performing several surveys in their respective fields and their qualifications to evaluate any incompatibilities or weaknesses in the statements being used in the questionnaire, according to the study objectives.

The reliability test of the questionnaire was applied to ensure the reliability of the collected data for analysis. There are several methods for estimating reliability to measure the internal consistency of the questionnaire. The most popular method is Cronbach's alpha [37]. The minimum accepted value is 0.6 which indicates the reliability of the collected data [38]. The overall value of Cronbach's alpha is 0.843, indicates a high consistency between the statements of the questionnaire, because it is higher than 0.6. Also, all the dimensions and the adoption of cloud computing services are higher than 0.6, which means the reliability of this questionnaire is high enough to accept the data for analysis.

DATA ANALYSIS

This section is for data analysis collected by the questionnaire to measure the factors influencing the adoption of cloud computing services. The questionnaire was divided into four sections; the first section was the demographic characteristics, followed by the second section which was general information. The third section of the questionnaire contains 25 statements divided into the four dimensions for adoption of cloud computing services. The last section is for suggestions and opinions and it includes two open-ended questions.

The analysis of the questionnaire using descriptive statistical analysis, represented by frequencies (F) and percentages (%) is illustrated by charts. Then, the hypotheses of the questionnaire will be tested by using variance analysis.

A. Demographic Characteristics Analysis

The demographic characteristics of the 45 respondents in the IT department; are shown in below Table. The distribution of the sample is categorized according to gender, nationality, job title, qualification, experience, and age.

Table II. Demographic characteristics of respondents

Demographic characteristics	Type	F	%
Gender	Male	37	82.2
	Female	8	17.8
Nationality	Bahraini	38	84.4
	Non-Bahraini	7	15.6
Job title	Head of section	4	8.9
	System analyst	35	77.8
	Missed data	6	13.3
Qualification	Diploma	5	11.1
	Bachelor	35	77.8
	Graduate studies	5	11.1
Experience (year)	Less than 1 year	2	4.4
	1-5	9	20.1
	6-15	23	51.1
	More than 15	11	24.4
Age (year)	Less than 25 years	2	4.4
	25-35	25	55.6
	36-45	10	22.2
	46-55	8	17.8
	Above 55 years	0	0

B. Dimensions Analysis

The dimension's section of the questionnaire with its four dimensions will be analyzed in this section. For each statement, Average (Avg), Standard Deviation (STD), and rates are calculated. The degrees of agreement are Strongly Agree (SA), agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD). The Average (Avg), Standard Deviation (STD), rates and ranks which represent the order of agreement for the statement are also calculated.

Table III. Dimensions statements analysis

No.	Statements	Avg	STD	Rate
PU1	Cloud computing services will increase my job efficiency	3.64	.981	A
PU2	Cloud computing services will increase my job productivity	3.58	.866	A
PU3	Cloud computing services will increase my job performance	3.51	.869	A
PU4	Cloud computing services enable me to monitor our hosted system more rapidly	3.60	1.009	A
PU5	Hosting the system on the cloud will be useful to improve system availability at anytime and anywhere	3.89	.935	A
PU6	Cloud computing will offer up-to-date information	3.91	.996	A
SPR7	Cloud computing will prevent unauthorized access to the records	3.36	.933	N
SPR8	The cloud computing provider can encrypt data transactions	3.91	.910	A
SPR9	The cloud computing services are secure	3.56	.813	A
SPR10	There is no significant potential for losing the data in the cloud	3.20	1.014	N
SPR11	Cloud computing reduces the risk compared with in-housing servers	3.51	.843	A
SPR12	Cloud computing adoption is not risky	3.25	.866	N
C13	Hosting the system on a cloud computing host will not require major changes in my Information Technology department	2.89	.885	N
C14	The cloud computing services will be compatible with our system	3.45	.761	A
C15	The cloud computing services will fit with the information management systems	3.33	.798	N
C16	The cloud computing will enable networking between different information management systems	3.60	.780	A
C17	The database will be compatible with cloud computing systems	3.27	.809	N
R18	Cloud computing services systems will have high reliability	3.98	.866	A
R19	The system hosted in the cloud will be available when needed	3.91	.709	A
R20	The speed of the cloud computing services is high enough to adopt our system	3.52	.976	A
R21	Cloud computing services will offer additional information	3.25	.866	N
A22	I am looking forward to engaging in cloud computing services	3.52	1.067	A
A23	I have enough skills to deal with system when hosted in the cloud	3.38	.886	N
A24	Our IT infrastructure is ready to host a system in cloud	3.32	.857	N
A25	I predict that I would use cloud computing in my job	3.71	.757	A

C. Correlation Analysis

Next Table shows the correlation between the four dimensions and adoption of cloud computing services by using the Pearson correlation. The results indicate that there are significant correlations between the four dimensions and adoption of cloud computing services. There is a strong positive correlation between the perceived usefulness dimension and the adoption of cloud computing services with correlation coefficient value is 0.610. Also, there is a strong positive correlation between the compatibility dimension and the adoption of cloud computing services with correlation coefficient value is 0.432. On other h and, there is a moderate positive correlation between the security and privacy risk dimension and the adoption of cloud computing services with correlation coefficient value is 0.380. Although, there is a moderate positive correlation between the reliability dimension and the adoption of cloud computing services with correlation coefficient value is 0.373. The results of correlations indicate that the selected dimensions have strong and moderate correlations with adoption of cloud computing services.

Table IV. Correlation Analysis

No.	Dimension	Adoption of cloud computing services	Correlation coefficient	Correlation interpretation
1	Perceived usefulness		.610** (0.000)	Strong
2	Security and privacy risk		.380** (0.010)	Moderate
3	Compatibility		.432** (.003)	Strong
4	Reliability		.373* (0.012)	Moderate

D. Hypotheses Testing

The hypotheses of the questionnaire (H1 to H4) are tested by using a simple linear regression. Below Table shows the results of testing these hypotheses.

Table V. Simple Linear Regression Test for H1 to H4

Hypothesis	R2	Sig.	
H1	.372	.000	Significant
H2	.145	.010	Significant
H3	.186	.003	Significant
H4	.139	.012	Significant

The variance analysis T-test and one-way ANOVA tests were used to test Hypothesis H5 in the next Table. The results of T-test show that gender has statistically significant differences on the adoption of cloud computing services since the significant value of the gender is 0.002, which is less than 0.05, while nationality and job title are statistically insignificant. On the other hand, the one-way ANOVA test for qualification, experience, and age showed no statistically significant differences on the adoption of cloud computing services with significant value equal to 0.817, 0.892 and 0.605 respectively. The significant values of these demographic characteristics are more than 0.05, which makes them insignificant on the adoption of cloud computing services. The reasons behind this might be that, the number of employees in the IT department are limited to 48 employees, which make them very close in their perspectives and almost more than half of them hold a bachelor's degree which makes them similar in their opinions.

Table VI. T-test and One-way ANOVA Test

Demographic Characteristics	Sig.	
Gender	.002	Significant
Nationality	.105	Insignificant
Job title	.800	Insignificant
Qualification	.817	Insignificant
Experience (year)	.892	Insignificant

E. Result Discussion

The usefulness dimension results show that the usefulness dimension average is 3.69, with an average standard deviation of 0.942, which corresponds to the rate of agreement in matters of degree of agreement and all the statements lay in the agree category. This indicates that the respondents agreed to the usefulness statements and they find that cloud computing services are useful and will offer up-to-date information. This finding is in agreement with earlier studies [16] [39] [40]. Reference [16] found that adopting cloud computing in Saudi organizations was significantly affected by perceived usefulness. While, reference [39] concluded that perceived usefulness had a direct effect on the adoption of cloud computing services. Also, reference [40] illustrated that perceived usefulness is one of the strong drivers of the adoption of cloud computing technology and most of the respondents showed a high level of concern over the issue of privacy risk. Thus, increasing the awareness of IT employees towards the usefulness of the adoption of cloud computing will most likely fasten the adoption of such technology.

The security and privacy dimension results show that the security and privacy dimension average is 3.46, with an average standard deviation 0.896 and the degree of agreement and the statements lay in two categories, neutral and agree. Compared with the other studies, the perceived risk has no significant effect on adoption of cloud computing services[39]. Reference [40] found that the security risk is the highest issue that has been affecting the adoption of cloud computing services.

The compatibility dimension results show that the compatibility dimension average is 3.31, with an average of standard deviation 0.806 and a neutral degree of agreement and the statements lay in two categories, neutral and agree. However, reference [15] stated that compatibility was not considered as a crucial motivation for cloud computing adoption. Reference [41] summarized that compatibility is negatively related to intention to adopt cloud computing. Perhaps, potential adopters view higher levels of their existing systems' application functionality as enabling the transition to or addition of cloud technologies, which suggests a greater degree of perceived compatibility. When the firm's existing information systems already encompass a great deal of compatibility, then adoption of cloud computing may be seen as less favorable. This disagrees with the findings of this study. While, reference [42] stated compatibility is positively correlated to the adoption of cloud computing and this agrees with the finding of this study.

The reliability dimension results show that the reliability dimension average is 3.66, with an average of standard deviation 0.854 and agree degree of agreement and the statements lay in two categories, neutral and agree. Reference [43] stated that reliability has a strong and direct impact on cloud computing adoption and it indicates that adequate technical requirements are important to adopt cloud computing technology. Also, reference [17] concluded that reliability is statistically significant on the intention to adopt cloud computing.

The adoption of cloud computing services results show that the average of the adoption of cloud computing services is 3.48, with an average of standard deviation 0.891 and agree degree of agreement and the statements lay in two categories, neutral and agree. This indicates that the IT employees ready to adopt cloud computing in the health sector and this agreement will increase when they are engaged with training courses.

The perceived usefulness dimension has the highest Avg of 3.68 with STD 0.942 which indicates clearly that the IT employees agree that the cloud computing services will be useful in the healthcare sector and will offer up-to-date information and this finding agrees with earlier studies. The lowest degree of agreement goes to the compatibility dimension, with an Avg of 3.31 and STD 0.806. These results exactly reflect exactly the real situation because they must convert their system to be compatible with the cloud computing services, and this of course, needs time and hard work. The results of all the dimensions indicate that the IT employees are ready to use cloud computing services in the healthcare context, but they need more training and workshops to increase their knowledge because approximately 65% of the IT employees did not enroll in any training.

Table VII. Dimensions Results

No.	Dimension	Avg	STD	Agreement
1	Perceived usefulness	3.69	0.942	Agree
2	Security and privacy risk	3.40	0.896	Agree
3	Compatibility	3.31	0.806	Neutral
4	Reliability	3.66	0.854	Agree
Adoption of cloud computing services		3.48	0.891	Agree

Hypothesis H1 was accepted with a moderate influence (r=0.372) between perceived usefulness and the adoption of cloud computing services. In this case, MOH need to present to the IT employees the usefulness of cloud computing and the positive effect of it in their daily work and in the healthcare services. The second hypothesis, H2, was accepted with a weak influence (r=0.145) of security and privacy risk dimension on the adoption of cloud computing services. The IT department should concentrate on the security and privacy because it is related to different field, data and informaiton security and personal privacy. The third hypothesis, H3, was accepted with a weak influence (r=0.186) of compatibility on the adoption of cloud computing services. The fourth hypothesis, H4, was accepted with weak influence (r= 0.139) between reliability and adoption of cloud computing services. The MOH need to clarify to the IT employees the importance of the cloud computing and the effect of the security and privacy, compatibility, reliability dimensions on the cloud computing technology. The MOH needs to have a strict plan to adopt the cloud computing technology in the healthcare context.

The fifth Hypothesis, H5, was used to test the influence of demographic characteristics (gender, nationality, job title, qualification, experience and age) on the adoption of cloud computing services. The results showed that the gender has a statistically significant difference on the adoption of cloud computing services since the significant value of the gender is less than 0.05. On the other h and, the nationality, job title, qualification, experience and age have no statistically significant differences on the adoption of cloud computing services. The reasons behind that may be that the number of employees in the IT department is limited to 48 employees, which makes them very close in their perspectives.

CONCLUSION

The findings supported the hypotheses indicating positive and significant influence of perceived usefulness, security and privacy risk, compatibility, reliability on the adoption of cloud computing services. The most challenging dimension facing the adoption of cloud computing services is the compatibility of cloud services, because compatibility needs are that the IT employees must have the ability to adopt their system to cloud and this needs time and hard work, with some knowledge of know-how to adopt their systems. Therefore, this need training that helps the IT employees acquire experience to adopt their system on cloud. The MOH needs the research and development center for information technology to follow up the new technologies in their field. Meanwhile, security and privacy can never be assured and secured 100% in these areas. Introducing a new technology requires investments in time and money. Therefore, when a ministry decides to implement a new technology, they would like to predict whether the new system will be fully accepted by users or not.

According to the results of this study, the recommendations are proposed. The IT department managers in MOH need to encourage the use of cloud computing technology by strengthening the concepts of the security, privacy, and compatibility of the systems. The IT department should be familiar with cloud computing by training programs of the cloud computing adoption.

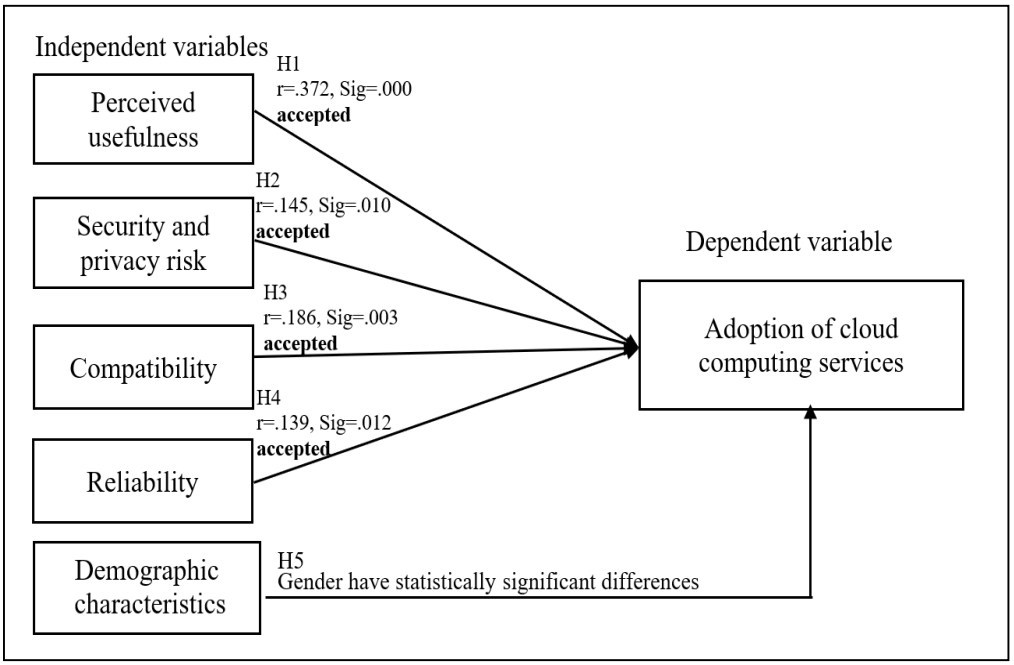

Figure 2. Conceptual Model Results

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