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نموذج هجين للحوسبة السحابية في المستشفيات اليمنية الخاصة

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A Hybrid Model of Cloud Computing for Yemeni Private Hospitals

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Abstract:
Cloud computing has become a transformative technology in the healthcare sector by enabling efficient access, storage, and sharing of medical information. Despite its global adoption, Yemeni private hospitals still face challenges in implementing cloud-based solutions, particularly in accessing patient records during emergencies.
This study proposes a hybrid model for adopting cloud computing in Yemeni private hospitals by integrating the TOE framework, DOI theory, IS strategic triangle, and Thong's model. The model includes twelve factors categorized into six contexts: technological, organizational, environmental, innovation, decision-making, and business.
A quantitative approach was employed using a structured questionnaire distributed to healthcare professionals, administrative staff, and IT personnel in private hospitals, with additional input from relevant governmental stakeholders to reflect the broader regulatory environment.
The findings reveal that relative advantage, reliability, availability, financial analysis and strategic value, compatibility, and decision-maker's IT knowledge are the most influential factors. The technological context was found to be the most significant, followed by business and innovation contexts.
These findings provide practical insights for decision-makers to support successful adoption of cloud computing in Yemeni private hospitals.
Keywords: Cloud Computing, Healthcare Sector, (TOE) Framework (DOI) Theory, Yemeni Private Hospitals.

الملخص:

أصبحت الحوسبة السحابية تقنية تحولية في قطاع الرعاية الصحية، حيث تتيح الوصول الفعّال إلى المعلومات الطبية وتخزينها ومشاركتها. وعلى الرغم من انتشارها العالمي، لا تزال المستشفيات الخاصة في اليمن تواجه تحديات في تطبيق الحلول السحابية، وخاصة في الوصول إلى سجلات المرضى أثناء حالات الطوارئ.

تقترح هذه الدراسة نموذجاً هجيناً لاعتماد الحوسبة السحابية في المستشفيات الخاصة اليمنية من خلال دمج إطار TOE، ونظرية DOI، ومثلث نظم المعلومات الاستراتيجي، ونموذج Thong ويتضمن النموذج اثني عشر عاملاً تم تصنيفها ضمن ستة سياقات: السياق التكنولوجي، التنظيمي، البيئي، الابتكاري، اتخاذ القرار، وسياق الأعمال. تم استخدام منهج كمي من خلال استبيان منظم وُزّع على العاملين في القطاع الصحي والموظفين الإداريين وموظفي تقنية المعلومات في المستشفيات الخاصة، بالإضافة إلى مدخلات من جهات حكومية ذات صلة لتعكس البيئة التنظيمية الأوسع.

أظهرت النتائج أن الميزة النسبية، والموثوقية، والتوافر، والتحليل المالي والقيمة الاستراتيجية، والتوافق، ومعرفة متخذ القرار بتقنية المعلومات هي أكثر العوامل تأثيراً. كما تبين أن السياق التكنولوجي هو الأكثر أهمية، يليه سياقا الأعمال والابتكار.

توفر هذه النتائج رؤى عملية لصناع القرار لدعم التبني الناجح للحوسبة السحابية في المستشفيات الخاصة اليمنية.

الكلمات المفتاحية: الحوسبة السحابية، قطاع الرعاية الصحية، إطار TOE ، نظريةDOI ، المستشفيات الخاصة اليمنية.

INTRODUCTION

Today, technology has become an important component in all industries, including the healthcare industry[1]. It is the key factor in the development of the world community. The development of Information and Communications Technology (ICT) is often to increase productivity, change the way business

works, develop business economy and share knowledge[2]. In this context, the health information system, as defined by the World Health Organization (WHO), is a system that combines data collection,

processing, reporting and its' usage to improve the efficiency and effectiveness of medical services through better management at all levels of medical services. Most of the current systems are independent, unmanaged, and do not support the sharing of information , these reduces the efficiency of the system in providing accurate information at the same time[3].

Cloud computing is a modern technology that revolutionized the way health care works in recent years, it provides greater computing power to achieve comprehensive healthcare [2] [4], such as storing patient's records that become easy to use and access resulting in increasing the productivity of health care[1, 5][6] .

Cloud computing is described by the National Institute of Standards and Technology as a model for enabling access everywhere, conveniently, and on demand, to a common set of configurable computing resources (servers, storage, networks, applications, and services)[7, 8][9] .The features of cloud computing have led to the adoption of cloud computing in many areas of work; such these features are scalable resources, self-service, on demand, high flexibility, wide network access, measured services, dynamic resources, and resource pooling with other tenants[10, 11] . Due to the improvement in basic infrastructure and living standards, people move a lot from one place to another. When people migrate from one location to another, they are likely to request medical attention from

various medical institutions. Institutions may have a small medical history record or no record of the patient. Many studies showed that the lack or restriction of access to patient's records for immediate decision making is one of the causes of medical errors that causes damage to the patient's health and may lead to death, and also damage the reputation of the medical institution[3]. The adoption of cloud computing makes it easier for patients and healthcare institutions to identify and trace the medical history, while facilitating the sharing of medical information resources among health care providers. Individuals in public places may confront unexpected diseases, for example, respiratory failure, strokes, asthma assaults, blacking out, regurgitating, seizures, diabetic crises and other perilous assaults. Either general people or the specialist in the close by emergency clinic couldn't help the suffered person, since they may not be mindful of the clinical history of the patient, as the clinical records of the patients are not accessible. Thus, it is extremely hard for care suppliers (specialists) to settle on a treatment plan. Creating Blood tests and different tests for identifying the sickness will take some time and this deferral may compromise the life of patient. During the emergency period, giving clinical history of the patient to the specialists is important [7].

Healthcare systems through the cloud is already adopted in some countries to provide this type of information services during the emergency period, but the Yemeni hospitals lack such systems that enable sharing health care information between healthcare centers. When Yemeni hospitals and health care centers use different electronic health systems with different standards, it becomes difficult to communicate and share medical data with each other.

Thus, proposing a model for Yemeni private hospitals for adopting cloud computing in the health sector is an important step, as there are expectations that future hospital systems can be managed mainly through cloud-based applications. Where cloud computing contributes to:

1) Provide an easier and less burdensome way to manage information on the health sector more efficiently and effectively, especially for developing countries that lack such technology in the health sector or skilled personnel, as well as resources that enable the creation of a high level of infrastructure of information technology in the health sector.
2) Improve the efficiency of hospital performance, increase the productivity of patient care, and increase the efficiency and quality of services provided to beneficiaries.
3) Facilitate storing medical data, which would allow physicians to know the full details of any medical condition of any situation from any location with low error rate in the diagnosis.
4) Improve communication between partners (physician, patient and management) and allow health clinics, medical centers and other hospitals around the world to exchange information on medical analysis, inquire about the availability of required medicines, and provide health information at any time and from anywhere.
5) Reduce cost, there is a decrease in the environmental cost, energy cost and operation cost.
6) Reduce the arrival time of medical results from weeks or months to a few minutes or even seconds.

Although there are many benefits for health sector from adopting cloud computing, it is still hesitated to implement it. So this paper attempts to identify the problems that delay the decision of adopting cloud computing in healthcare sectors and clarify the requirements the decision makers need to take the decision.

The main objective of this paper is to propose a hybrid model for adopting cloud computing in the Yemeni private hospitals by examining the factors that contribute to the successful adoption of cloud computing.

Research Gap

Although previous studies have investigated cloud computing adoption using frameworks such as TOE and DOI, most of these studies were conducted in developed or semi-developed countries and focused on limited sets of factors. Furthermore, few studies have integrated multiple theoretical perspectives into a unified hybrid model.

In the context of Yemen, there is a lack of comprehensive studies that examine cloud computing adoption in private hospitals while incorporating technological, organizational, environmental, innovation, decision-making, and business perspectives simultaneously.

Therefore, this study addresses this gap by proposing and empirically validating a hybrid model tailored to the Yemeni healthcare context.

LITERATURE REVIEW AND RELATED STUDIES

Different studies reveal different factors affecting the decision to adopt certain technologies. Researchers chose different methods to examine the factors that enable organizations to take decision on adopting cloud computing. In the studies[12] eight factors e.g. relative advantage, compatibility, complexity, company size, top management support , technology readiness, trading partner pressure and competitive pressure were investigated. These factors were examined in order to identify their influence on the company's decision makers for adopting cloud computing. The results indicated that five of these factors significantly influence the adoption of cloud computing namely: top management support, relative advantage, company size, business partner pressure and competitive pressure. [13] used the Technology, Organizational, and Environmental (TOE) framework to identify the factors that influenced the decision of the UK's cloud computing adopters. The results showed that complexity, competitive pressure, trading partner pressure and technology readiness factors had a positive impact on the adoption of cloud computing.

[14] investigated the factors that affect the cloud computing adoption in Jordanian hospitals. They used TOE framework in their study. The results showed that all factors including "Relative Advantage, Complexity, Compatibility, Top Management Support, Technological Readiness, Competitive Pressure, Trading Partner Pressure, and Vendor Scarcity" had a substantial positive impact on the cloud computing adoption in Jordanian hospitals. The technological factor was the most influential factor on the adoption of decision, followed by the environmental factor and finally the organizational factor. But the study did not consider some important factors such as: Financial analysis & strategic value of cloud, regulation and rules, security, decision-maker, **availability**, and reliability.

[15] identified and evaluated the factors affecting the adoption of cloud computing in Irish hospitals, using the TOE framework. The most important factors in the study were "cost, data security, perceived usefulness, available resources, organization size, regulatory & legal context and vendor support". The study ignores the compatibility, complexity, technology readiness, top management support, decision-maker, and reliability factors.

[16] examined the critical factors influencing the decision to adopt cloud computing at the Taiwan hospitals by integrating the TOE framework with the HOT-fit (Human-Organization-Technology fit) model. The results indicated that the five most important factors are data security, perceived technical competence, cost, top management support, and complexity. The most important factor was the technological followed by human, organizational and finally environmental. The study focused on small and medium-sized hospitals in Taiwan, which have a very high degree of E-health. However, the study has not been circulated to developing countries and did not discuss the issues of technological readiness, change resistance and external expertise.

[17] investigated and identified the factors that influenced the adoption of cloud computing in Saudi health care organizations. The authors integrated the TOE framework with the IS Triangle framework and the HOT- fit model. Among the five perspectives examined in the work, business perspective was found to be more important followed by technological, organizational, environmental and finally human. The results of the study showed that the most important factors are soft financial analysis, relative advantage, hard financial analysis, attitude toward change, and the pressure from partners in the business ecosystem. The study did not address the availability and reliability factors.

The aim of the study in [18] was to assess the cloud computing adoption in Saudi hospitals, in addition to identifying the factors that affect the adoption of cloud computing technology. The authors integrated the TOE framework with the DOI innovation theory and added the context of the decision - maker to the original model. The results of this study identified five factors affecting the adoption of cloud computing in the hospitals of the Saudi Arabia universities. The factors subjected to investigation were relative advantage, decision maker's innovativeness, decision maker's

knowledge in IT, compatibility, and top management support. Among the four factors, decision-making presents to be the most important context, followed by technological, organizational and finally environmental context.

[19] investigated the factors that influence the adoption of cloud computing technology in the health care industry in Sri Lanka. Various techniques were used to analyze and identify whether the environmental, organizational and technical factors affect the role of specialist in decision making in health care sectors, in order to consider cloud computing technology services as an effective investment. The results of the study showed that the three factors of the TOE framework were highly correlated and had a great impact on the decision of organizations. The addressed factors in this study were limited and did not take into account the availability, reliability, regulation and rules, security, and decision-maker.

The purpose of the research in [20] was to investigate the factors and barriers expected to affect the adoption of cloud computing in Indian hospitals. The TOE framework was considered in the study. The results indicated that all three factors were correlated and had a substantial impact on the adoption of cloud computing technology. It also predicted that IT managers will be assisted in assessing potential adoption and raising awareness about the issues of adoption. But the study did not consider some important factors such as: availability, reliability, financial analysis & strategic value of cloud, and decision-maker.

In a more relevant review[21] the factors influencing cloud computing adoption in private and public hospitals in a developing country were also analyzed, especially hospitals in Brazil. The results of this review showed that availability, security and flexibility are factors of high importance while the cost and management were of medium importance. Moreover, the review showed that the regulations issues are of high importance in public hospitals and of medium importance in private hospitals. The review also differentiated between private and public hospitals in terms of regulations and contractual issues and cost. But the study did use neither TOE nor DOI frameworks.

[22] analyzed the cloud computing reception in Indian health care centers and explored the components that affect the adoption of cloud computing. In their proposed model, they merged the TOE framework with DOI. The results showed that factors such as "relative advantage, complexity, compatibility, technological readiness, top management support, organization size, competitive pressure, have a positive impact on the adoption of cloud computing in Indian private hospitals.

THE PROPOSED HYBRID MODEL

The main objective of this paper is to propose a hybrid model for adopting cloud computing in the Yemeni private hospitals by examining the factors that contribute to the successful adoption of cloud computing. This model is achieved by integrating the technological, Organizational and environmental (TOE) framework with the theory of the diffusion of innovation (DOI), in addition to decision-making context, and business context from information systems strategy triangle framework (IS triangle). This hybrid model will provide a comprehensive assessment of the determinants of adopting cloud computing in private hospitals.

Innovation diffusion theory is one of the theories of Technology adoption, which focuses on the adoption of technology at the organizational level. DOI is the main theory commonly used with the TOE framework , since these two models complement each other in the knowledge of the characteristics of innovation in order to offer a richer theory to understand the behavior of adoption [23]. DOI theory consists of five factors, three of which were adopted in our model, namely (Relative advantage, Complexity and Compatibility)

[18] . Also the decision maker context has been added to the model of our study, this context was adapted from the Thong's model [24], the characteristics and functions of the decision maker reflect attitudes, motivations and perceptions towards the adoption of innovation. So, involving decision maker will have a positive impact on the adoption process due to the decision maker has crucial role.

Business concepts should be taken into account by any decision maker [25] , so the business context is added from the strategic triangle framework of information systems in order to add the strategic value to our model. The following are the contexts that constitute our model:

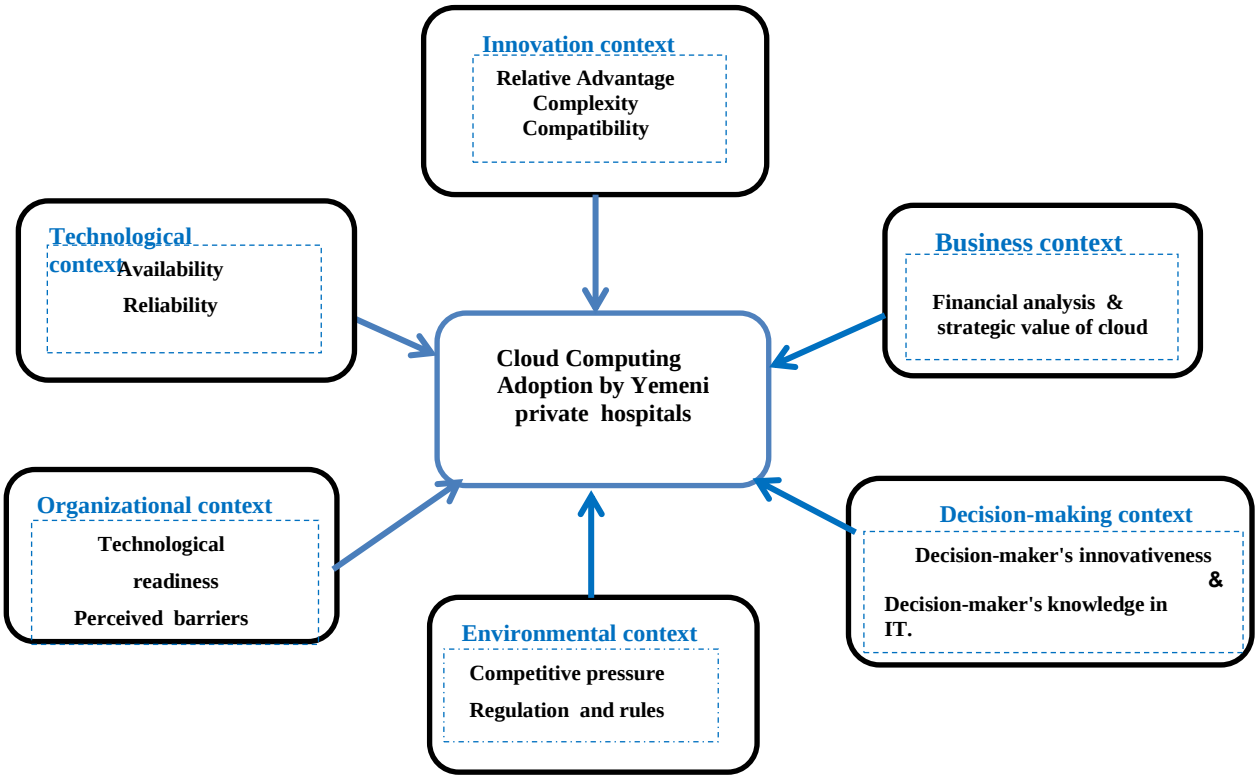

Figure 1 : The proposed model of the study

A. *Innovation Context (IC)*

This context includes three factors: relative advantage, complexity, and compatibility.

- Relative Advantage: The use of new technology offers many potential benefits to the organization, thus cloud computing technology cloud improve the quality of medical services at the medical centers[14] .
- Complexity: The use of new technology may be more challenging, as it faces the challenges of changing processes associated with business systems. To increase the probability of successful adoption of new technology, it must be less challenging and easy to use[15] .
- Compatibility: It addresses the consistency of the organization and its members in terms of behavioral patterns existing values and past experiences [16] .

B. *Technological Context (TC)*

This context refers to the internal and external technologies used in the organizations. The internal technology refers to the technologies already used to improve productivity of the organization and the external technology refers to that available in the market and are not used by the organization yet [19] [26] . This context refers to the following factors:

- Availability: Health services in cloud computing must be available continuously without interruption or decrease in performance.
- Reliability: Health services and data must be error-free, consistent and in a valid state irrespective of any software, hardware or network failure.

C. *Organizational Context (OC)*

This context deals with characteristics and resources of the organization[26] [19]. It refers to:

- Technological Readiness: it deals with the readiness of infrastructure, information technology, information technology and human resources that influence the adoption of new technology [22] .

- Perceived Barriers: it deals with the barriers that influence the adoption of cloud computing technology such as security and privacy[21].

D. Environmental Context (EC)

It is the environment, in which organizations manage business [19] . This context refers to:

- Competitive Pressure: it deals with **t**he amount of pressure the organization faces from the competitors in the same industry. This competition plays a positive role in accepting any new technology [20].
- Rules and Regulations: it deals with the policies, initiatives, agencies and all that the government provides or organizes to accelerate the rate of adoption of new technology [21] .

E. Decision Maker Context (DC)

This contexts represent the decision maker's personal characteristics and their ability to accept change[18]. It refers to:

- Decision-maker's innovativeness and Decision-maker's knowledge in IT[17] [18].

F. Business Context (BC)

Financial analysis deals with the adoption decision and assessment of the use of cloud computing from business perspective [17] . This context refers to:

- Financial Analysis & Strategic Value of Cloud : Cost analysis in capital and operating expenses is a strategic value to be added to the health industry [17] .

In this paper, a hybrid model for adopting cloud computing services in Yemeni private hospitals was proposed by integrating the TOE framework, DOI model, business context from IS strategic triangle framework, and decision maker context from the Thong's model.

The proposed model consists of twelve factors classified into six contexts. Since the model incorporate the TOE framework with the theory of diffusion of innovation, in addition to the strategic triangle framework, it might become a valuable and comprehensive model compared to other models in technology certification studies.

HYPOTHESES

A. Null Hypotheses

H1: There is a negative impact between relative advantage factor and adoption of cloud computing in private hospitals in Yemen.

H2: There is a negative impact between compatibility factor and adoption of cloud computing in private hospitals in Yemen.

H3: There is a negative impact between complexity factor and adoption of cloud computing in private hospitals in Yemen.

H4: There is a negative impact between availability factors and adoption of cloud computing in private hospitals in Yemen.

H5: There is a negative impact between reliability factor and adoption of cloud computing in private hospitals in Yemen.

H6: There is a negative impact between Technological readiness factor and adoption of cloud computing in private hospitals in Yemen.

H7: There is a negative impact between perceived barriers factors and adoption of cloud computing in private hospitals in Yemen.

H8: There is a negative impact between competitive pressure factor and adoption of cloud computing in private hospitals in Yemen.

H9: There is a negative impact between regulation and rules factors and adoption of cloud computing in private hospitals in Yemen.

H10: There is a negative impact between top management support factor and adoption of cloud computing in private hospitals in Yemen.

H11: There is a negative impact between decision-maker's innovativeness and knowledge in IT factor and adoption of cloud computing in private hospitals in Yemen.

H12: There is a negative impact between financial analysis & strategic value of cloud factors and adoption of cloud computing in private hospitals in Yemen.

B. *Alternative Hypotheses*

H1: There is a positive impact between relative advantage factor and adoption of cloud computing in private hospitals in Yemen.

H2: There is a positive impact between compatibility factor and adoption of cloud computing in private hospitals in Yemen.

H3: There is a positive impact between complexity factor and adoption of cloud computing in private hospitals in Yemen.

H4: There is a positive impact between availability factors and adoption of cloud computing in private hospitals in Yemen.

H5: There is a positive impact between reliability factor and adoption of cloud computing in private hospitals in Yemen.

H6: There is a positive impact between technological readiness factor and adoption of cloud computing in private hospitals in Yemen.

H7: There is a positive impact between perceived barriers factors and adoption of cloud computing in private hospitals in Yemen.

H8: There is a positive impact between competitive pressure factor and adoption of cloud computing in private hospitals in Yemen.

H9: There is a positive impact between regulation and rules factors and adoption of cloud computing in private hospitals in Yemen.

H10: There is a positive impact between top management support factor and adoption of cloud computing in private hospitals in Yemen.

H11: There is a positive impact between decision-maker's innovativeness and knowledge in IT factor and adoption of cloud computing in private hospitals in Yemen

H12: There is a positive impact between financial analysis & strategic value of cloud factors and adoption of cloud computing in private hospitals in Yemen.

RESEARCH METHODOLOGY

The proposed model in this work is a hybrid model for investigating the correctness of the hypotheses and achieve the objectives of the study. The quantitative method was used to explore the impact of the selected factors on the adoption of cloud computing. Then the quantitative methodology for collecting numerical data was developed in order to generalize the results. The quantitative data were collected through a questionnaire which was designed and worded carefully in order to include all sub-questions to represent every context (Innovation, Technological, Organizational, and Environmental, Decision-maker, Business), in regard to the adoption of cloud computing technology by Yemeni private hospitals.

The questionnaire consists of five parts. The first part was a cover letter form for the participants' agreement to answer the questionnaire items and it contained information about the study and the researcher. The second part was a summary of cloud computing technology. The third part was the demographic information of the participants, which included gender, age, education, position, and years of experience. The fourth part was about the Adoption of Cloud Computing. The fifth part was dedicated to explore the various dimensions that can affect the adoption of cloud computing technology. For measurement process 72 questions were developed to measure 12 factors in the hybrid theoretical model using a five-point Likert scale ranging from strongly agree to strongly disagree.

To ensure the validation of the questionnaire items in terms of accuracy, clarity and relevance, the questionnaire was validated by 12 experts (professor, associate professor, doctor from inside and outside Sana'a city, 10 specialists in the field of information technology and 2 specialists in the field of statistics and informatics. Then the questionnaire was distributed after validation to 13 as a pilot study that included M.A students and lecturers at the Faculty of Computer and Information Technology, Sana'a University to test the usability of the research instrument. Validity and reliability were checked and all the values followed the normal distribution. Stability test was also achieved by

using Cronbach's alpha. It was found that all data had a Cronbach's alpha (> 0.5) and 96.3%. Validity was evaluated during the questionnaire test using Cronbach's alpha also. Accordingly, the results proved the validity and reliability of the questionnaire tool and the normal distribution of all values.

This study is conducted on private hospitals in the Republic of Yemen and the target environment was 32 hospitals in in the Capital city Sana'a in addition to the Ministry of Public Health and Population.

Although the primary focus of this study is on private hospitals, selected participants from the Ministry of Public Health were included due to their critical role in regulating, supervising, and facilitating national healthcare IT infrastructure. Their inclusion provides a broader institutional perspective without altering the study's primary focus on private hospitals.

The data collection was conducted from September to November 2019; 416 surveys were hand-delivered and online survey. The purposive sample of the study included administrative and IT staff and the health care professionals (doctors, nurses, pharmacists and labs physicians) from 32 private hospitals. Moreover, the questionnaires were distributed to the administrative staff from the Information Technology Department at the Ministry of Public Health.239 surveys were usable for the analysis and the results were presented in several statistical measures such as frequency, percentage, mean, standard deviation, Pearson and linear regression analysis using the SPSS program.

A. Methods of statistical analysis

The data is processed statistically using the Social Statistical Package (SPSS) program. Each of the following statistical measures is calculated:

1)Frequency and Percentage used to describe demographic characteristics for respondents through in the following aspects: gender, age, education, years of experience and position.

2)Calculation of the mean and the standard deviation to determine the respondents to different variables of the study.

3)Regression analysis to find out the significance of the differences for respondents to the six contexts of the study in accordance with the demographic characteristics of the respondents.

4)The Cronbach's alpha to measure reliability and validity.

B. The Expected Results

Validation of the hypothesis will prove that there is a positive impact between the twelve factors and the adoption of cloud computing in private Yemeni hospitals.

C. Data analysis

In order to examine the impact of the hybrid model for adopting cloud computing in private hospitals, a five-point Likert scale was used to analyze the data from the surveys using SPSS.

- ***Demographic Data Analysis***

The following section presents the demographic characteristics of the respondents according to: gender, age, education, position and years of experience.

Table1. Frequency Distribution – Demographic of Respondents

	Items	Frequency	Percent
Gender	Male	161	67.4%
	Female	78	32.6%
	25 years or less	75	31.4%
Age	26 - 35 years	110	46.0%
	36 years or more	54	22.6%
Education	Diploma	35	14.6%
	Bachelor	139	58.2%
	Higher Education	65	27.2%
Position	IT Manager	22	9.2%
	IT staff	63	26.4%
	General director	7	2.9%
	Manager financial	13	5.4%
	Director of Human Resources	4	1.7%

	Others administrators	21	8.8%
	Doctor	41	17.2%
	Physician Assistant	17	7.1%
	Pharmacist	25	10.5%
	labs physician	23	9.6%
	Others health care professional	3	1.3%
Years of Experience	4 years or less	104	43.5%
	5 - 10 years	76	31.8%
	10 years or more	59	24.7%

- ***Descriptive Statistics***

To represent numerical or mathematical methods to collect data to summarize or shorten it and display it in Table 2.

Table2 **. Descriptive Statistics of Financial analysis & strategic value of cloud.**

Items	Mean	Std. Deviation	Percentage	Verbal Result
Adoption of Cloud Computing	4.23	0.596	84.6%	Strongly Agree
Relative Advantage	4.29	0.557	85.8%	Strongly Agree
Compatibility	3.78	0.785	75.6%	Agree
Complexity	3.18	0.822	63.6%	To a certain agree
Availability	4.08	0.643	81.6%	Agree
Reliability	4.15	0.533	83.0%	Agree
Technological Readiness	3.6	0.836	72.0%	Agree
Perceived Barriers	3.58	0.830	71.6%	Agree
Competitive Pressure	3.71	0.669	74.2%	Agree
Regulation And Rules	3.11	0.847	62.2%	To a certain agree
Top Management Support	3.54	0.927	70.8%	Agree
Decision-maker's innovativeness knowledge in IT	3.74	0.980	74.8%	Agree
Financial analysis & strategic value of cloud	3.92	0.706	78.4%	Agree

- ***Correlation Analysis***

Correlation is an indication of the nature of the relationship between two variables. The relationship can be positive, negative, weak, moderate, strong, or any logical combination. “A Pearson correlation matrix will indicate the direction, strength, and significance of the bivariate relationships among all the variables that were measured at an interval or ratio level. The correlation is derived by assessing the variations in one variable as another variable also varies. Thus, a hypothesis that postulates a significant positive (or negative) relationship between two variables can be tested by examining the correlation between the two. Table3 , shows that the rules of thumb that need to be used in interpreting the R-value obtained from inter correlation analysis.

Table3 **. Interpreting the R-value for Correlations**

Relationship	R-value Relationship
Very strong relationship	Above 0.70
Strong relationship	0.50- 0.69
Moderate relationship	0.30- 0.49
Low relationship	0.10- 0.29
Very low relationship	0.01- 0.09

Table 4**. shows the correlation analysis between the dependent variable and independent variables.**

Variables		Person correlation	p-value
Adoption of Cloud Computing	Relative Advantage	.680**	.000
	Compatibility	.512**	.000

	Complexity	-.075-	.251
	Availability	.549**	.000
	Reliability	.230**	.000
	Technological Readiness	.401**	.000
	Perceived Barriers	-.228-**	.000
	Competitive Pressure	.391**	.000
	Regulation and Rules	.259**	.000
	Top management Support	.460**	.000
	Decision-maker's innovativeness knowledge in IT	.406**	.000
	Financial analysis & strategic value of cloud	.524**	.000

**. Correlation is significant at the 0.01 level (2-tailed)

- ***Regression Analysis***

It is used to predict the value of a variable called the dependent variable through a set of independent variables.

Table 5. Regression Analysis Results.

Hypotheses		T-value	P-value	Support	R-Square
H1	RA → ACC	14.267	Yes, p< 0.001 extremely statistically significant.	Support	0.462
H2	CB → ACC	9.166	Yes, p< 0.001 extremely statistically significant.	Support	0.262
H3	CX → ACC	-1.150	No, p>0.05	No	0.006
H4	AV → ACC	10.108	Yes, p< 0.01 very statistically significant.	Support	0.301
H5	RB → ACC	3.644	Yes, p< 0.01 very statistically significant.	Support	0.053
H6	TR → ACC	6.733	Yes, p< 0.01 very statistically significant.	Support	0.161
H7	PB →ACC	-3.601	Yes, p< 0.01 very statistically significant.	Support	0.052
H8	CP →ACC	6.532	Yes, p< 0.01 very statistically significant.	Support	0.153
H9	RAR →ACC	4.123	Yes, p< 0.01 very statistically significant.	Support	0.067
H10	TMS →ACC	7.955	Yes, p< 0.01 very statistically significant.	Support	0.211
H11	DM →ACC	6.836	Yes, p< 0.01 very statistically significant.	Support	0.165
H12	FA →ACC	9.472	Yes, p< 0.01 very statistically significant.	Support	0.275

H1: There is a significance positive impact between Relative Advantage and Adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square is 0.462 and the p-value < 0.001. These values indicate that there is a positive significant Relative Advantage and the adoption of cloud computing. Moreover, as the value of Pearson correlation coefficient (r) is 0.680, which means the relationship is a strong positive correlation between Relative Advantage and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of relative advantage on the adoption of cloud computing. Thus, the hypothesis H1 is accepted.

H2: There is a significance positive impact between Compatibility and Adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = .262, p-value < 0.001. These values indicate that there is a significance positive impact between Compatibility and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .512, which means the relationship is a strong positive correlation between Compatibility and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Compatibility on the adoption of cloud computing. Hence hypothesis H2 is accepted.

H3: There is a significance positive impact between Complexity and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = .006, p-value > 0.05. These values indicate that there isn't a significance positive impact between Complexity and the adoption of cloud computing

in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is -.075-, which means the relationship isn't relationship correlation between Complexity and the adoption of cloud computing in private hospitals in Yemen. These results the research hypotheses which indicates the negative impact of Complexity on the adoption of cloud computing. Hence hypothesis H3 isn't accepted.

H4: There is a significance positive impact between Availability and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = .301, p-value < 0.01. These values indicate that there is a positive impact significance between Availability and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .549, which means the relationship is a strong positive correlation between Availability and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Availability on the adoption of cloud computing Hence hypothesis H4 is accepted.

H5: There is a significance positive impact between Reliability and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.053 and the p-value < 0.01. These values indicate that there is a positive significance Reliability and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .230, which means the relationship is a low positive correlation between Reliability and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Reliability on the adoption of cloud computing. Hence hypothesis H6 is accepted.

H6: There is a significance positive impact between Technological Readiness and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.161 and the p-value < 0.01. These values indicate that there is a positive significance impact between Technological Readiness and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .401, which means the relationship is a moderate positive correlation between Technological Readiness and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Technological Readiness on adoption of cloud computing. Hence hypothesis H6 is accepted.

H7: There is a significance positive impact between Perceived Barriers and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.052 and the p-value < 0.01. These values indicate that there is a statistically significant relationship between Perceived Barriers and the adoption of cloud computing in private hospitals in Yemen. Moreover, the value of Pearson correlation coefficient (r) is -.228, which indicates a low negative correlation between Perceived Barriers and cloud computing adoption.

Although the statistical results indicate a significant relationship, the negative coefficient suggests that perceived barriers negatively influence cloud computing adoption. Therefore, the hypothesis is only partially supported, and the direction of the relationship contradicts the initially proposed assumption.

H8: There is a significance positive impact between Competitive Pressure and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.153 and the p-value < 0.01. These values indicate that there is a positive significance impact between Competitive Pressure and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .391, which means the relationship is a moderate positive correlation between

Competitive Pressure and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Competitive Pressure on the adoption of cloud computing. Hence hypothesis H8 is accepted.

H9: There is a significance positive impact between Regulation and Rules and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.067 and the p-value < 0.01. These values indicate that there is a positive significance impact between Regulation and Rules and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .259, which means the relationship is a low positive correlation between Regulation and Rules and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Regulation and Rules on the adoption of cloud computing Hence hypothesis H9 is accepted.

H10: There is a significance positive impact between Top management Support and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.211 and the p-value < 0.01. These values indicate that there is a positive significance impact between Top management Support and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .460, which means the relationship is a moderate positive correlation between Top management Support and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Top management Support on the adoption of cloud computing. Hence hypothesis H10 is accepted.

H11: There is a significance positive impact between Decision-maker's innovativeness knowledge in IT and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.165 and the p-value < 0.01. These values indicate that there is a positive significance impact between Decision-maker's innovativeness knowledge in IT and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .406, which means the relationship is a moderate positive correlation between Decision-maker's innovativeness knowledge in IT and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of Decision-maker's innovativeness knowledge in IT on the adoption of cloud computing. Hence hypothesis H11 is accepted.

H12: There is a significance positive impact between financial analysis & strategic value of cloud and adoption of Cloud Computing in private hospitals in Yemen.

According to the analysis, the value of R Square = 0.275 and the p-value < 0.01. These values indicate that there is a significance positive impact between financial analysis & strategic value of cloud and the adoption of cloud computing in private hospitals in Yemen. Moreover, as the value of Pearson correlation coefficient (r) is .524, which means the relationship is a strong positive correlation between financial analysis & strategic value of cloud and the adoption of cloud computing in private hospitals in Yemen. These results support the research hypotheses which indicates the positive impact of financial analysis & strategic value of cloud on the adoption of cloud computing. Hence hypothesis H12 is accepted.

- *Reliability and Validity*

  Reliability was assessed using Cronbach's alpha coefficient, where all values exceeded the acceptable threshold, indicating high internal consistency.

Validity was ensured through expert review (content validity) and pilot testing. A panel of 12 experts evaluated the questionnaire items in terms of clarity, relevance, and coverage. Based on their feedback, necessary modifications were made before final data collection

Table 6 **. Cronbach's Alpha.**

N	Variables	N of Items	Cronbach's Alpha	Alpha½
1	Adoption of Cloud Computing	7	0.644	0.802
2	Relative Advantage	6	0.788	0.888
3	Compatibility	5	0.842	0.918
4	Complexity	6	0.883	0.934
5	Availability	4	0.770	0.877
6	Reliability	5	0.816	0.903
7	Technological Readiness	7	0.995	0.997
8	Perceived Barriers	3	0.692	0.832
9	Competitive Pressure	5	0.712	0.844
10	Regulation And Rules	4	0.789	00.888
11	Top management Support	6	0.893	0.945
12	Decision-maker's innovativeness and knowledge in IT	7	0.948	0.974
13	Financial analysis & strategic value of cloud	7	0.935	0.967
	All items	**72**	**0.963**	**981**

Table 6, shows Cronbach's alpha. The values of Cronbach's alpha coefficient (α) for data collecting scale stability is 96.3% which means a high degree of the credibility of the answers. Moreover, this result indicates that the sample is homogeneous in responding to the questionnaire and can greatly depend on and generalize the results to the research community.

- *Normality*

Table7 **. Skewness and kurtosis values of the variables**

Variables	Skewness	Kurtosis
Adoption of Cloud Computing	-0.354	-0.288
Relative Advantage	-0.693	-0.549
Compatibility	-0.498	-0.166
Complexity	0.030	-0.911
Availability	-0.042	-0.732
Reliability	-0.844	-0.707
Technological Readiness	0.444	-0.986
Perceived Barriers	0.033	-0.720
Competitive Pressure	1.112	0.141
Regulation And Rules	0.745	-0.063
Top management Support	0.155	-0.490
Decision-maker's innovativeness and knowledge in IT	-.034	-0.830
Financial analysis & strategic value of cloud	-1.361	0.714

Table7, shows that Skewness values for all variables are ranging between (1.112) and (-1.361) which are between the value of the Skewness coefficients - / + 2.58, whereas Kurtosis values ranging between (0.714) and (-0.911) which are values close to zero, which means that all values are normal distribution.

Ethical Considerations

Participants were informed about the purpose of the study, and their participation was voluntary. Data confidentiality and anonymity were ensured. No personal identifying information was collected, and responses were used solely for research purposes.

The study followed general ethical guidelines for academic research.

RESULTS AND DISCUSSION

The main purpose of this research is to build a hybrid model for adopting cloud computing in the private hospitals in Yemen in order to identify the factors affecting the adoption of cloud computing. The results indicate that the six contexts of the model have a positive impact on the adoption of cloud computing in the private hospitals in Yemen.

The following section discusses these contexts in details. Table5 and Table 8 show that.

A. Technological Context

The results show that the technological context is the first most important dimension in the adoption of cloud computing in the private hospitals in Yemen and represents a mean of 4.12. This context is represented by two technical factors, namely availability and reliability. The results showed that there is an important positive impact between availability and the adoption of cloud computing. The availability factor represents the third important factor of adopting cloud computing among the twelve factors. This finding is in line with the previous studies conducted in the hospitals in Brazil [21] and the hospitals in India [20]. The results indicate that available patient data is critical for hospital healthcare providers who cannot work effectively unless these data are available. The second variable in this context is reliability. The results also show that there is an important positive impact between reliability and the adoption of cloud computing. The reliability factor represents the second most important factor of adopting cloud computing among the twelve factors. In contrast with previous study conducted in[27] where reliability has a negative impact. All health services and data are required to be consistent, error-free and reliable in order to accept the application of cloud computing technology services in the medical field.

B. Business Context

The results show that this context is the second most important dimension in the adoption of cloud computing in the private hospitals in Yemen and represents a mean of 3.92. This context is represented by one factor namely the financial analysis and the added value of the cloud. The results show that there is an important positive impact between financial analysis and the added value of the cloud and the adoption of cloud computing. From the descriptive analysis, financial analysis and the added value of the cloud represent the fourth most importance factor among the twelve factors. The results indicate that with adopting cloud computing technology, there are many benefits that can be gained from the cost savings of hardware, software, operations, energy and environmental. The cost saving will positively affect the business process of hospitals. The use of cloud computing technology allows the hospital to provide services that could not be provided before. This result is consistent with the previous studies conducted in Taiwan hospitals [16] , health care organizations in Saudi Arabia [17] and public and private Hospitals in Brazil [21].

C. Innovation Context

The results show that this context is the third most important dimension in the adoption of cloud computing in the Yemeni private hospitals and represents a mean of 3.75. This context represented by three factors namely relative advantage, compatibility and complexity. The results show that there is an important positive impact between the relative advantage and adopting cloud computing. The relative advantage represents the first most important factor of adopting cloud computing among the twelve variables. This means the participants in study believe that the use of cloud computing technology provides real benefits for hospitals. The use of cloud computing technology improves the quality of medical services in the hospital. Cloud computing technology increases the productivity of hospital staff and contributes to accomplishing the tasks more quickly. This result is consistent with the previous studies conducted in Saudi health care organizations [17], in Jordanian Hospitals [14], Hospitals in Colombo District, Sri Lanka [19] , Saudi University Hospitals[18], and Private Hospitals in India [22].The result is in contrast with previous study that was conducted in Taiwan hospital [16]. And as expected, the results show that there is an important positive impact between compatibility and adoption of cloud computing. Where compatibility represents the fifth most important factor of adopting cloud computing among the twelve factors. The result indicates that cloud computing services are compatible with the hospital's current business strategy. Cloud computing also compatible to the hospital's values, goals and the administrative operational needs in the hospital.

This result is in line with the previous studies conducted in the hospital in Saudi Arabia organizations[17], Jordanian Hospitals [14] , Colombo District, Sri Lanka Hospitals [19], Saudi University Hospitals[18], and Private Hospitals in India[22]. In contrast with previous study that were conducted in Taiwan [16], where the compatibility has less positive impact.The result of this study indicates, with high agreement from the participants, the positive effect of adopting cloud computing with the current work strategy in the hospital and the information technology infrastructure and operations. This study proves that the adoption of any modern technology needs to ensure compatibility of systems and infrastructure with modern technology. Regarding complexity, the results of this study show that there is no significant effect of complexity on the adoption of cloud computing. This may indicate that the respondents, who are mostly IT and healthcare professionals, possess sufficient technical knowledge to handle the complexity of this technology. This result is consistent with previous studies conducted in university hospitals in Saudi Arabia[18] and private hospitals in India[22]. which also reported that complexity has no significant effect on the adoption of cloud computing.

Unlike other studies that reported a strong impact of complexity, this study found no significant effect. This discrepancy may be attributed to differences in respondents' technical background and the specific context of Yemeni private hospitals.

The result indicates that the complexity factor may influence the adoption of cloud computing, but it is not considered a major barrier in this context. This reflects the technical background of the participants, which enables them to handle technological complexity and demonstrates their willingness to adopt new technologies such as cloud computing. In contrast, previous studies conducted in Taiwanese hospitals[16]. reported that complexity was ranked as the fifth most important factor influencing cloud computing adoption. Similarly, studies in hospitals in the Colombo District, Sri Lanka[19]. found that complexity had a strong impact on adoption. This indicates that the role of complexity varies across different healthcare contexts, depending on technological readiness and user experience.

D. Decision Maker Context

The results show that this context is the fourth most important dimension in the adoption of cloud computing in Yemeni private hospitals and represents a mean of 3.64. This context is represented by two factors namely top management support and decision-maker's innovativeness knowledge in IT. The results show that there is an important positive impact between top management support and adoption of cloud computing. Also there is an important positive impact between the decision-maker's innovativeness knowledge in IT and adoption of cloud computing. These results revealed the importance of innovative decision-maker in adopting new information technology services in Yemeni private hospitals. The results also indicate the positive decision-maker's attitude towards adopting cloud computing and also decision-makers' desire to increase their knowledge of new technology. This result is consistent with the previous studies conducted in Saudi University Hospitals [18] .With regard to top management, the results realized the benefits of cloud computing technology after clarifying the idea of this technology. Therefore, the top management encourages and supports enthusiastically the adoption of this technology in the health sector. This result is in line with the previous studies conducted in Saudi University Hospitals [18] , Taiwan hospital [16] , Saudi healthcare organizations [17], hospitals in Colombo District, Sri Lanka [2], Private Hospitals in India[22]. In the study[14] , this factor had small impact.

E. Organizational Context

The results show that this context is the fifth most important dimension in the adoption of cloud computing in private Yemeni hospitals and represents a mean of 3.59. This context is represented by two factors namely technological readiness and perceived barriers. The results show that there is an important positive impact between technological readiness and adoption of computing cloud. The results of the study indicate that the hospital's administration takes advantage of cloud computing

technology to achieve their goals. This means that the hospital has technical staff ready to deal with cloud computing. This result is consistent with the previous studies conducted in private hospitals in Colombo District, Sri Lanka[19], private India hospitals [22] . In contrast with previous study that were conducted in the Saudi healthcare organizations [17], where the factor showed a negative impact. **Moreover**, the results show that perceived barriers have a significant negative impact on the adoption of cloud computing. In contrast, the study conducted in Saudi University Hospitals[18] reported that perceived barriers have a neutral effect on cloud computing adoption.

This unexpected negative relationship suggests that higher perceived barriers reduce the likelihood of adoption, which aligns logically with technology resistance theories. This indicates the need for better awareness, training, and risk mitigation strategies in Yemeni hospitals.

This finding highlights the importance of addressing organizational and technological barriers to enhance successful adoption.

F. Environmental Context

The results show that this context is the sixth most important dimension in the adoption of cloud computing in Yemeni private hospitals and represents a mean of 3.41. This context is represented by two factors namely competitive pressure and regulation and rules. The results show that there is an important positive impact between competitive pressure and adopting cloud computing which means that the adoption of cloud computing technology in private hospitals is a key strategy for improving competitive advantage. Hospital management believes that cloud computing has an impact on competition for delivering services. Pressure from competitors affects the adoption of cloud computing technology, since managers get worried from losing customers unless adopting cloud computing services. This result is in line with the previous studies conducted in Taiwan hospitals[16], Jordanian Hospitals[14], Hospitals in Colombo District, Sri Lanka[19], Private Hospitals in India[22]. In contrast with previous study that were conducted in Saudi University Hospitals[18], where competitive pressure has no influence. Regarding the regulation and rules factor, the results show that there is an important positive impact between regulation and rules and adoption of cloud computing. The results indicate that regulation and rules should exist in the hospital to ensure the confidentiality of clients' data and proper use of cloud computing technology. The results indicate that government systems in Yemen have sufficient rules to protect users from the risks associated with cloud computing technology. This result is consistent with the previous studies conducted in India hospitals [20], Brazil hospitals [21]. In contrast with the studies that were conducted in Taiwan hospitals[16] and Saudi University Hospitals[18], where regulation and rules have no impact. Regulation and rules have negative impact in Saudi healthcare organizations [17].

Table 8 **Overall Statistical Results of the Research Variables**

Context	Context Ordinary	Variables	Mean	SD	Percent	Verbal Result	Ordinary
Technological (mean=4.12)	1	Availability	4.08	0.643	81.6%	Agree	3
		Reliability	4.15	0.533	83.0%	Agree	2
Business (mean=3.92)	2	Financial analysis & strategic value of cloud	3.92	0.706	78.4%	Agree	4
Innovation (mean=3.75)	3	Relative Advantage	4.29	0.557	85.8%	Strongly Agree	1
		Compatibility	3.78	0.785	75.6%	Agree	5
		Complexity	3.18	0.822	63.6%	To a certain agree	10
Decision – making(mean=3.64)	4	Top Management Support	3.54	0.927	70.8%	Agree	9

		Decision-maker's innovativeness knowledge in IT	3.74	0.980	74.8%	Agree	6
Organizational (mean=3.59)	5	Technological Readiness	3.6	0.836	72.0%	Agree	12
		Perceived Barriers	3.58	0.830	71.6%	Agree	8
Environmental (mean=3.41)	6	Competitive Pressure	3.71	0.669	74.2%	Agree	7
		Regulation And Rules	3.11	0.847	62.2%	To a certain agree	11

G. Hypotheses Testing

According to the results of the regression analysis presented in Table 5, Table 9 shows the results of testing the research hypotheses.

Table 9. **Summary of Hypotheses Testing Results**

Hypotheses		P-value	Result
H1	RA→ACC	There is extremely statistical significance between relative advantage and adoption of cloud computing in private hospitals in Yemen.	Support
H2	CB →ACC	There is extremely statistical significance between compatibility and adoption of cloud computing in private hospitals in Yemen.	Support
H 3	CX →ACC	There is no statistical significance between complexity and adoption of cloud computing in private hospitals in Yemen.	No
H4	AV →ACC	There is extremely statistical significance between Availability and adoption of cloud computing in private hospitals in Yemen.	Support
H5	RB →ACC	There is extremely statistical significance between reliability and adoption of cloud computing in private hospitals in Yemen.	Support
H6	TR →ACC	There is very statistical significance between technological readiness and adoption of cloud computing in private hospitals in Yemen.	Support
H7	PB→ACC	There is very statistical significance between perceived barriers and adoption of cloud computing in private hospitals in Yemen.	Support
H8	CP→ACC	There is very statistical significance between competitive pressure and adoption of cloud computing in private hospitals in Yemen.	Support
H9	RAR →ACC	There is very statistical significance between regulation and rules and adoption of cloud computing in private hospitals in Yemen.	Support
H10	TMS →ACC	There is very statistical significance between top management Support and adoption of cloud computing in private hospitals in Yemen.	Support
H11	DM→ACC	There is very statistical significance between decision-maker's innovativeness knowledge in IT and adoption of cloud computing in private hospitals in Yemen.	Support
H12	FA →ACC	There is very statistical significance between financial analysis & strategic value of cloud and adoption of cloud computing in private hospitals in Yemen.	Support

CONCLUSION AND FUTURE WORK

This study proposed a hybrid model to examine cloud computing adoption in Yemeni private hospitals. The findings confirm that multiple factors across six contexts influence adoption decisions, with technological and business factors being the most critical.

However, some relationships, such as perceived barriers and complexity, revealed unexpected or insignificant effects, indicating the need for further investigation.

The study is subject to limitations related to sample scope and analytical methods. Future research is recommended to apply more advanced statistical techniques and broader samples to enhance model validation.

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APPENDIX: MEASUREMENT ITEMS

Constructs		Items	Adapted source
Relative Advantage(RA)	RA 1	The use of cloud computing technology provides real benefits for patients.	[17]
	RA 2	The use of cloud computing technology improves the quality of medical services in the hospital.	[16]
	RA 3	Cloud computing technology increases the productivity of hospital staff.	[17]
	RA 4	The use of cloud computing technology in the hospital contributes tasks to be done more quickly.	[17]
	RA 5	Cloud computing technology improves the efficiency of communication between partners (physician, patient, management).	[16]
	RA6	Cloud computing technology provides instant information to beneficiaries at any time and from anywhere.	[16]
Compatibility (CB)	CB1	Cloud Computing services are compatible with the hospital' current business strategy.	[17]
	CB2	Cloud Computing technology is compatible with the current Information Technology infrastructure (hardware/software) of the hospital.	[17]
	CB3	Cloud Computing technology is compatible with the values and goals of hospital.	[17]
	CB4	Cloud computing technology is compatible with administrative and operational needs in the hospital.	[19]
	CB5	Cloud is compatible with existing hospital systems.	[19]
Complexity(CX)	CX1	There is difficulty in transferring existing systems to the cloud computing technology platform.	[16]
	CX2	There is a difficulty in managing cloud computing technology systems.	
	CX3	There is a complexity in the maintenance of the cloud computing technology platform.	[16]
	CX4	There is a difficulty in prepare an environment for cloud computing technology.	
	CX5	There is difficult to integrate cloud computing technology into the hospital's current business practices.	[16]

	CX6	There is a complexity in learning the skills required to use cloud computing technology for hospital staff.	[2]
Availability (AV)	AV1	Cloud computing in hospital provides its services consistently and uninterruptedly.	[28]
	AV2	Providing patient data is critical to healthcare providers in hospital who cannot work effectively unless such data is available.	[28]
	AV3	The cloud computing continuously provides health services without a decline in performance.	[28]
	AV4	Cloud computing in hospital need to make serious judgments to interact quickly and efficiently to ensure the continuity of service.	[28]
Reliability (RB)	RB1	The use of cloud computing in hospital requires assurances of the good reliability of the services provided.	[28]
	RB2	All health services and data require to be consistent and error-free.	[28]
	RB3	Data in cloud computing in hospital requires to in good condition regardless of any software, hardware or network failure.	[28]
	RB4	There are some cases where cloud computing services suffer from unreliability for technical reasons.	
	RB5	The provision of reliability and security requires to accept the application of cloud technology software in the medical field.	
Technological Readiness (TR)	TR1	The hospital provides Internet access to all its staff.	[17]
	TR2	The hospital has hardware that has the capabilities to adopt cloud computing technology.	[2]
	TR3	The hospital has software that has the capabilities to adopt cloud computing technology.	[2]
	TR4	The hospital has a network to adopt cloud computing technology.	
	TR5	The hospital has a technical staff ready to deal with cloud computing.	
	TR6	The hospital has sufficient training and education for staff to adopt cloud computing technology.	[19]
	TR7	The hospital management benefits from information technology to achieve its goals.	[17]
Perceived Barriers (PB)	PB1	There is a concern about data security in cloud computing.	[2]
	PB2	Using cloud computing reduces data privacy.	[29]
	PB3	There is concern about denial of data access at sometimes instance.	
Competitive Pressure(CP)	CP1	Hospital management believes that cloud computing has an impact on competition in its services.	[29]
	CP2	Pressure from competitors affects the adoption of cloud computing technology.	[29]
	CP3	The adoption of cloud computing technology in hospitals is the key strategy for improving competitive advantage.	[16]
	CP4	There is Some of our competitors have already started using cloud computing.	[29]
	CP5	We believe that we will lose some of our customers to our competitors if we do not adopt cloud computing technology.	[16]
Regulation And Rules (RAR)	RAR1	Government systems in Yemen are sufficient to protect users from the risks associated with cloud computing technology.	[17]
	RAR2	There are laws in Yemen related to ownership and responsibility for patients' electronic data	[17]
	RAR3	The hospital has regulations for the use of cloud computing technology.	
	RAR4	There are laws and regulations in the hospital that ensure the confidentiality of their clients' data.	
Top management Support(TMS)	TMS1	The top management is aware of the benefits of cloud computing technology.	[16]
	TMS2	The top management enthusiastically supports the adoption of cloud computing technology.	[16]
	TMS3	The top management allocates appropriate funding and adequate resources to adopt and operate cloud computing technology.	[16]
	TMS4	The top management takes on the risks (financial and regulatory) resulting from the adoption of cloud computing technology.	[29]

	TMS5	The top management encourages employees to use cloud computing technology in their day-to-day tasks.	[16]
	TMS6	The top management has vision to make the hospital leader in the use of cloud computing technology.	[16]
Decision-maker's innovativeness and knowledge in IT(DM)	DM1	Hospital's decision makers have an understanding of innovation towards the adoption of cloud computing technology.	[18]
	DM2	Decision makers have a desire to applies of cloud computing technology.	[18]
	DM3	Hospital's decision makers have a positive attitude towards the adoption of cloud computing technology.	[18]
	DM4	Hospital's decision makers are aware of cloud computing services.	[18]
	DM5	The hospital has decision-makers with the necessary knowledge and skills to adopt Cloud Computing services.	[16]
	DM6	Hospital's decision makers know the applications and platforms of cloud computing technology.	[18]
	DM7	Cloud computing is the choice of decision maker to develop the current situation and promote hospitals to a high level of quality and production	[18]
Financial analysis & strategic value of cloud (FA)	FA1	Cloud Computing reduces the operation cost of information technology in hospital.	[17]
	FA2	The benefits of cloud computing technology are greater than their adoption costs.	[2]
	FA3	There is a reduction in energy costs and environmental costs with the adoption of cloud computing technology.	
	FA4	Cloud computing technology reduces hardware and software cost	[2]
	FA5	The hospital has enough budget to develop Cloud Computing technology.	[17]
	FA6	The use of Cloud Computing will allow the hospital to provide services that could not be provided before.	[17]
	FA7	The adoption of Cloud Computing positively affects business processes of the hospital.	[17]
Adoption of Cloud Computing (ACC)	ACC1	Adopting cloud computing technology in the hospital is a useful technological option.	[30]
	ACC2	Adopting cloud computing technology in the hospital is a useful economic option.	[30]
	ACC3	The adoption of cloud computing technology in the hospital increases the efficiency and quality of the medical services provided to the beneficiaries.	[30]
	ACC4	The adoption of cloud computing technology in the hospital increases the efficiency of hospital staff.	[30]
	ACC5	The adoption of cloud computing technology in the hospital increases the satisfaction of beneficiaries.	[30]
	ACC6	The adoption of cloud computing technology in the hospital increases the protection and security of information and data.	[30]
	ACC7	The adoption of cloud computing technology improves the performance of medical services.	[30]