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**Research paper** 

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## Determining Effective Factors in Cloud Computing Acceptance Using Rogers' Diffusion of Innovation Model and Davis' Technology Adoption Model (A Case of Financial Institution)

### H. KardanMoghaddam<sup>1,\*</sup>, A. Rajaei<sup>2</sup>, F. Jafari<sup>1</sup>

<sup>1</sup>Department of Computer Engineering, Birjand University of Technology, Birjand, Iran. <sup>2</sup>Department of Computer Engineering, Velayat University, Iranshahr, Iran.

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<sup>\*</sup>Corresponding Author's Email

h.kardanmoghaddam@birjand

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#### Abstract Background and Objectives: Determining effective factors in cloud

computing adoption on employees of Noor credit institution in South Khorasan province, Iran, is the purpose of the present study. A practical oriented method is applied regarding the research objective and a descriptive-survey method is used for collecting field data. Employees of Noor credit institution of South Khorasan province (50 people) are selected as the research sample.

**Methods:** Accurate questionnaires are analyzed. Two researcher-made questionnaires are conducted as research tools. These questionnaires consist of effective factors in cloud computing adoption (12 factors including 47 items) and cloud computing adoption intention (3 items). The reliability of the research is evaluated using Cronbach's alpha coefficient which is obtained  $\alpha$ =0.54% for the questionnaire of effective factors in cloud computing adoption and has various values for the questionnaire of the cloud computing adoption intention. Also, the descriptive statistics approach is used to define variables, and confirmatory factor analysis and path analysis are applied in the inferential section. Structural equation modeling using Smart-PLS software is used to determine the effective factors in cloud computing adoption

**Results:** All 12 determined factors in cloud computing adoption are considered as dependent variables and cloud computing adoption intention is considered as an independent variable. 12 effective factors in cloud computing adoption on Noor credit institution of South Khorasan in Iran are determined and examined.

**Conclusion:** It can be concluded that all factors (except the support of the top manager) have a positive and significant effect on cloud computing adoption intention, nonetheless, the value of statistic t for path analysis of the support of the top manager on cloud computing adoption intention is less than 1.96. This shows that the support of the top manager does not have a significant effect on cloud computing adoption intention.

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#### Introduction

The world is increasingly converging with the growth of information and communication technology. Information technology can be widely used therefore it not only affects its own activity domains but also it facilitates other economic and non-economic activities and improves productivity and efficiency. In recent decades, the use of information technology has stimulated the economic process and business prosperity. Information technology has transformed the industrial age, which was the thriving age of industrial products into the communication age.

All scientific, cultural, educational, commercial, official, and economic activities are influenced and revolutionized by new information technology. Currently, cloud computing has great potential in different fields, especially in the banking industry. The term "cloud computing" has become a crucial topic in years in the field of recent information technology [1], [2]. Cloud computing is based on the idea that organizations and institutions use it to store the necessary information instead of using their different types of hardware and software. These organizations and institutions can use cloud computing as a service not a product, which they can pay for it based on their usage. In this regard, companies, and institutions providing public services such as water, electricity, telephone, and Internet can be mentioned as there is no need for individuals and organizations to purchase infrastructure related to these public services. However, they use its services and pay for them based on the amount of use of the individual or organization [3]. In this regard, cloud computing is a new concept that has the necessary infrastructure to help institutions to implement practical applications as an appropriate service for launching a web browser on the Internet [4]. Cloud computing was commenced in the 1950s, several users had concurrently access to central computers and simultaneously use them due to their high price and huge size. In the 1970s, the idea of using a separate central environment as a processor unit was highlighted for myriad users. In the 1990s, various telecommunication companies introduced virtualized communications to users. In 2002, Amazon unveiled the Amazon Web Service, which, as a technology pioneer, has played an important role in this area. In 2006, Google also introduced its cloud service to the public, and so far many companies have entered this field. Cloud computing is considered to be the last generation of the Internet evolution reflecting the architecture of future generations applications [5]. Cloud computing as a new computing paradigm revolutionized access methods and the use of computer infrastructure and services [6]. It has various advantages including spatial independence, cost-effectiveness, maintenance, and scalability [7], [8].

Tung et al., (2008) [9] reported that only less than 2% of businesses and organizations use cloud computing technology. Cloud computing services have considerably improved and are capable of providing a wide range of information technology services. Therefore, cloud computing adoption and use are dramatically increasing and drawing attention [10]. Many experts and researchers have emphasized the benefits of cloud computing adoption by users [11]-[13]. Nevertheless, it has a slow growth with a significant difference between

the implementation process and predicted plans [14], [15]. Cloud computing certainly changes the structure and nature of organizations' information systems and in particular the development of telecommunications, which is very important and effective. Nonetheless, the main issue before using these new technologies is to examine and measure the cloud computing adoption intention of the organization's employees to apply these new tools and technologies [16].

Banks and credit and financial institutions have gradually adopted cloud computing because of sensitive security problems as they worry about security threats, surveillance and reliability. This issue causes that these organizations become deprived of many modern system facilities, but the cloud computing gradually changes the interaction method of people with these systems and causes that users increasingly use more cloud systems and it is very important to examine the acceptance of these systems by the users. Examination of the acceptance of the new technology by the users is considered the most important factor in successful implementation of a new technology. In case of nonacceptance of the new technology by use or accepting it at low level, organization capabilities are decreased and leads to loss of human and financial resources in the organization. Examination of the acceptance of the cloud computing by the users before implementing it causes that we recognize deficits and weakpoints of the organization and before making expenses and cloud computing implementation, accurately organize and examine instructions and infrastructures required by the users and eliminate the obstacles and choose a suitable model for the organization based on the cloud system. In this research we examine effective factors in accepting cloud computing in credit and financial institution in South Khorasan County (Noor); this institution has many branches and makes many credit and financial exchanges with banks and other credit and financial institutions in Iran and abroad and the objective is prioritization of effective factors in this case and proposing a model for developing credit and financial activities in cloud computing. This research was carried out in Noor credit and financial institution for the first time while there were similar researches in other banks and credit and financial institutions of other countries. As these institutions require these researches, carrying out this research can lead to practical and valuable results. Another researcher has used a different model to carry out a research with patterns confirmed by other researchers. In this model, the cloud computing acceptance has been examined using diffusion of innovation model by Rogers and technology acceptance model by Davis. Noor Credit and Financial Institution as a

credit and financial institution provides banking service to all classes of people in Iran by contributing economy development and supporting production and employment. This institution received its business license from Central Bank of Islamic Republic of Iran. This institution has provided electronic banking for its clients by joining Shetab Network and Real Time Gross Settlement system(RTGS) and Automated Clearing House (ACH) and also electronic service portals connecting to Shetab Network like mobile banking, telephone banking and internet banking. This institution has developed its services by adding points of sales (POS) to electronic banking service cycle and also it has got the final license for launching SEPAM (System for Electronic Payment messaging) System for issuing Rial bonds, internal document credits and joining Chakwak System and Central Bank of Islamic Republic of Iran monitors all banking activities and transferring method of assets and debts of this institution [17].

Many organizations and institutions (public and private) are considering using the capabilities of cloud computing which use information technology in the shortest time and at the lowest cost. Also, experts are suggesting using cloud computing facilities in banking systems where an effective response to the needs of users is the priority. Most banks and financial and credit institutions can meet the needs of their users with one of the dominant forms of the cloud computing. The lifespan of organizations depends on their reconstruction plan. This reconstruction correlates the goals with the current condition to improve and adjust research methods based on these goals. An organization has to strengthen the processes of innovation and creativity in its correlation path. However, the main issue before applying these new technologies is to examine the willingness and intention of employees to use these new tools and technologies [14]. The study on the adoption of new information and communication technologies has recently received much attention thus the investment in these technologies is growing. Numerous researchers are conducting research on the determination of effective factors in the adoption of information technology. Adoption is a multidimensional phenomenon and includes key variables such as beliefs, attitudes, characteristics perceptions, of individuals, and the degree of involvement with information technology. Developing countries have always had difficulty accepting new technologies and could not overcome this obstacle. Cloud computing is a solution for accepting new technologies in developing countries. This allows organizations in developing countries to access and use the advanced technologies of developed countries, thereby making them globally competitive. The digital divide between developed and

developing countries indicates inequality in access to information and communication technology (ICT) resources and the ability to use [6]. Adoption and use of cloud computing can reduce these inequalities, bridge the digital divide, and provide a platform for organizations in developing countries to access and connect globally. Despite the many advantages of cloud computing technology, Chang (2020) [4], Priyadarshinee (2020) [16], and Changchit, C., & Chuchuen, C. (2018) [18] emphasized that organizations should be first assessed and then select the right model for the organization before applying cloud computing.

Technology acceptance as an individual-voluntary behavior has been defined by various models. These models are; the Theory of Reasoned Action (TRA) [19], Fishbein & Ajzen (1975), Theory of Planned Behavior (TPB) [20] Ajzen (1991), Technology Acceptance Model (TAM), Davis (1989) [55], Technology, Organization and Environment (TOE) Tornatzky & Fleischer (1990) [21], Diffusion of Innovations (DOI) Rogers (2010) [22] and the Unified Theory of Acceptance and Use of Technology (UTAUT), Venkatesh et al., (2003) [23]. In the present study, in addition to cloud computing, Rogers' diffusion of innovation theory and Davis' technology acceptance models have been used, which will be discussed in the following. Rogers theory is more concerned with the processes of the diffusion of innovation and accepting them in a systematic and planned way. This theory examines the social process of innovation and its accessibility and development to an entire social system. In the present study, the employees of a financial and credit institution (Noor) were studied to employ Rogers and Davis' diffusion of innovation model as they do not accept innovation immediately according to the acceptance process. In fact, the acceptance of this innovation takes some time. Rogers's theory of diffusion of innovation is used for the commercialization of research results, innovations resulted from technology opportunities, and new products marketing. The innovation process can be adapted to the Rogers model to define the behavioral and social characteristics at different stages of the innovation process within the organization [24]. According to Rogers (1995), innovation can be a new and original idea, practice, or object, or it can seem unique. Innovation is not necessarily a very new idea, unlike its definition. It is rather an idea, practice, or object which is perceived new from the perspective of the people who accept it (Perceived Newness). Thus, the impression of novelty is more important than objective novelty regarding the diffusion of a new idea [25]. According to Roger (1995) [25], the factors in the diffusion of innovation are 1. Innovation that is accepted through 2- Special communication channels 3- Overtime 4- by members of the social

system [26]. Rogers considers the effectiveness of several features of innovation in their acceptance rate which include: A- comparative advantage, B- compatibility, C- complexity, D- testability, and D- visibility of results [27], [54].

**Comparative advantage**: It indicates the perception of replacing the old idea or method with a better innovation by individuals. The comparative advantage is measured by economic factors; often other factors such as social credibility, convenience, and satisfaction with innovation acceptance also play a significant role. Having a great advantage of the objectivity of innovation is not as important as the individual's perception of the extent of the advantage of innovation. The better the innovator perceives the innovation, the faster his or her acceptance rate will be.

**Compatibility:** It indicates the perception of the harmony of innovation with existing values, past experiences, and recipient needs by individuals. Ideas that are compatible with prevailing social values are accepted more quickly than ideas that are not compatible with social values. Accepting an incompatible innovation often requires an initial acceptance of the new value system.

**Complexity:** It indicates the perception of learning difficulty and applying innovation by individuals. Some innovations are easy to perceive and apply for the majority of people in a social system whereas other innovations are less quickly accepted. Generally, new ideas that do not require learning and investment are accepted faster than innovations that require the acquisition of new knowledge and skills.

**Testability:** It refers to the assessment and examination of innovation at a limited level. Innovations that can be tested with limited facilities are accepted faster than those that cannot be tested. Innovations that are already being tested on a small scale are less risky.

**Visibility of results:** It means the visibility of the innovation results for individuals. The more visible the results of the innovation to the individual are, the more likely it is to be accepted [27], [54].

Rogers (1995) [25] argues that innovations with a greater comparative advantage, compatibility, objectivity, and less complexity are much easier and faster to accept than other innovations by their recipients.

According to Lin, the technology acceptance model should be used if the main purpose of the research is technology acceptance. Also, the Theory of Planned Behavior (TPB) should be used if the main purpose of the research is to determine the factors affecting behavioral tendencies [28]. The purpose of the present study is cloud computing acceptance; therefore, the technology acceptance model has been used. This model considers the use of information technology as a function of a four-step process in which external variables affect users' perceptions regarding the convenient use and practicality of systems. Moreover, users' perceptions affect the attitudes towards the use of the system. This attitude determines their intention to use the system, and finally, the level of the use of the system can be determined. Davis' theory of technology acceptance (1989) was developed to describe computer use behavior. Davis (1993) believes that the purpose of most information systems is to improve job performance. Unfortunately, when information systems are discarded by the user, it affects his/her performance. Technology acceptance by the user is a necessary and determining factor in the success or failure of an information system. The Technology Acceptance Model (TAM) has been introduced as a compact, predictive, and powerful model to explain and predict behavior in decisionmaking and acceptance of the use of a particular technology. This model claims that an individual's decision to use technology depends on two particular behavioral beliefs, including perceived usefulness and perceived ease of use. Perceived usefulness is the mental expectation of a user of a particular technology that improves his performance. Perceived ease of use is the expectation of a user of the technology to be effortless to use. Moreover, this model claims that the perceived usefulness of technology is affected by its perceived ease of use, because the easier it is for a user to apply technology, the more useful that technology will seem to the user. In Davis Technology Acceptance Model (TAM) (Fig.1), two groups of factors (structures) lead to technology acceptance by users: internal structures (including ease of use, the usefulness of use, attitude towards use, intention to use, and actual use) and external structures (including the support of managers, task-technology appropriateness, individual, organizational, and social factors, characteristics of computer systems, such as type of hardware and software, training, system complexity, user experience, optionality, etc.) [29], [55].

According to the Davis Technology Acceptance Model (TAM), systems are useful and easy for people to use and intervene in their jobs. This model is one of the most effective research models to study indicators of the use of information technology (IT). This model is a valid model for predicting the acceptance behavior of individuals towards different information technologies and their use [30]. According to Rogers and Shoemarker, 50 percent of people in the society are resilient to accept innovation and can be considered as a resistant group and the other 50 percent is relatively receptive to innovation. This division is shown as a normal distribution by Shoemarker [31].



Fig. 1: Davis Technology Acceptance Model (TAM) [29].

Financial and credit institutions have shown little interest in changing technology due to their sensitivity and the need for high security of banking. Therefore, a limited number of institutions have used cloud computing in their work. This research can provide the situation to develop and expand financial and credit activities in cloud computing and can also provide a model for it.

In this research, literature reviews and previous studies concerning the use of cloud computing are presented in the second part. The research methodology is stated in the third part. The research findings, hypotheses, the effect of factors on the cloud computing acceptance intention, and the models that determine its acceptance rate are stated in the fourth part. Conclusion and comparison of this research with similar studies are discussed in the fifth part.

#### **Literature Review**

Behrend et al. (2011) [32] had studied acceptance and usage of cloud computing among about 750 students of local colleges who had enrolled in basic computation skills courses. In this study, through an online questionnaire, some factors such as access to software, facility of traffic, self-creativeness, anxiety of technology, teacher's support and reliability of effective factors on utility perception, usage facility perception, actual use and future utility were examined. The results of path analysis indicate that utility perception and usage facility perception factors have a positive effect on decision of cloud computing usage among students; whereas, usage facility perception factor in regard to negative effect of factors, such as anxiety of technology, access to software and facility of traffic on utility perception factor is stronger. Hence, utility perception factor doesn't have a meaningful effect on students' usage of cloud computing. Opitz et al. (2012) [33] examined acceptance of cloud computing by the use of information analysis of 100 IT managers in leading companies in stock market in Germany. In this research which has been done through questionnaire, they reached to this conclusion that there is a significant relationship between utility perception factor and attitude toward managers' use of cloud computing technology, although managers' usage facility perception factor has less effect on attitude of their usage of this technology. Alharbi (2012) [34] has examined the acceptance of cloud computing in Saudi Arabia by the usage of factors, such as gender, age, area of expertise, level of education and nationality. The results of this study which were done through online questionnaire on 171 employees of IT organizations of the Kingdom of Saudi Arabia and linear regression, shows that utility perception and usage facility perception factors are significantly related to the attitude toward using. Furthermore, there is a significant relationship between factors of usage facility perception and utility perception, also between factors utility perception and decision of usage, and between factors of attitude toward usage and decision of usage. Akbari, Sohrabi and Zanjani [35] (2012) in a research have examined the condition and pressure of acceptance of search engines and super engines among users of Isfahan University based on Roger's Innovation Dissemination Theory. The main purpose of this research has been examining of acceptance rate, identification of capabilities and influential tools in accepting search engines and super engines among users of Isfahan University. The research results indicated that the average acceptance of search engines and super engines hasn't been significant by users of Isfahan University in terms of gender, level of education and faculty statistically, moreover, it has been significant just in term of gender in accepting technical search engines. The other results indicated that "friends" of users played an important role in how to accept public search engines and thematic guides, moreover, the "masters" played an important role in how to accept technical search engines and super engines. The most acquaintance place of users with search engines and super engines was in the university. In addition, the comparison between simple and complicated searched pages in google showed that among users, there is more attitude toward simple searched pages, and this confirms Rogers' theory.

Luo (2012) [36] in a research examined the estate of reference librarian usage of cloud computing technology. The main purpose of this research was the usage of customer oriented software tools as (saas) services in order to support and facilitate their work. The results of this research indicated that librarians utilize these tools for various purposes, such as facilitation of internal communication, performing collaborative works and information literacy training support. Heidari, Alizadeh Aghdam and Hamdipour (2013) [37] engaged in a research by the purpose of examining effective factors on accepting electronic information resources by faculty members of Iran's Knowledge and Information Science

groups based on Roger's Innovation Dissemination Theory. The research method was descriptive-survey and through electronic questionnaire. The results of exploratory factor analysis determined the most important features of electronic information resources, such as comparative advantage, testability, adaptability, complexity, observability and test opportunity. The results indicated that above features have a significant relation with the rate of acceptance of electronic information resources and can be influential in their acceptance. Moreover, the results of multivariate regression showed that features of observability, test opportunity and age are meaningful predictions in accepting the electronic information resources which play a role in explanation of 27% of variance of the dependent variable. Generally, the results confirmed Rogers' Innovation Dissemination Theory (2003) in perception of features of electronic information resources by faculty members of Iran's Knowledge and Information Science groups. Fung (2013) [38] has used TAM models and Porter five forces analysis to predict the decision of accepting the cloud computing technology in IT Outsourcing Service Providers. Based on this quantitative inferential research which was done by online examining through the questionnaire, by multiple regression method and path analysis by using PLS software, only the utility perception factor, usage facility perception factor and the attitude toward accepting cloud computing of TAM model have been examined. According to the results, the acceptance facility perception factor of cloud computing can predict positive effect and its utility perception factor significantly. Furthermore, factors of utility perception and usage facility perception of accepting cloud computing can predict its decision of accepting significantly and positively. In a comprehensive study conducted by Sun et al. [39] (2014), they categorized views of cloud services providers' choice in five dimensions consisting of a) using decision making methods, b) using information display methods, c) using parameters of cloud computing features, d) content and e) purpose.

Yuvaraj (2014) [40] has examined the acceptance of cloud computing programs among 209 librarians of India's University central libraries. In this research which has been in survey type, and method of data collection in it has been postal questionnaire during 11 months, he emphasizes on the effect on four factors of the utility perception, the usage facility perception, the attitude toward usage and the usage decisions. In order to the results of this research, there wasn't a reasonable relationship between the utility perception factor and the factor of the attitude toward librarians' usage, moreover, between the factor of the attitude toward usage and the decision of usage the applicable programs of cloud computing; furthermore, there is only a meaningful relationship between the factor of usage utility perception with the utility perception factor and the attitude toward using. The work done in [41] is a reviewing study which has examined the work done in the field of immigration to the cloud (2009-2014) and has presented a series of effective factors in acceptance of cloud computing in the form of a conceptual model. The immigration feasibility, needs analysis, compiling an immigration plan, the cost frugality, the effective usage of resources, the unlimited scalability of resources and low effort to conserve resources were indicated key factors in this model. Mangai, Ganesan & Kumar (2014) [42] in a research, they examined cloud computing technology outlook in library services. In this cloud computing research, its origin and different types, its influence on libraries and its pros and cons were analyzed. They concluded that Information and Communication Technology has made the library change in function and information process; moreover, in order to the development of technology, libraries with automation, digital, etc. emerged. These writers believe that through this technology, users can access the information from anywhere of the world. Furthermore, this action causes frugality in cost, time and sources.

Yaghoubi et al. (2015) [43] determined and ranked the risk factors of cloud computing in government organizations in Iran. The results showed that the experts have taken intangible risks as the most important risks in using cloud computing in government organizations. The risk of "data confidentiality" has taken the first place. Scholtz (2016) [44] examined effective technical and environmental factors in acceptance the cloud computing in public sector of South Africa. In this research, 51 experts from 40 organizations in governmental sector of South Africa were surveyed by using Delphi method and questionnaire. The results showed that most of the respondents were anxious about the privacy, and this factor was ranked firstly. The environmental factors, such as learning pressure, resistance to change, lack of security, etc. were effective in order to adopt a cloud computing implementation strategy as usage solution provider and legal requirements in the organization on cloud computing usage, and was ranked secondly. Valmohammadi and Mazaheri (2017) [45] on their research dealt with "the explanation of influential factor on the decision of usage of cloud computing among employees of the Radio and Television (Iran) based on technology acceptance model". Moreover, by using Davis model, the utility perception factor was identified as the most important effective factor on decision of usage of cloud computing. Villapol et al. (2017) [46] assessed "recording, storing and the judo competitions using Android software and cloud computing". This research has shown that athletic performance can be improved by using an information technology approach (using cloud computing) in the competition section. Heydari Dahouei et al. (2017) [47] in their research presented a framework in order to choose a suitable system for implementation of cloud computing (case study: Faculty of Modern Sciences and Technologies, University of Tehran). Based on the steps taken, criteria of accessibility, reliability, system security and system stability were considered the most important criteria by experts' view.

Sabi et al. (2018) [6] in his research examined the creation a background model of the factors affecting the acceptance of cloud computing in the universities of Sub-Saharan Africa by the combination of models of Diffusion of Innovation (DOI Theory) and The Technology Acceptance Model (TAM Theory). The results indicated that sociocultural factor, displaying the results, usefulness and data security were main and important factors in accepting cloud computing in universities. Changchit, Chuleeporn and Chuchuen (2018) [48] in their research factors affecting the acceptance of cloud computing. They used The Technology Acceptance Model for this affair; furthermore, they identified the factors affecting the acceptance of cloud computing consisting the usefulness perception, the usage facility perception, security perception and the usage cost perception. Changchit, C., & Chuchuen (2018) [48] examined the effective factors in cloud computing adoption. They used technology adoption model and determined effective factors in cloud computing adoption including effectiveness, convenience, security, and cost-effectiveness. Ali et al. (2020) [49] proposed "A strategic framework to address the reliability problems regarding the cloud computing adoption in higher education centers" which consisted of five main steps. The most important steps were technology information, the support of managers and participants for success. Alidoust et al. (2020) [50] studied effective factors in cloud computing adoption of the employees of physical education faculties in Tehran, Iran. In this study, 12 factors affecting cloud computing adoption were identified and examined, among which 11 factors were considered as a positive effect. The component of complexity has negatively affected the cloud computing adoption intention. Also, technology readiness had the highest impact on cloud computing adoption. The growth of technology readiness among physical education faculties, data security, and reducing complexity were identified as the most important factors on cloud computing adoption which can effectively facilitate cloud computing adoption. Albelaihi, Khan (2020) [51] examined the advantages and barriers to

cloud computing adoption in small and medium enterprises in Saudi Arabia. In their research, they interviewed managers of the information and communication technology industry. The questionnaire was completed via telephone inquiring managers of the enterprises in different geographical parts of Saudi Arabia. After evaluating the questionnaires, a significant relationship was derived between the use of cloud computing and the increasing quality of services as well as the performance of small and medium companies. They concluded that the level of knowledge of managers in these enterprises is lower than the global average. They also found that the biggest challenge in Saudi Arabia is privacy and security regarding cloud computing service providers and users, which the culture of Saudi Arabia has played a role in preventing cloud computing adoption. In another study by D. H. Tesema (2020) [52] the challenges and the importance of cloud computing adoption were examined in terms of security, privacy, and availability in a commercial bank in Ethiopia. A descriptive method was used to study and analyze the role of cloud computing in commercial banks. Also, the role of cloud computing was analyzed as a powerful tool for savings and cost-effectiveness on large commercial banks considering the mentioned bank as a case study. The results of this study display the main effective factors such as cost efficiency, security and compliance, reliability, and also the ability to cooperate in cloud computing adoption in the Commercial Bank of Ethiopia (CBE). Omar Ali et al. (2021) [53] assessed the complexity of cloud computing adoption in local governments in Australia. In this research, they proposed a hybrid evaluation model for cloud computing adoption in information systems. To evaluate the proposed model, 21 IT managers from local governments were interviewed in the first phase, and then in the second phase, 480 IT employees from 47 local governments responded to an online survey. After evaluating the results, they concluded that the complexity of an organization, the structural complexity of technology, the dynamic complexity of an organization, and the dynamic complexity should be considered in the use of cloud computing, and without them, the results will not be satisfactory.

The literature review indicates that there is not extensive and efficient research on cloud computing acceptance in a financial and credit institution yet, based on Rogers' diffusion of innovation and Davis technology acceptance model. Also, models with a clear image and specific data of reality have not been developed in this area. Banks and financial and credit institutions have slowly applied the use of cloud computing due to security sensitivities. Previous studies have less addressed the issue of cloud computing acceptance in the banks and financial and credit institutions. In the present study, an attempt has been made to address the existing barriers to cloud computing acceptance in financial and credit institutions. Also, a set of contributing factors in cloud computing acceptance are introduced in the form of a conceptual model. The results of this study will enable policymakers in the financial and monetary sectors to take the necessary steps to formulate future policies for financial transfers in the cloud. It also provides a benchmark for evaluating the performance of private companies in terms of cloud computing acceptance.

Therefore, in the present study, the diffusion of innovation model introduced by Rogers (2003) [54] is considered as the theoretical framework of this research due to the novelty of the cloud computing concept in organizational research. Sabi et al. (2018) [6], applied the Davis' technology adoption model (1989) [55] coupled with the diffusion of innovation model to determine effective factors in cloud computing adoption. In this research, this model has been used along with the main model. In addition to the main theoretical models, background, technological and economic factors are also used to complement the effective factors along with the main research models. Therefore, the present study pursues more effective factors in the cloud computing adoption for the employees of Noor credit institution of South Khorasan and its optimal model.

#### **Research Methodology**

The practical oriented method is applied regarding research objectives and a descriptive-survey method is used for collecting field data. Employees of Noor credit institution of South Khorasan Province (50 people) are considered as statistical population. The total population sampling method is conducted due to the limited number of statistical populations. 50 accurate questionnaires are statistically analyzed. Two researcher-made questionnaires are conducted as the research tools. These questionnaires consist of effective factors in cloud computing adoption (12 factors including 47 items) and cloud computing adoption intention (3 items). Rogers' diffusion of innovation (2003) [54] and Davis' technology adoption models (1989) [55] are used to design questionnaire. Thus, questions and items are designed for the existing factors in these models using library studies and reviewing articles and resources in the field of cloud computing. Also, background factors (including the support of the top managers of the organization, the existing infrastructure in the organization, and awareness), technology, and economic factors are used along with other factors in the models to complete the effective factors in cloud computing adoption. A researcher-made questionnaire is designed to evaluate the cloud computing adoption intention of employees (as a research-dependent variable) which consists of 3 items. All items designed in this study are based on a 5-point Likert scale (very low 1 to very high 5). The reliability of the research is evaluated using Cronbach's alpha coefficient which is obtained  $\alpha$ =0.54% for the questionnaire of effective factors in cloud computing adoption and has various values for the questionnaire of the cloud computing adoption intention. Finally, the data collected by Smart-PLS software are used for statistical analysis.

#### **Findings**

19 people (38%) were female and 31 (62%) were male out of 50 individuals. Most of the employees were between 31-35 years old (46%), with work experience of 11-15 years (38%), and had a bachelor's degree (46%).

Table 1: Demographic characteristics of the studied employees

Variable		Frequency	Percent
Condor	Female	19	38
Gender	Male	31	62
	26-30 years	14	28
	31-35 years	23	46
Age	Older than 35 years	13	26
	Less than 5 years	8	16
Mork	6-10 years	13	26
ovnorionco	11-15 years	19	38
experience	More than 15 years	10	20
	Associate Degree	10	20
Educational	Bachelor	23	46
level	Higher than the Master Degree	17	34

Confirmatory factor analysis is used in the inferential section of the research to evaluate the accuracy of the measurement of the models before testing hypotheses and the conceptual model. The significance of the path coefficient between items and latent variables was examined to evaluate the confirmatory factor analysis of the questionnaire. Path coefficient is a numerical value that determines the intensity rate of the relationship between a hidden variable and the corresponding explicit variable during the path analysis process. The standardized path coefficient between all items and the corresponding latent variables is given in Table (2). The value of the path coefficient of each of the observed variables with the corresponding hidden variable is the minimum acceptable value of 0.4. Some researchers suggest eliminating the reflective observed variable from the measurement model when their path coefficient is below 0.4 and only if eliminating the path coefficient increases the corresponding combined reliability (CR). If the path coefficient value is less than 0.4 and the value of the t statistic is more than 1.96, then the item can be kept in the model. As can be seen, all items related to the components can be kept in the model as their factor loading is obtained greater than 0.4 and with a t-statistic greater than 1.96.

Table 2: The result of confirmatory factor analysis of the questionnaire of effective factors in cloud computing adoption

Dimension	Number of Items	Factor loading	t-statistic	Result
e c	1	0.82	30.22 42.61	keep
tag	2	0.80	42.01	keep
npa van	7	0.84	28.92	keen
con ad	5	0.85	636	keen
	6	0.94	81.12	keep
exity	7	0.96	117.28	keep
comple	8	0.82	14.22	keep
0 ≩	9	0.89	40.49	
atibili	10	0.80	16.59	keep
Comp	11	0.83	26.81	keep
~	12	0.47	3.22	keep
oility	13	0.78	15.94	keep
stak	14	0.87	25.90	keep
Те	15	0.69	12.91	keep
ş	16	0.80	27.36	keep
seues	17	0.78	21.80	keep
tive	18	0.71	11.33	keep
ffec	19	0.79	18.54	keep
Ш	20	0.61	8.98	кеер
jce	21	0.71	11.22	кеер
nier	22	0.73	13.04	keep
nve	23	0.75	12.25	keep
ő	24	0.86	24.61	кеер
, se	25	0.84	17.99	keep
Cost fect nes	26	0.91	55.48	кеер
Ē	27	0.88	52.76	кеер
ity	28	0.79	16.58	keep
scur	29	0.67	9.003	кеер
ta se	50	0.84	55.55	кеер
Dat	31	0.78	26.44	keep
s of	32	0.85	32.12	keep
ne ort ( top	33	0.92	58.44	keep
Th supp the man	34	0.83	31.26	keep
p f	35	0.80	20.85	keep
ss al	36	0.91	41.47	keep
enes tude oloy	37	0.77	17.10	keep
vare Attit Emp	38	0.57	6.14	keep
A _	39	0.30	2.59	keep
gy SS	40	0.86	25.07	keep
line	41	0.92	61.36	keep
rechr Reac	42	0.89	27.53	keep

0	43	0.82	29.59	keep
ture	44	0.82	22.22	keep
unc	45	0.88	52.78	keep
rast	46	0.70	10.99	keep
Inf	47	0.75	14.33	keep

In addition to confirmatory factor analysis, the reliability of the questionnaire is examined using Cronbach's alpha coefficient which is presented in Table (3). Obviously, all components of the alpha coefficient are more than 0.70 indicating the appropriate reliability of the model.

Table 3: The assessment of the reliability of the questionnaire of effective factors in cloud computing adoption using Cronbach's alpha method

Dimension	Number of items	Cronbach's Alpha Coefficient
Comparative advantage	5	0.85
Complexity	3	0.89
Compatibility	3	0.78
Testability	4	0.70
Effectiveness	5	0.78
Convenience	4	0.75
Cost-Effectiveness	3	0.85
Data Security	4	0.78
The Support of the Top Managers	3	0.83
The Awareness and Attitudes of Employees	5	0.71
Technology Readiness	3	0.86
Infrastructure	5	0.86
Total Effective Factors	47	0.96

Structural equation modeling using Smart-PLS software is used to determine the effective factors in cloud computing adoption. All 12 determined factors in cloud computing adoption are considered as independent variables and the cloud computing adoption intention is considered as a dependent variable.

Path coefficients display the positive effect of effective factors in cloud computing adoption (except for the support of the top manager) on cloud computing adoption intention, Fig. 4.

Also, the coefficient of determination (R2) is obtained 0.54, which indicates that the effective factors in cloud computing adoption can explain 54% of the changes in the variable of cloud computing adoption intention.



Fig. 2: Path coefficient related to confirmatory factor analysis.



Fig. 3: t-statistic related to confirmatory factor analysis.



Fig. 4: Path coefficients related to the effective factors in cloud computing adoption.

Fig. 5 shows the t-statistic for all paths related to the effective factors in cloud computing adoption (except the path of the support of the top managers on the cloud computing adoption intention) is more than 1.96 indicating the significance of the coefficients of the relevant paths. Therefore, it can be concluded that all factors (except the support of the top managers) have a

positive and significant effect on the cloud computing adoption intention. Nevertheless, the t-statistic for the support of the top managers for the path of the cloud computing adoption intention is less than 1.96, which shows the support of the top managers does not have a significant effect on the cloud computing adoption intention.



Fig. 5: T-Statistic related to the effective factors in cloud computing adoption.

The results in Table 4 show that all factors (except the support of the top managers) have a positive and significant effect on the cloud computing adoption intention. Effectiveness with the path coefficient of (0.844) had the most effect and complexity with the path coefficient of (0.511) had the least effect on the cloud computing adoption intention. The support of the top managers with a path coefficient of (0.098) did not have a significant effect on the cloud computing adoption intention.

Table 4: The path coefficients and t-statistic related to effective factors in the cloud computing adoption intention

Path	Path Coefficient	t-statistic
Comparative Advantage on Cloud Computing Adoption Intention (DOI)	0.814	33.259
Complexity on Cloud Computing Adoption Intention (DOI)	0.511	7.116
Compatibility on Cloud Computing Adoption Intention (DOI)	0.736	16.572
Testability on Cloud Computing Adoption Intention (DOI)	0.768	17.999
Cost-Effectiveness on Cloud Computing Adoption Intention (Economic Factor)	0.599	9.402
Data Security on Cloud Computing Adoption Intention (Technological Factor)	0.737	13.850
Technology Readiness on Cloud Computing Adoption Intention (Technological Factor)	0.626	8.642
Effectiveness on Cloud Computing Adoption Intention (TAM)	0.844	33.259
Convenience on Cloud Computing Adoption Intention (TAM)	0.780	14.719
The Support of the Top Managers on Cloud Computing Adoption Intention (background factor)	0.098	0.947
The Awareness and Attitudes of Employees on Cloud Computing Adoption Intention (background factor)	0.785	19.965

(background factor)
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#### **Results and Discussion**

The present study indicates that the factors of the DOI model can directly affect the cloud computing adoption. This model consists of four sub-factors of comparative advantage, complexity, compatibility, and testability.

The comparative advantage with the path coefficient of (0.814) has a positive and direct effect on the cloud computing adoption. Valmohammadi and Mazaheri (2017) [45], Sabi et al. (2018) [6], and Oliveira et al. (2014) [1] obtained similar results. Nonetheless, in another study, Alhammadi et al. (2015) [8] determined effective factors in cloud computing adoption in Saudi Arabia. They stated that the comparative advantage did not affect the cloud computing adoption, which was inconsistent with the results of the present study. In general, the managers and employees of organizations should have a complete and clear understanding of new technology, its advantages, and uses in their executive activities before implementing and accepting that technology in organizations. Also, the effectiveness of this new method in organizational processes as well as its functions should be evaluated. The Noor credit institution is connected to Iran's banking systems therefore using cloud computing can facilitate and speed activities up. Determining the advantages of using cloud computing in the branches of Noor credit institutions can be used to establish extensive connections with other banking environments as well as other credit financial institutions. This will increase the scientific level of the institution.

Moreover, this study displays that the complexity directly and inversely affects the cloud computing adoption with the path coefficient of (0.511). Alhammadi et al. (2015) [8] did not report a significant relationship between complexity and cloud computing adoption in their research, whereas they assumed a negative and direct effect of complexity on cloud computing adoption at the beginning of their research. Therefore, their research was inconsistent with the result of the present study. However, Sabi et al. (2018) [6], Oliveira et al. (2014) [1], and Gangwar et al. (2015) [14] stated a negative and direct relationship between complexity and cloud computing adoption which is consistent with the present study. Since cloud computing is a new and modern technology that requires training from the early stages, employees of the organizations may have difficulties accepting new devices and working methods as they are accustomed to their old and current systems.

This component has had a positive and direct effect on the cloud computing adoption among the employees of Noor credit institution. Generally, complexity can become a challenge in implementing and integrating existing systems with cloud services and using cloud solutions if the experts in this field are not present in the organization.

Another result of the study reveals that compatibility also had a positive effect on the cloud computing adoption (path coefficient = 0.736). Alshamaila et al. (2013) [11], Gangwar et al. (2015) [14], and Alhammadi et al. (2015) [8] reported similar results to the present study. Nonetheless, Oliveira et al. (2014) [1] did not find a significant relationship between compatibility and cloud computing adoption. Numerous studies on information technology have shown the role of compatibility in these areas. It is implied that cloud computing platforms are aligned with the Internet platforms; Therefore, the organization can take more advantage of cloud computing. The best advantage is the possibility of reducing uncertainty for cloud computing users and consumers. In the case of cloud computing, it is essential to discern whether this technology is compatible with the existing technology architecture in the organization or not? Therefore, it can be recommended that Noor credit institution should first measure and synchronize its facilities regarding the implementation of cloud computing to minimize the problems of technology compatibility in the future and after implementation.

Another result of the study indicates a direct and significant relationship between testability and cloud computing adoption (path coefficient = 0.768). The obtained results are consistent with the studies of Jones et al. (2017) [7], Sabi et al. (2018) [6]. Organizations need to train and examine their employees before implementing cloud computing as it is a complex and new information system. This reduces the anxiety and stress of employees regarding using cloud computing and provides a better motivation and understanding of its benefits to performing their tasks (Gangwar et al., 2015) [14]. This reduces ambiguity and prepares employees to effectively use cloud computing in the future. Finally, it can be concluded that testability allows employees to understand the performance and technical perspectives of cloud computing to gain the required information and experience. This enables them to become knowledgeable, experienced, and responsible to effectively use cloud computing. Therefore, it is recommended that Noor credit institution should implement the testability stage to address possible shortcomings and problems before applying cloud computing. In this regard, employees can gain the necessary experience and training.

The positive and direct effect of the determined economic factor, i.e. being cost-effectiveness on cloud computing adoption is another result of the study (path coefficient = 0.599). This obtained result is consistent with the studies of Jones et al. (2017) [7], Oliveira et al. (2014) [1], and Christauskas et al. (2012) [2]. Jones et al. (2017) [7] stated that an organization can reduce the allocated time to system maintenance and routine upgrades, also decrease the cost of infrastructure, energy consumption, and maintenance by using cloud computing. Oliveira et al. (2014) [1] introduced cloud computing as an opportunity to innovate by reducing IT costs. In general, low startup costs and its payment model of cloud computing is one of the key benefits for users and organizations. Therefore, banks must evaluate their current systems and analyze cost-benefit analysis to make the right decision about pay per use.

Another result of this study reveals the effect of two factors of the TAM model on the cloud computing adoption intention of the employee. The obtained results present that the effectiveness of cloud computing can have a positive and direct effect on the cloud computing adoption (path coefficient = 0.844). In this study, the convenience of using cloud computing has also a positive and direct effect on the cloud computing adoption (path coefficient = 0.780). Studies by Lin and Chen (2012) [12], Alshamaila et al. (2013) [11], Gangwar et al. (2015) [14], Changchit & Chuchuen (2018) [18] and Sabi et al. (2018) [6] had similar results to the present study. Generally, effectiveness is an important index because when users observe the efficiency, performance, and productivity of cloud services in their business, they tend to use cloud computing (Alshamaila et al., 2013 [11]). In addition to effectiveness, the convenience of using cloud computing is significant in the TAM model. The convenience use of cloud services is a strong motivation for users because they can use computational resources and IT solutions without knowing details or in-depth knowledge according to a report of the Cloud Computing Research Center (2011). In this regard, it can be recommended that Noor credit institutions should evaluate the opinions of their employees regarding these two important components. They can monitor the capability to implement cloud computing in branches of Noor credit institutions.

In addition to the main models, the researcher examined the factors that can directly affect the cloud computing adoption. These determined factors include; the support of the top managers of the organization, the existing infrastructure in the organization, and awareness which are considered as the background factors. The support of the top managers can directly and positively affect the cloud computing adoption (path coefficient = 0.098). Ali et al. (2020) [49], Tarhini et al.

(2017) [56], Gangwar et al. (2015), [14] Oliveira et al. (2014) [1] revealed the same results as the present study. The support of the top managers in the organization plays a vital role in the successful adoption of new technologies. The support of the top managers is major challenge because receiving sufficient а investment and technological competencies requires the intention of the managers to understand the benefits of the cloud business and its competition, as well as its implementation in the organization (Alshamaila et al.[11]). In addition, a manager has an effective role in motivating employees by encouraging their work behaviors. This demonstrates continued commitment and support to provide an environment conducive to implement (such as providing the necessary resources such as time, space, equipment, and people) and accept cloud computing; Therefore, it can be alleged that the adoption of technology generally has a top-down approach which can also be applied for Noor credit institution.

The infrastructure factor also has a positive and direct effect on the cloud computing adoption (path coefficient = 0.752). Villapol et al. (2017) [46] pointed out that facilities and equipment and technology infrastructure can facilitate the use of cloud computing. Paquette et al. (2010)[57] considered the cloud computing infrastructure sector as one of the significant risks of cloud computing uses that the lack of this component and the necessary physical and human infrastructure in any organization leads to failure in cloud computing. Gangwar et al. (2015) [14] also introduced infrastructure as an effective factor in the cloud computing adoption. Generally, organizational infrastructure including experts and skilled manpower, necessary equipment and technologies, effective organizational and interorganizational communication, etc. can be facilitators and incentives towards the cloud computing adoption by employees as well as the managers, which can bring many benefits to the organization. Therefore, it is suggested that the necessary infrastructure should be provided before implementing cloud computing in Noor credit institutions.

Another result of the present study is the positive and direct effect of the awareness factor on the cloud computing adoption (path coefficient = 0.785). Research conducted by Arpaci (2017) [10], showed that educational centers can provide cloud computing adoption by increasing awareness of management knowledge. Hinde & Van Belle (2012) [58], assessed the risks and the benefits of cloud computing for small businesses in South Africa. They yield similar results as the present research; The studies of Panda et al. (2019) [59] and Yeboah-Boateng & Essandoh (2013) [13] were also in line with this research. However, the study

of Sabi et al. (2018) [6] showed that this component (awareness) did not affect the cloud computing adoption. In general, technology awareness by the managers and other stakeholders is very vital in deciding cloud computing adoption. Moreover, it can facilitate the optimal use of many benefits of this technology and new tools. Therefore, it can be recommended that the managers first gain the necessary and useful information about cloud computing and its benefits, and then boost the adoption of this technology by transferring it to their employees in Noor credit institution.

This study indicates that the security of the cloud computing system can affect the cloud computing adoption (path coefficient = 0.737). The results obtained from this part of the research are consistent with the studies of Ali et al. (2020) [49], Yaokumah & Amponsah (2019) [5], Sabi et al. (2018) [6], Alhammadi et al. (2015) [8], Heidaryd Dahooie et al. (2017) [47] and Yaghoubi et al. (2014) [43]. Despite the growing popularity of cloud computing, business customers are still reluctant to deploy their business plans using cloud computing, mainly due to concerns about data security and privacy (Raza et al., 2015 [15]). Cloud systems users are unaware of the exact place of their data storage, nor of the data sources of other users in the same system in a multi-user cloud model, which raises concerns about their adoption and use. (Gangwar et al., 2015 [14]). It can be recommended that organizations should use effective experts to reduce system security concerns. It leads to both enjoying the benefits of cloud computing and improving their system security.

Another result obtained from the research shows that technology readiness also affects the cloud computing adoption (path coefficient = 0.626). The results of research by Yaokumah & Amponsah (2019) [5], Sabi et al. (2018) [6], and Gangwar et al. (2015) [14] also presented the effect of technology readiness on the cloud computing adoption which was consistent with the results of the present study. In fact, technology readiness is an index to evaluate the maturity of new technologies since their design, development, and implementation in the organization. In this regard, tools are used to determine the level of technology readiness in organizations before the design and development of new technology. This primarily measures the level of readiness and maturity of technology and also the risk of a technology use in the product development. The purpose of technology readiness is to reduce the risk of technology projects and to adjust the costs of technology testing and technology upgrading projects (Hinde & Van Belle 2012 [58]). Technology readiness in an organization includes various aspects of hardware, software, and manpower. For example, from hardware aspect; structural architecture and data management services in the organization such as databases, access, storage, subscription, data software center, the international internet communication networks and domestic internet networks and having an IT unit in the organization can be used as hardware readiness and considered a structure for the organization. On the other hand, software models and existing technologies for the use of cloud computing also show the readiness of the organization to apply cloud computing. Finally, in addition to the necessary structural and technical requirements for the use of cloud computing, experts and efficient human resources are needed to benefit the organization for optimal use of cloud computing. Therefore, it is recommended to the managers of organizations measure the level of readiness in the organization before the implementation of cloud computing, which requires an expert group to improve the information technology of banks.

In general, information technology has become an important competitive advantage for organizations. The lack of attention to this issue can lead to worrying consequences for organizations. Banks can act as a mediator for institutionalizing and implementing new technologies other organizations in through troubleshooting and optimization due to their closer relationship with modern technologies. Applying and implementing cloud computing in Noor credit institutions can be transferred to other institutions and banks in the future and will facilitate its implementation in these organizations. The recommendation in line with this research and cloud computing adoption is informing employees and people who are using this technology in the organization. Awareness can be done in various ways, including; holding training courses before starting cloud computing use in the organization to raise the level of knowledge of individuals and its users, preparing executive instructions for users of this system, hiring experts in the organization for emergencies, and situations that need to solve a problem in the system, using easier and more convenient versions at the beginning of its application and implementation and using more up-to-date version based on the level of awareness and knowledge individuals and employees in the future.

Even cutting-edge technology may face problems (such as natural disasters, electricity shortage, low-speed internet, repair and maintenance of services, etc.). Due to required accessibility, quality and efficiency in the banking industry, technological equipment (such as dynamic data storage in short-term memories and other techniques) is necessary to avoid delays in networks. Since cloud computing depends on proper internal networks and the internet, the quality of connection equipment is extremely important. Good quality connection to the internet is very vital in cloud computing. It is impossible to have access to Cloud without internet connection and as a result, no cloud computing is feasible. it is clear that constant internet connection is a basic need and is considered a limitation for users of cloud computing. Another problem in cloud computing is accessibility and service level. Banks perform sensitive operations and are in need of constant high accessibility, therefore they are always seeking to reduce the delay time in systems. There are doing so in order to avoid: 1. reduction in productivity 2. negative impact on client satisfaction. Consequently, they need to utilize proper Cloud to have high accessibility. Band widths incur high costs on banks and financial Institutes. Web-based applications and documents which are stored on Clouds need a broadband connection to easily get downloaded. Accordingly cloud service providers store their clients' data on physical data centers. The bandwidth of each data center is a limiting factor which should be considered so as to avoid encountering the slow speed in sending and receiving data. In case, a low band width is used, many features of a cloud computing system will be out of service. Even in broad band services, high latency occasionally causes disappointing disruptions in cloud-based processing. Another problem in cloud computing systems is distributed denial-ofservice which causes lack of access to data and applications. In these technical attacks, the service of the victim suffers lack of systemic resources such as slow processing, memory and bandwidth. Hackers reduce the system speed maximally and irritate system users which causes disastrous consequences for the banking system. Since the cloud service providers in the banking system provide services to many users on a daily basis, they might experience some troubles such as electricity breakdown, etc. This might lead to suspensions in businesses. Users and service clients have limited control because the whole infrastructure of cloud system belongs to service providers. In other words, users can control and manage only applications, data, and services. Also, it is possible that key executive tasks such as access to servers, updating, and managing meso-software might not be controlled by the user. Another problem with cloud services is the lack of unified standards of service providers. There have been attempts to reach a set of standards but they have not been successful. Changing cloud service providers is not fully developed yet. Organizations may find it difficult to shift from one provider to another one. If a company is dissatisfied with the services of a cloud service provider, or if the service vendor withdraws from the business, the buyer may not necessarily be able to easily and cheaply transfer to another provider or move cloud computing services back into the company, but have to reformat its data and applications to a new provider, which is a potentially complex process and the challenges of this sector have not been comprehensively analyzed and its various dimensions and problems are not completely clear. When a bank or financial institution moves to cloud computing, it faces many challenges. The first issue in this regard is security. The use of cloud services to develop banking services may lead to data leakage to other parties. It can be said that the biggest drawback of cloud application development is its privacy. Many companies prefer to have IT programs, data, and activities under their own control. Although cloud service providers comply with the best security standards and industry certifications, storing important files and information on external service providers always carries risks. The use of cloud computing technology means that users allow access to important business information by their cloud service provider. Ease of providing and accessing cloud services, especially in the banking industry, can allow hackers to scan, identify and exploit vulnerabilities within a system. Some governments, especially members of the European Union, have passed some laws banning the sending of certain personal information abroad. On the one hand, data protection and confidentiality regulations are determined by the laws of the host country. On the other hand, the bank may need to control some information accurately and effectively and monitor its access and security.

Cloud computing may not provide the abovementioned monitoring. Also, the important questions would be: What will happen to the data if the cloud computing company goes out of business? and will user data be recoverable or not? The answers to these questions will be a very important issue in the banking industry. The other issue would be legal compliance of banks and financial institutes to keep their clients' information confidential. The use of global cloud services by banks, financial and credit institutions whose servers are outside the borders of a territory is restricted. Banks are more exposed to legislative challenges than any other business due to the inherent sensitivity of their data. Cloud rules and regulations vary from country to country. Storing information in data centers located in another country can be a problem in legal disputes for organizations, especially banking organizations. For example, if the court in one country which hosts the data centers issues a license to record the information of another country's organization or bank, the service provider will be obliged to provide that information, in which case organizations and banks will face risks and problems.

Each technology has its pros and cons. It is very important to be aware of them before using them.

Perhaps, the most important advantage of cloud computing is the cost savings in information technology. No matter what type or size a business is, it will be profitable when the capital and operating costs are minimized. It does not matter if the cloud computing technology is used publicly, privately or in combination, today cloud computing has become a key factor for in competition between companies. It is clear that the advantages of this technology outweigh its disadvantages and its use is expanding day by day. Although it is very useful to use cloud technology, there are some disadvantages that should not be overlooked. Getting familiar with the pros and cons of cloud computing can help you customize it to different businesses especially in the banking industry, and plays a crucial role in choosing an appropriate cloud service provider. Another issue in the banking industry is that as the main services in the banking industry moves to the cloud servers, the bargaining power of the cloud supplier increases, and this may be a major threat to the future of banks and financial and credit institutions. Another obstacle is the difficulty of transferring current applications to the cloud environment. This transfer is not cost-effective. Therefore, cloud computing is often used for new users. Unless the organization know enough about cloud providers, cloud-based applications, and the necessary tasks for its operations, there will be risks that are not measurable. These risks are more dangerous than common well-known risks.

The limitation of the study is the small sample size. If we could have a larger sample size for example the entire staff of Noor Financial and Credit Institution in eastern Iran or the entire staff of this institute in Iran, we might obtain more accurate results. The data of the present study are taken from Noor Financial and Credit Institution in Birjand city in South Khorasan province. Generalizing the finding of this study to other contexts should be done with care and caution. Also, this research has been done on the personnel working in Noor Financial and Credit Institution in Birjand, so it cannot be generalized to the whole society affiliated with the Iranian banking industry. Another limitation of this research is the scare of related research in this area which makes it impossible to have a comparison of results.

#### **Author Contributions**

Hossein KardanMoghaddam proposed the main idea of the paper and designed road map of the research. Fatemi Jafari designed, simulated, carried out the data analysis, collected the data and interpreted the results. Manuscript has been written by Dr. Amir Rajaei and Hossein KardanMoghaddam. All authors discussed the results and contributed to the final manuscript.

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#### **Conflict of Interest**

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

#### Abbreviations

RTGS Real Time Gross Settlement Syste
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- ACH Automated Clearing House
- POS Points of Sales
- SEPAM System for Electronic Payment Messaging
- ICT Information and Communication Technology
- TRA Theory of Reasoned Action
- TPB Theory of Planned Behavior
- TAM Technology Acceptance Model
- TOE Technology, Organization and Environment
- DOI Diffusion of Innovations
- UTAUT Unified Theory of Acceptance and Use of

Technology

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#### Biographies



Hossein Kardan Moghaddam received M.Tech (CCT) from the University of Mysore, India (2009-2011), He is currently faculty member in the department of computer engineering, Birjand University of Technology, Birjand, Iran. His research interests are in Image processing, Machine Learning, Information Technology Management, Health Engineering.



Amir Rajaei received MCA and PhD degrees computer science in and technology from the University of Mysore, 2008 India. in and 2013. He worked on UGC sponsored major project. He is currently facultv а in the department of computer engineering, University of Velayat, Iranshahr, Iran. His research interests are in computer network, image processing, object recognition and

data mining.



Fatemi Jafari, She received her bachelor's degree in computer engineering from Birjand University of Technology in 2020.

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