**Research Article**

# Toward a Holistic Model for Adopting Cloud Computing in Organizations: A Systematic Review

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| ARTICLE INFO | ABSTRACT |
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| | Regarding the innovation that occurred in the information technology industry over the years, the dependence on cloud computing has increased. In this regard, cloud computing has drastically developed in recent years. Many organizations usually rely on this technology for their business and use it as the backbone of their company's IT infrastructure. Despite the extensive advantages of the could computing, many of these services are limitedly adopted by the companies and many companies are dubious to adopt this technology. The present study aimed to systematically review the factors effective in organizational decision-making for adoption of the cloud computing by the use of the Technology-Organization-Environment (TOE) framework. The TOE framework classifies the factors affecting an organization's adoption of innovation into three groups: 1. Technology (meaning the system's security and complexity), 2. Organization (meaning the organization size and chief managers' support of functional systems displacement), and 3. Environment (cases such as market uncertainty and pressure from the government or competition). |

## INTRODUCTION

Concerning the pace of digital development and diffusion of technological innovations as well as their effects as a strong driving force for new businesses, we should try to identify the main dimensions of this factor as soon as possible. Cloud computing plays a fundamental role in the digital development of businesses in various industries (Lialestani et al., 2021). There are few technological advancements as deeply effective as cloud computing, which is one of the most important digital developments in technology. A view of the cloud revolution reveals how this paradigm has transformed global businesses. Cloud computing affects a range of companies from established companies that optimize their workloads to "born in the cloud" startups, and constantly provides new visions in the area of technology and innovation. Cloud computing has emerged as an equalizer for businesses of any size and global companies to startups, and provides equal conditions for innovation and optimization of the workload. Large companies use cloud computing to simplify operations, increase scalability, and reduce costs, while it provides an environment for startups to test, repeat, and rapidly scale regardless of the traditional infrastructural investments (Sayegh, 2023). The global market of computing is developing worldwide and its value is expected to reach 675 billion dollars in 2024 (Statista, 2024).

Anyways, although it seems that cloud computing is an appropriate solution for organizations, the adoption of new technologies has always faced some challenges. Cloud adoption studies are conducted under diffusion of innovation research and focus on the way the innovation is transferred between the members of a social system through specific channels (Rogers et al., 2014). It is usually built based on several logical models which are known as the adoption frameworks or models in the literature. These models describe factors that make the users, be it

an organization or an individual, decide to adopt and use the innovation (cloud computing). While these models constitute the theoretical foundation in the adoption literature, they are also used as a tool to identify the factors effective in users' decisions to adopt the new technologies and predict the important factors in adoption decision-making (i.e., replacement of traditional technology with a modern one). Among the many adoption frameworks, the Technology-Organization-Environment (TOE) proposed by Tornatzky and Fleischer (1990) has been chosen for the present study because it focuses on organizational factors rather than individual factors. Other frameworks such as diffusion of innovation (Rogers, 2003), Technology Acceptance Model (ATM) (Davis et al., 1989; Venkatesh et al., 2000, 2003, and 2008), Organizational Model of Human Resources-Technology (Yusof et al., 2008), Decomposed Theory of Planned Behavior (Taylor and Todd, 1995), Task-Technology Fit model (Goodhue and Thompson, 1995), and Inter-Organizational Information Systems (Iakovou et al., 1995) have not been considered in the present study due to their focus on the individual intention and behavior (Hadwer, 2021).

The TOE framework categorizes the factors affecting an organization's adoption of innovation into three groups: 1. Technology (meaning the system's security and complexity), 2. Organization (meaning the organization size and chief managers' support of functional systems displacement), and 3. Environment (cases such as market uncertainty and pressure from the government or competition). This framework is an appropriate holistic tool for research at the organizational level and deals with the technical aspects of cloud technology and external/internal organizational factors that allow for the successful utilization of cloud computing technology (Oliveira et al., 2014). There is a limited number of studies on the adoption frameworks for understanding the decisions to use cloud computing technology in organizations. The present study reviews the literature to investigate the effective factors in cloud adoption using a TOE framework with the following research question:

What factors affect the organizational decision-making to adopt cloud computing technology?

To answer this question, the following objectives are considered:

1.        Defining cloud computing and its models and services as well as the opportunities and challenges related to its adoption;

2.        Understanding how the independent or integrated TOE framework is used in the literature to investigate different environments for general adoption of the cloud by organizations;

3.        Listing and categorizing the technical and non-technical factors effective on the cloud computing adoption process and their importance.

This study is organized as follows. In the second chapter, the method adopted is presented and in the third chapter, the results are provided. Finally, in the fourth chapter, the conclusion and the conceptual framework extracted from the systematic review and content analysis are presented.

## METHODOLOGY

A combination of the systematic review and content analysis methods has been used to conduct the present study. The use of this trend, in addition to using the advantages of both methods, facilitates the interpretation of the explicit and implicit content of the literature. The systematic review of the texts is a coordinated measure for systematic identification of all primary studies available, critical analysis of these studies, and a combination of the quality data with standard and systematic methods, done to answer a desired question. The review of literature is important since by doing so, it tries to summarize and categorize the texts related to a desired subject (Khalil et al., 2013). On the other hand, content analysis facilitates reproducible and valid conclusions from latent and explicit data of texts, extracting concepts from literature, and categorizing them (Oleinik et al., 2014). In the present study, the systematic review framework proposed by Kitchenham& charters (2007) has been used. This method is adopted for two reasons: (1) It is extensively used in the area of computing and information systems, and (2), Compared to other methods of systematic review, this method is newer (Hadwer, 2012). In this regard, the review process includes three stages namely the review method design, review of the sources, and compilation of the review report (Franco Bedoya et al., 2014). In the following, the measures taken in each stage are elaborated.

### First Stage: Review Method Design

In this stage, the following measures are taken based on the research objectives:

- Identification of the need for literature review: The rapid development of IT has led to an increase in market

competition. As a result, the consumers' habits have also changed in a way that the organizations have to be efficient and provide services with lower costs. This issue explains a considerable part of the constant need for the adoption of innovative technology (Trigueros-Preciado et al., 2013). Cloud computing adoption is a relatively new trend and has recently become popular worldwide due to the ease of implementation, lack of the need for intraorganizational IT infrastructure, and low costs, in a way that smaller firms can also benefit from the advantages of these systems. However, the rate of adoption of this technology in organizations is low. Also, the research indicates that organizations are still dubious about the adoption of such technology and struggle with its technical challenges such as security and fear of losing data control (Hsu & Lin, 2016) or underuse of such technology despite the high investment costs (Liang et al., 2017). Therefore, it is necessary to identify the factors that encourage organizations to adopt cloud computing technology. To do so, the literature related to the diffusion of innovation is very important to understanding the way cloud computing is achieved.

- Setting the research objectives: Three objectives were determined in the present study which were mentioned in the introduction chapter.

- Identification of related and authentic databases: To answer the research question, the research domain is focused on searching the articles in the relevant databases, which includes computer-assisted review and information systems. In this regard, the following databases have been chosen: ACM Digital Library, IEEE Xplore, ISI Web of Science, Springer, Google Scholar, Noor Mags, and Elmnet.

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## Second Stage: Literature Review

This stage consists of two parts:

- Identification and selection of the primary references: The keywords to be searched were determined by studying the main references and extracting their keywords. To retrieve the related articles, the Boolean strategy has been used in the fields such as the title, abstract, and keywords based on the requirements of various databases, and finally, a collection of keywords was prepared (Table.1).

Table.1: Keywords searched

| Cloud OR Adopt*, Accept*, Factors, Paramet* (for parameter or parameters) | AND | Determin* (For determinants and determinants in their title) |
|---|---|---|

After retrieving and accessing the references, 224 articles were extracted. In the preliminary review of the articles, the articles with irrelevant titles and abstracts were excluded. As a result, the number of the final list articles was reduced to 85. Finally, based on the inclusion criteria, 25 articles in the 2014-2024 period were chosen. The specifications of these articles (year of publishment, author, title, and reference code) are presented in Tab.2. These articles were screened with the help of two experts in the field of information systems and cloud computing. There was no need to refer to a third expert due to the agreement between these two experts.

Table.2: Articles analyzed in the present study

| eference code | Authors | Title | Year |
|---|---|---|---|
| | | | |

| 1 | Oliveira, Tiago   Thomas, Manoj   Espadanal, Mariana | Assessing the Determinants of Cloud Computing Adoption: An Analysis of Manufacturing and Service Sectors | 2014 |
|---|---|---|---|
| 2 | Lian, Jiunn-Woei   Yen, David C   Wang, Yen-Ting | An exploratory study to understand the critical factors influencing the decision to adopt cloud computing in a hospital in Taiwan | 2014 |
| 3 | Sang Gun Lee,SuwoongHwang,JuyoungKang,Sora Yoon | Factors affecting the adoption of organizational cloud computing | 2014 |
| 4 | Gangwar, Hemlata   Date, Hema   Ramaswamy, R | Understanding the determinants of cloud computing adoption using an integrated TAM-TOE model | 2015 |
| 5 | Gutierrez, Anabel   Boukrami, Elias   Lumsden, Ranald | Technological, organizational, and environmental factors influencing managers' decision to adopt cloud computing in the UK | 2015 |
| 6 | Wahsh, Muntasser A   Dhillon, Jaspaljeet Singh | Investigating factors affecting the adoption of cloud computing for the implementation of e-government | 2015 |
| 7 | Safari, Fariba   Safari, Narges   Hasanzadeh, Alireza   Ghatari, Ali Rajabzadeh | Factors affecting the adoption of cloud computing in small and medium-sized companies | 2015 |
| 8 | Hsu, Chin-Lung   Lin, Judy Chuan-Chuan | Factors affecting the acceptance of cloud services in companies | 2016 |
| 9 | Al-Jabri, Ibrahim M   Alabdulhadi, Mohammed H | Factors affecting the adoption of cloud computing: the perspective of IT professionals | 2016 |
| 10 | Liang, Yikai   Qi, Guijie   Wei, Kangning   Chen, Jiali | Examining the determining mechanism and effectiveness of cloud computation of e-government in governmental organizations in China | 2017 |
| 11 | Yaokumah, Winfred   Amponsah, Rebecca Adwoa | Investigating factors influencing the adoption of cloud computing in a developing country | 2019 |
| 12 | Pathan, ZulfiqarHussain   Jianqiu, Zeng   Akram, Umair   Latif, Zahid   Khan, Muhammad Kaleem   Tunio, M Zahid | Basic factors in the adoption of cloud computing by SMEs | 2017 |

| 13 | Priyadarshinee, Pragati   Raut, Rakesh D   Jha, Manoj Kumar   Gardas, Bhaskar B | Understanding and Predicting the Determinants of Cloud Computing Adoption: A Two-Step Hybrid SEM-Neural Networks Approach | 2017 |
|---|---|---|---|
| 14 | Liang, Yikai   Qi, Guijie | Determinants of cloud e-government adoption: A multi-case analysis of China | 2017 |
| 15 | Hassan, Haslinda   Nasir, MohdHerryMohd   Khairudin, Norhaiza   Adon, Iskandar | Factors affecting the adoption of cloud computing in small and medium-sized companies | 2017 |
| 16 | Senarathna, I. | Factors affecting cloud computing adoption: An empirical study of Australian SMEs | 2018 |
| 17 | Ming, C Fook   On, C Kim   Rayner, A   Guan, T Tse   Patricia, A | Determinants affecting the adoption of cloud computing by small and medium enterprises (SMEs) in Sabah, Malaysia | 2018 |
| 18 | Raut, Rakesh D   Priyadarshinee, Pragati   Gardas, Bhaskar B   Jha, Manoj Kumar | Analyzing factors affecting the adoption of cloud computing using a three-step hybrid SEM-ANN-ISM (SEANIS) approach | 2018 |
| 19 | Alkhater, Nouf   Walters, Robert   Wills, Gary | An empirical study of the factors influencing cloud adoption among private sector organizations | 2018 |
| 20 | Singh, Jewan   Mansotra, Vibhakar | Factors affecting the adoption of cloud computing in Indian education system | 2019 |
| 21 | Hussein Alghushami, Abdullah   Zakaria, NurHaryani   Mat Aji, Zahurin | Factors affecting the adoption of cloud computing in higher education institutions of less developed countries: Evidence from the Republic of Yemen | 2020 |
| 22 | Ali, O., Shrestha, A., Osmanaj, V., & Muhammed, S. | Adoption of cloud computing technology: An assessment of key factors in local governments | 2020 |
| 23 | Nassoura, AymanBassam | Critical success factors for cloud computing adoption in Jordanian healthcare organizations | 2020 |
| 24 | Qasem, Yousef AM   Asadi, Shahla   Abdullah, Rusli   Yah, Yusmadi   Atan, Rodziah   Al-Sharafi, Mohammed A   Yassin, Amr Abdullatif | A multi-analytical approach to predict the determinants of cloud computing adoption in higher education institutions | 2020 |

| 25 | Skafi, Mahmoud   Yunis, Manal M   Zekri, Ahmed | Factors influencing the adoption of cloud computing services by small and medium enterprises in Lebanon: an empirical analysis using TOE and environmental theory. | 2020 |
|----|------|------|------|

## Third Stage: Compilation of review report

In the final stage, the systematic review findings were analyzed based on the research questions and objectives. Figure.1 shows the stages and findings of each stage.
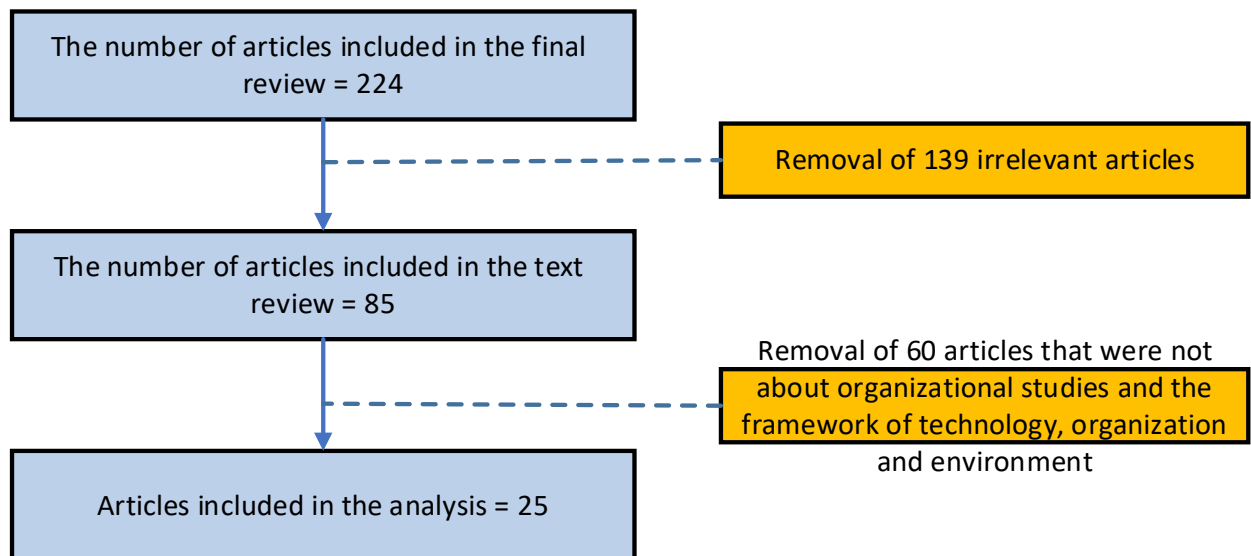


Figure.1: Selection process and results of screening

### RESULTSAND DISCUSSION

The main objective of the present study was to identify the probable effective factors in cloud computing technology adoption for the digital transformation of organizations. Other objectives include defining cloud computing technology and determining the theoretical models or frameworks to investigate cloud computing service adoption by organizations.

## Cloud Computing:

Cloud computing is a model that packs and provides various types of IT technologies in the form of a service package. Currently, the technologies in the field of IT such as Web 2.0 and virtualization are implemented separately. Yet, some of their capabilities are chosen to activate the cloud environment (Schubert et al., 2010).

According to Fowler &Worthen (2009), in the late 1990s, people used to use the cloud to show everything related to the internet (Fowler &Worthen, 2009). The term "cloud computing" was first used at the Search Engine Strategies Conference in San Jose, when Eric Schmidt, former CEO of Google, tried to describe the history of the internet and computer architecture (Limet et al., 2015). More than half of the articles investigated in the present study have noted the definition of cloud computing proposed by the National Institute of Standards and Technology (NIST) ((Al-Jabri&Alabdulhadi, 2016; Gangwar et al., 2015; Gutierrez et al., 2015; Hassan et al., 2017; Hsu & Lin, 2016; Lian et al., 2014; Pathan et al., 2017; Priyadarshinee et al., 2017; Raut et al., 2018; Senarathna, 2018; Singh &Mansotra, 2019; Yaokumah&Amponsah, 2019). In the definition provided by the NIST, shareability, scalability, and cost reduction have been presented as the main advantages of cloud computing (Hadwer, 2021). Generally, cloud computing can be categorized in the following three dimensions (GhaithJaafar Mohammed, 2018)

- Software as a service (SaaS): The user accesses various client applications through a client interface, such as a web browser or an application interface.

- Platform as a service (PaaS): The user, who is usually a cloud applications developer, creates new applications through access to programming languages, libraries, services, and tools supported by the cloud provider.

- Infrastructure as a service (IaaS): The user (usually an engineer) can establish and execute software that can include various operating systems and applications while the cloud provider supplies the fundamental computation sources such as processing, storing, and the programs needed for the network.

## Cloud Adoption Theories:

The studies in the literature can be categorized into two groups: Articles that have merely used Tornatzky&Fleicher's theory of TOE (Tornatzky et al., 1990), and articles that have been written merely by customizing the adoption framework of TOE and/or merging it by other adoption theories such as Roger's Diffusion of Innovation (Rogers et al., 2014). Figure.2 shows the use of these theories in the final 25 articles investigated in the present study.
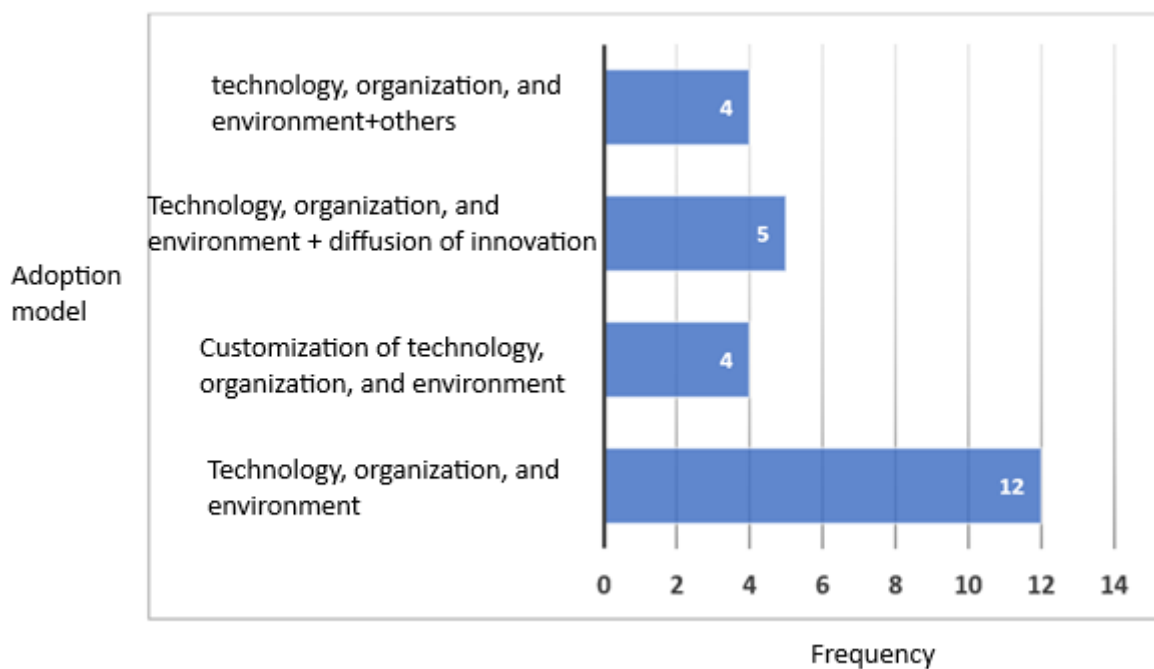


Figure.2: Frequency of cloud adoption models from 2014 to 2024

The TOE model identifies the dimensions under which the factors affecting the technology-organization-environment innovation factors are categorized. The technology dimension describes the relationship between new technologies and the organization and investigates the effects of factors such as data security and protection, privacy, complexity, and compatibility. The organization dimension deals with the availability of the resources in the organization that allows for adoption and evaluates the effects of factors such as organization size, previous experience of technology use, and cost reduction. The environment dimension explains those industrial features within which an organization works. This dimension evaluates the effects of factors such as governmental regulations and/or competition (Ogunlolu, 2019).

The diffusion of innovation theory explains how specific characteristics (factors) of innovation allow for its adoption (Oliveira et al., 2014). The factors specified in this theory include: (1) Relative advantage which denotes the degree to which the acceptor perceives the innovation provides features or advantages that replace the current

system, (2) Compatibility which denotes the level to which the adaptation of innovation and available values raises the previous methods and current needs of the acceptor, (3) Complexity that denotes the level to which the complexity of an innovation is perceived, (4) Observability that denotes the level of innovation visibility to others, and (5) Trialability that denotes the level to which an innovation can be trialed in a limited manner (Rogers et al., 2014).

Among the five characteristics of diffusion of innovation, the effects of relative advantage on adoption have been extensively explained and measured for numerous reasons. One of the advantages of the innovation's relative advantages can be tangible characteristics or values that are perceived by the users and developers of the technology compared to other available cases. While the effects of trialability have been sufficiently dealt with in the literature, many cloud computing providers have provided limited services to their user organizations.

The diffusion of innovation theory is necessary for studies in the field of information systems adoption. Therefore, cloud adoption evaluation is done with two methods: (1) For comparison of the level of adoption in several organizations (e.g., comparing the manufacturing and service enterprises in Portugal) (Oliveira et al., 2014) or small and medium enterprises (Pathan et al., 2017; Senarathna et al., 2018), and (2) For perception of the organizational concept of the cloud adoption (Liang & Qi, 2017; Liang et al., 2017; Wahsh&Dhillon, 2015). Some researchers argue that merging the TOE with other adoption models can strengthen its capability or lead to better prediction and success (Gangwar et al., 2015; Ming et al., 2018). At the same time, some others have claimed that the TOE is comprehensive enough and the diffusion of innovation is itself an inseparable part of the TOE (Gangwar et al., 2015). They believe that the main features of the diffusion of innovation, i.e., relative advantage, complexity, and compatibility, have been already provided by the TOE in its technological dimension. Thus, the use of the TOE alone is enough for the whole study.

## Factors of Cloud Computing Adoption:

A combination of the TOE and the diffusion of innovation is used to encourage cloud adoption among Chinese governmental organizations to provide policy recommendations to policymakers. The issues of complexity, security, and performance have all created technological concerns despite the relative advantage, i.e., diffusion of innovation. This study concludes that internal factors such as management support, affect cloud adoption more than the relative advantage of the cloud (Rogers et al., 2014).

In another study, the TOE was merged with cloud computing (Lian et al., 2014). Lian et al. generalized and modified the TOE and named it the technology-organization-human to facilitate cloud computing in Taiwanese hospitals. This developed model has allowed the researchers to conduct an integrated study through an investigation of the competence of employees in adopting cloud computing in hospitals. They found that the technical competence of employees involved in adoption (such as the chief IT officers and the chief IT manager) plays an important role in the determination of cloud computing adoption. Regardless of the adoption model used in the study, it was revealed that non-technical factors play an important role in cloud computing (Liang & Qi, 2017; Oliveira et al., 2014; Senarathna, 2018; Wahsh&Dhillon, 2015). These factors include chief management support, organization size, innovation, and users' awareness of the relative advantage of cloud adoption, while this issue is indicative of the importance of the non-technical factors in cloud adoption (Al Hadwer et al., 2019). Further and deeper investigation of this topic is needed to see how ignoring these factors hinders cloud adoption.

Some researchers have changed the name of a factor or mentioned it under a different name although the description is the same. For example, for the effect of governmental regulations and cloud adoption, there are three different categorizations: government policy (Safari et al., 2015), regulatory environment (Patahn et al., 2017), and adaptation to the rules (Alkhater et al., 2018). Other researchers who have used the customized version of the TOE have added more dimensions to it such as the social (Alkhater et al., 2018) or human dimensions (Lian et al., 2014; Safari et al., 2015). Unfortunately, there is no clear explanation to separate these factors from the environmental or organizational dimensions of the TOE. Thus, the social or cultural factors are categorized under the environmental dimension, and the human factors are categorized under the organizational dimension.

Based on the content analysis of these 25 articles, 79 themes and three dimensions of the TOE were identified, overall, which illustrate the collection of factors effective in cloud computing for digital transformation in organization. In the following, the results are presented in three parts, based on the research objectives.

Table.3: Dimensions and themes extracted from the coding

| Dimension | Theme (code frequency) | Reference coded |
|---|---|---|
| Technology | Security concerns (12) | [2][3][6][8][10][13][18][21][22][23][24][25] |
| | Compatibility (12) | [4][6][7][10][11][12][14][20][21][22][23][24] |
| | Complexity (11) | [1][2][4][5][6][14][20][22][23][24][25] |
| | Relative advantage (11) | [1][4][6][7][8][10][12][16][20][21][22] |
| | Human competence (2) | [4][19] |
| Organization | Chief management support (13) | [1][2][4][6][9][12][14][17][20][21][22][24][25] |
| | Organization size (4) | [1][12][19][22] |
| | Cost saving (4) | [1][2][17][22] |
| Environment | Regulatory support (7) | [5][7][8][12][15][20][21] |
| | competition pressure (2) | [19][24] |
| | Cloud zone (1) | [19] |

## Technological Factors:

In the technology dimension, the relative advantage is reported to be a computation method with capabilities beyond the current method of intra-organizational computing, and one of the most influential factors that convince the organizations to adopt it. In addition to the complexity (Gangwar et al., 2015; Pathan et al., 2017; Safari et al., 2015; Singh &Mansotra, 2019) and compatibility ( Gangwar et al., 2015; Gutierrez et al., 2015; Oliveira et al., 2014; Pathan et al., 2017; Wahsh&Dhillon, 2015), relative advantage is among the characteristics of the diffusion of innovation which were previously mentioned. These factors affect cloud computing adoption. Yet, the effects of this factor have been minimized in organizations with Asian culture such as Chinese (Liang & Qi, 2017) and Saudi Arabic organizations (Al-Jabri&Alabdulhadi, 2016), because in these countries, the culture is described as collectivist in nature. However, in Yemen, culture considerably moderates the relationship between relative advantage and cloud computing adoption (Hussein Alghushami et al., 2020).

Although the security factor plays an important role in the adoption of cloud computing by organizations (Alkhater et al., 2018; Hsu & Lin, 2016; Lian et al., 2014; Priyadarshinee et al., 2017), it is ignored in various cases (Al-Jabri&Alabdulhadi, 2016). The possible explanation for this difference can be the recent advancements in the provision of cloud services such as improvement of data management tools and encryption for data transmission. Cloud computing can manage more compact requests on the computation programs by its users through these technical advancements. In terms of cost reduction, both PaaS and SaaS models may help with the optimization of virtual desktops, file-sharing platforms, and other digital solutions so that businesses can reduce their equipment and office tools purchase costs. Cost reduction has led to an increase in the use of cloud services among the users which has consequently increased the cloud computing adoption in part as a secure environment for storing enterprise data which was very difficult until a few years ago.

## Organizational Factors:

All studies have shown that non-technical factors such as employee competence and chief management support have a medium to high effect on cloud adoption. This effect is increased when the competence of the administrative or technical employees is high. Some researchers have studied employee competence, such as the creativity of CIOs (Lian et al., 2014), user awareness of cloud computing (Senarathna, 2018), team IT knowledge (Wahsh&Dhillon, 2015) or knowledge of CIOs (Safari et al., 2015) as an individual characteristic, because they all

played an important role in the decision-making process. CEOs and CIOs are top-level employees who tend to adopt quickly because they know it's useful. Then they express a positive attitude towards adopting cloud computing technology (Lian et al., 2014).

In this regard, the chief management support is the most effective factor in the adoption of cloud computing by organizations. It is believed that chief management's awareness of the cloud advantages positively affects cloud adoption. Chief management plays an important role in cloud adoption especially in developing countries, because they provide the necessary support to facilitate the adoption of cloud computing by confirming the financial and human resources of the adoption process. However, this factor may act as a double-edged sword, because when chief management is not aware of the benefits of cloud adoption, they are unlikely to support it.

## Environmental Factors:

Most of the studies on the adoption by the organizations have been conducted in developing countries. Developing countries often lag behind in adopting new technologies and are not among the first to confront emerging innovations and challenges. Cloud computing is no exception. The low rate of its adoption makes the universities and researchers feel challenged to accelerate this trend especially when its adoption gets more complicated due to other unique economic or environmental obstacles. For example, a recent report by the United Nations Conference on Trade and Development indicated that the percentage of people who have access to the Internet is still very low in developing countries. In addition, governments should apply appropriate rules in terms of the use of cloud computation to deal with issues such as security, data protection, and cyber crimes (NATIONS, 2017). This does not apply to developed countries, regarding the fact that 85% of the world's cloud data centers are located in developed countries, especially the United States (NATIONS, 2017), which is a response to the extensive adoption of cloud services by organizations. Competition has been considered an important factor that positively affects cloud computing adoption, especially in developed and developing countries. There were only three articles that considered the effects of this factor in cloud adoption to be tiny (Hassan et al., 2017; Ming et al., 2018; Oliveira et al., 2014). It was revealed in China that organizational factors, especially chief management support and organizational inertia play a vital role in cloud adoption by governmental organizations (Ming et al., 2018; Oliveira et al., 2014; Pathan et al., 2017; Safari et al., 2015). One of the most important findings of this study is that the government's financial support was not a sufficient driving force without the chief management's support.

## CONCLUSION

Digital transformation is a subject discussed in various countries, nowadays. Cloud computing technology is one of the key pillars of digital transformation, and there are concerns about its adoption in many organizations in various countries. The main objective of the present systematic review was to identify the factors effective in cloud computing adoption by the organizations in the last ten years for digital transformation in these organizations. In addition, the TOE as a theoretical foundation was evaluated in the present study. This theory works as a comprehensive framework that can be used to study successful cloud adoption in various cases by itself or combined with other theories. The main share of the present study is extraction and categorization of all factors effective in the use of cloud computing technologies by the organizations during the last ten years, and have led to the increase in the use of cloud solutions by the organizations. These factors have been extracted and categorized based on the TOE framework and through content analysis of the research texts so that (1) they can be used as appropriate tools for future studies on the innovation acceptance by the organizations and (2) they allow the researchers in the field of information management to observe how the cloud computing adoption's determinant factors change over time. The most important factors as well as their difference with previous studies have been highlighted. The effective factors in cloud computing adoption might differ with the improvement and diffusion of innovation when changing the context or due to the nature of the cloud. Finally, content analysis of the literature related to the factors effective in cloud computing adoption for digital transformation in organizations was done in a conceptual framework from a technological, organizational, and environmental point of view.
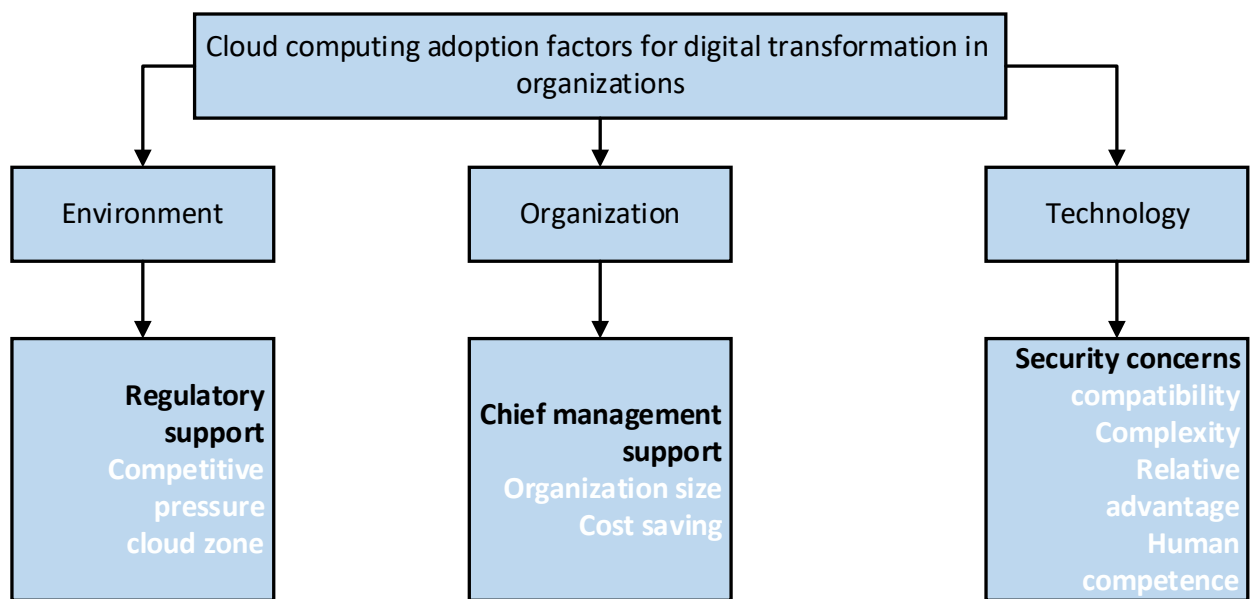
Figure.3: Conceptual framework of the literature related to factors effective in cloud computing adoption for digital transformation in organizations (extracted from the systematic review and content analysis)

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