

International Journal of Services, Economics and Management

ISSN online: 1753-0830 - ISSN print: 1753-0822
<https://www.inderscience.com/ijsem>

Is the game worth a candle? Users' adoption of private cloud computing

Kasim Tatić, Mahir Haračić, Merima Činjarević, Merima Haračić

DOI: [10.1504/IJSEM.2023.10058762](https://doi.org/10.1504/IJSEM.2023.10058762)

Article History:

Received:	14 September 2022
Last revised:	25 April 2023
Accepted:	05 July 2023
Published online:	21 February 2025

Is the game worth a candle? Users' adoption of private cloud computing

Kasim Tatić

Department of Microeconomics,
School of Economics and Business,
University of Sarajevo, Bosnia
Email: kasim.tatic@efsa.unsa.ba

Mahir Haračić

BH Telecom d.d. Sarajevo,
Franca Lehara 7, 71 000 Sarajevo,
Bosnia and Herzegovina
Email: mahir.haracic@bhtelecom.ba

Merima Činjarević*

Department of Microeconomics,
School of Economics and Business,
University of Sarajevo, Bosnia
Email: merima.cinjarevic@efsa.unsa.ba
*Corresponding author

Merima Haračić

Prevent Visoko,
Topuzovo polje bb, 71 300 Visoko,
Bosnia and Herzegovina
Email: merima.haracic@outlook.com

Abstract: The present study explores the effect of human-related factors (job opportunity) and system-related factors (perceived risk and perceived usefulness of cloud computing services) on an individual's decision to adopt cloud computing services. Besides, it strives to explore the perceived usefulness of cloud computing services as a mediator in the perceived risk-cloud computing adoption link and the job opportunity-cloud computing services link. Data were collected online from 125 users of cloud computing services and analysed using partial-least square structural equation modelling. The findings reveal that perceived risk directly negatively affects the perceived usefulness of cloud computing services. Job opportunity is positively associated with the perceived usefulness of cloud computing services. We found that the perceived usefulness of cloud computing services mediates the relationship between perceived risk, an individual's decision to adopt cloud computing services, and the link between job opportunities and an individual's decision to adopt cloud computing services. The current study has two theoretical contributions that are worth noting. First, this research offers insight into how

perceived risk and job opportunities influence individuals' adoption of cloud computing services. Second, the present study contributes to existing knowledge about applying the technology acceptance model in the context of cloud computing services.

Keywords: cloud computing; technology acceptance model; TAM; perceived risk; job opportunity; perceived usefulness.

Reference to this paper should be made as follows: Tatić, K., Haračić, M., Činjurević, M. and Haračić, M. (2025) 'Is the game worth a candle? Users' adoption of private cloud computing', *Int. J. Services, Economics and Management*, Vol. 16, No. 1, pp.63–78.

Biographical notes: Kasim Tatić is a Full Professor at the University of Sarajevo, School of Economics and Business, Department of Microeconomics. He is engaged as a researcher and consultant on various projects funded by state institutions or by the European Commission. His research interest includes microeconomics, managerial economics, environmental economics, and educational economics.

Mahir Haračić works as a coordinator in Communication Solutions Preparation at BH Telecom. He has completed his Master's in the field of Financial Management at the School of Economics and Business, University of Sarajevo. His professional interests include IT strategy, market research, and management.

Merima Činjurević is an Associate Professor at the University of Sarajevo, School of Economics and Business, Department of Microeconomics. She is engaged as a researcher on various projects funded by state institutions or by the European Commission. Her research interest includes consumer behaviour, tourism, and behavioural economics.

Merima Haračić works as a Supplier Quality Assurance Assistant at Prevent CEE. She holds a Master's in the field of Financial Management from the School of Economics and Business, University of Sarajevo. Her professional interests include supplier quality management and business process management.

1 Introduction

Cloud computing and the service-oriented architectures it spawned – software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS) – are often regarded as the most ground-breaking advancements in the field of information technology (IT) since the advent of the internet itself (Kajiyama et al., 2017; Song and Sohn, 2022). Although cloud computing offers advantages such as cost savings, flexibility, mobility, scalability, and convenience (Cheng et al., 2019; Gashami et al., 2016), these services indicate that our data asset is stored on the provider's infrastructure. Therefore, users may lose control of their data since it is digitally preserved in the cloud, raising privacy and security issues and threats (Widjaja et al., 2019). Consequently, data risk has been identified as a significant concern in cloud computing (Asadi et al., 2020; Ho et al., 2017; Widjaja et al., 2019).

Individuals are free to decide whether or not they will adopt cloud computing, just as with any other emerging technology. Adopting emerging and developing technologies may be modelled using several theoretical frameworks. The technology acceptance model (TAM) is one of the most extensively utilised models to explain the adoption of cloud computing. TAM is a theory for facilitating IT adoption grounded in the theory of reasoned action (Ajzen and Fishbein, 1980). According to TAM, an individual's adoption or desire to use new technology is affected by their opinions of its usefulness and ease of use (Davies, 1989). Since technology adoption is a complex process that is often dependent on the surrounding environment, some scholars have expanded the TAM to incorporate additional indicators such as perceived risk, (e.g., Ho et al., 2017; Im et al., 2008; Bachleda and Ait Ouaziz, 2017), trust, (e.g., Alsmadi et al., 2022; Burda and Teuteberg, 2014), or subjective norms (e.g., Sim et al., 2012).

Cloud computing adoption is still a nascent phenomenon. Although the topic of cloud computing adoption has attracted the attention of many scholars in recent years, most of the existing research focuses on the use of cloud computing at the organisational level. Therefore, there is a paucity of research on driving and deterring factors of cloud computing adoption from the end-users perspective (Bachleda and Ait Ouaziz, 2017; Bhattacharjee and Park, 2014; Sharma et al., 2016; Tan and Kim, 2015). Thus, this study aims to address this research gap by exploring the effect of human-related factors (job opportunity) and system-related factors (perceived risk and perceived usefulness of cloud computing services) on an individual's decision to adopt cloud computing services.

The rest of the paper is organised as follows. The next section begins with a review of the relevant literature on cloud computing, defining the scope of cloud computing services and providing insights into risks related to the use of cloud computing services and the promises of cloud computing. Section 3 presents the conceptual model and explains the proposed theoretical linkages. After that, we present the methodology and main findings. The last section concludes the paper with a discussion on theoretical and managerial implications, avenues for future research and limitations.

2 Theoretical background

2.1 The scope of cloud computing

Cloud computing is a network-based distributed system that offers on-demand access to shared computer resources like storage on a pay-as-you-go basis (Song and Sohn, 2022). Broad network access, on-demand self-service, resource pooling, and measurable service are just a few of cloud computing's many attractive qualities (Mikkonen and Khan, 2016; Song and Sohn, 2022). Typically, cloud computing offers three service model types – IaaS, PaaS, and SaaS. These service models are available to customers through one of four distribution channels (Patel and Kansara, 2021; Song and Sohn, 2022): public (accessible to the general public), private (managed exclusively for an organisation), community (used by several organisations), and hybrid (a combination of two or more clouds). Both the users and their motivations provide context for the various cloud computing classifications. For instance, IaaS and PaaS are organisation-level services that allow business users to create and manage the platform and virtual resources (IaaS) or to build, run, and manage software applications (PaaS). On the other hand, SaaS has been

regarded as an individual-level service that offers applications that users need to do their tasks.

Personal cloud storage service refers to the ‘cloud computing service that allows users to save their data on dedicated online storage systems instead of user-owned local systems’ [Li et al., (2017), p.1]. The capacity to remotely store and access personal information in the cloud has fuelled the growth of cloud storage companies, with Dropbox, Apple iCloud, Microsoft OneDrive, and Google drive being notable examples.

Table 1 Review of recent studies related to cloud storage service adoption and continuance intention

<i>Studies</i>	<i>Theoretical underpinnings</i>	<i>Main findings</i>
Liu et al. (2019)	IT continuance decision model and stimuli organism response (SOR) framework	The relationship between service quality and continuance intention decision is fully mediated by the two mediators, perceived benefits and satisfaction. Moreover, the perception of the reliability and flexibility of personal cloud storage services are the main drivers of service quality.
Widjaja et al. (2019)	Communication privacy management theory and privacy trust-behavioural intention model	User willingness to use personal cloud storage services is affected by the perceived costs, perceived benefits, and trust. Cost-benefit cognitive assessment plays an essential role in determining user willingness. The effects of perceived costs and perceived benefits on user willingness differ among different types of information sensitivity.
Cheng et al. (2019)	Push-pull-mooring framework of migration theory	Perceived privacy and security risks positively affect users’ intention to switch to a substitute. Perceived usefulness and enjoyment also have a relatively strong influence on switching intention.
Santoso et al. (2018)	TAM	Trust, perceived risk and subjective norms are antecedents of users’ intention to use cloud drive.
Wu et al. (2017)	Push-pull-mooring (PPM) framework of migration theory	Perceived risk positively motivates users to switch to another cloud storage platform. Transfer trust and critical mass have a positive impact on the switching intention. Favourable social norms towards alternatives and low switching costs positively impact switching intention.
Arpaci (2016)	Extended TAM by adding factors such as perceived ubiquity, perceived security, perceived privacy, subjective norm, and trust	Perceived usefulness, trust, and subjective norm significantly affect attitudes toward mobile cloud computing services, influencing the intention to use mobile cloud computing services.

Source: Author’s research

Table 1 Review of recent studies related to cloud storage service adoption and continuance intention (continued)

<i>Studies</i>	<i>Theoretical underpinnings</i>	<i>Main findings</i>
Yang and Lin (2015)	Task-technology fit theory	The cloud computing support, unstructured task, cloud computing self-efficacy and the opinion of reference groups positively impact the perceived usefulness of cloud computing services, further influencing users' continuance intention to use cloud computing services. The effect of perceived usefulness on continuance intention is negatively moderated by cloud computing service's privacy protection risk and lack of privacy-policy risk.
Burda and Teuteberg (2014)	IS success and technology acceptance (ISTAM)	System quality and service quality are significant predictors of satisfaction, influencing the usefulness, ease of use, attitude and intention to use personal cloud archiving.
Menard set al. (2014)	Protection motivation theory	Users' perception of the severity of losing data, being vulnerable to data loss, the ability to back up data to the cloud automatically, and the replication of data across multiple devices positively impact users' intention to back up data in the cloud.

Source: Author's research

The uptake of these services has been substantial in recent years; the number of personal cloud storage users worldwide increased from 1.1 million in 2014 to 2.3 million in 2020. However, the rise of other personal cloud storage service providers means that concerns about user switching behaviour and longevity have grown along with the popularity of these services. Therefore, it is crucial to understand the main drivers of users' intentions to continue using cloud computing services. We conducted a cross-disciplinary literature search to comprehend better earlier work that explains cloud storage service adoption and continuance. The review of recent studies related to cloud storage service adoption and continuance is presented in Table 1.

2.2 *Security in the cloud*

The term 'security' describes various rules, methods, and procedures used to secure data, applications, and the accompanying infrastructure within the cloud. Security in the cloud refers to the safety of the user's data and the services provided by the cloud provider. The data saved in the cloud exists on a distant networked resource that may be accessed through virtual computers. These virtual computers are often located in data centres that might be situated anywhere in the globe, beyond the users' control, posing various security and privacy problems. Security risks related to cloud computing services may be divided into two categories: those encountered by cloud service providers and those faced by end users (Yuvaraj, 2015). According to Yuvaraj (2015), the top threats in the cloud are data breaches, data loss, account or service traffic hijacking, malicious insiders, insecure interfaces, and shared technology vulnerabilities.

Scholarly research on cloud computing services shows that security concerns have a discernible influence on user behaviour (e.g., Alsmadi et al., 2022; Kajiyama et al., 2017). Moreover, the importance of data security and privacy is recognised by large technology companies that offer a variety of tools which end users can utilise to monitor, control and analyse their own data. Due to the importance of privacy protection and other aspects of digital identity, various laws and regulations have been created regulating data storage, data management, and data access. Digital data regulation and protection can be defined at the state level. However, it is also important to mention international regulations such as the General Data Protection Regulation (GDPR) (European Commission, 2019) created by the EU, Health Insurance Portability and Accountability Act (HIPAA), Children's Online Privacy Protection Act (COPPA) and others (e.g., PIWIK) (Peltz and Street, 2020). Certain countries, such as Germany and China, have particular rules regarding data protection and storage, which requires cloud providers to store data and, in most cases, provide services from data centres within the country's border (Wharton and Lin, 2015).

Many users utilise various cloud services, primarily SaaS, while they are only partially aware or familiar with the available cloud technologies. However, they must be aware and familiar with the data collected by service providers and services. In this manner, for example, the average user employs a considerable number of services every day through the same or different accounts, such as one or more e-mail services, (e.g., private or business), various services used to store data in the cloud (e.g., Microsoft OneDrive, Google Drive Dropbox), several services to access video content, (e.g., Youtube, Netflix), various social networks (Facebook, Twitter, LinkedIn), then various applications for navigation, online shopping, (e.g., Amazon, e-bay), communication applications (e.g., Viber, Teams, OneDrive), etc. Most of the applications we use daily represent cloud-based applications that store and collect data we are aware of (e.g., photos we share). However, a large amount of data is stored that we may be unaware of, such as access to time and location, device status and software versions, data used to analyse user habits, etc. Thus, end users must be aware of the importance of the data collected, how companies collect data, what data is used or can be used, and what technologies/models the company uses to make end users' data accessible, secure, and protected.

2.3 The promises of cloud computing

Integrating artificial intelligence (AI) in cloud computing significantly changes how businesses and private users use IT (Costa et al., 2022). Personal assistant apps, (e.g., Siri, Google Assistant, Amazon Alexa, Cortana) employ sophisticated AI tools of various shapes and models to provide the highest-quality services, and their work primarily depends on the volume and quality of data collected. Collecting and processing large amounts of data allows the creation of services that, until a few years ago, were partially presented in science fiction movies. Due to the role and importance of AI, which primarily uses cloud technology and cloud services in the background, it is extremely important to understand and present AI basics. Microsoft, which uses AI in many of its advanced services, has created six principles for AI software development. These six principles represent the following (World Economic Forum, 2021): fairness (AI systems should treat all people fairly), reliability and safety (AI systems should perform reliably and safely), privacy and security (AI systems should be secure and respect privacy),

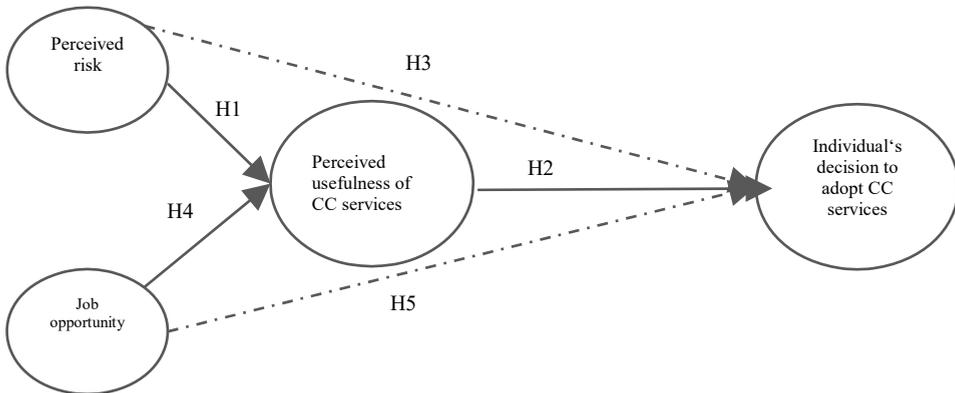
inclusiveness (AI systems should empower everyone and engage people), transparency (AI systems should be understandable), accountability (people should be accountable for AI systems). These principles are fundamental when creating advanced systems, especially those that embrace AI technology.

Also, the integration of business process management (BPM) in cloud computing enables smaller and medium-sized enterprises (SMEs) to maintain their focus on their businesses and gain a competitive edge (Wang et al., 2017). Business intelligence (BI) tools are crucial, enabling the companies to generate the necessary real-time reports based on available data from enterprise resource planning (ERP), customer relationship management (CRM), data management systems (DMS), warehouse management system (WMS) and other systems (Tatić et al., 2018). The application of sophisticated analysis systems such as BI applications is supremely significant in the process of analysis and improvement of business processes through BMP (and the use of adequate metrics related to key performance indicator (KPI) (Tatić et al., 2018). The role of BI tools is becoming increasingly important for SMEs. Being familiar with BI tools in the form of ready-made cloud-based solutions can be extremely helpful and produce significant differences in how data and information are generated for business decision-making. These cloud services are primarily intended for users who do not have advanced information and statistical knowledge.

3 Research model

Our research model (Figure 1) is underpinned in the TAM-related literature and the privacy risk research stream, aiming to identify relevant antecedents of internet users' decisions to use CCS.

Figure 1 Conceptual model



3.1 Perceived risk and usefulness of cloud computing services

Perceived risk can be described as the subjective belief and anticipation of potential harm, (i.e., loss or risk) that influences the decision-making process (Ho et al., 2017). When a person's risk tolerance threshold is exceeded, their perception of risk has a

negative impact on their decision to acquire goods or services (Venkatesh and Goyal, 2010). When it comes to the online environment, the risk may be divided into three categories: financial (opportunity costs as well as time and effort), product (the possibility that a product does not operate as intended), and information (privacy and security issues) (Bhatnagar et al., 2000). Even though a well-managed cloud data centre may be more secure than a poorly maintained PC environment, scholars suggest that abuse, manipulation, and exposure to data theft in the cloud are real and severe risks in cloud computing (Caldarelli et al., 2016). According to Caldarelli et al. (2016), there are myriad risks associated with cloud computing adoption, including organisational, technical, legal, and other general risks. The present study focuses on other general risks, including data security and protection concerns. Previous research suggests that people are less likely to use such technology when they are unsure about the implications of storing their personal information in a personal cloud (Burda and Teueberg, 2014). Although most cloud computing services include various security solutions, (e.g., firewalls, backup servers, anti-virus, encryption), none of these protection measures is flawless and cannot protect users from all security threats (Bhattacharjee and Park, 2014).

Furthermore, cloud computing service providers often keep their risk-mitigation plans under wraps for security reasons, leaving end-users to doubt whether these plans are appropriate. In addition, perceived risk was found to be negatively associated with perceived usefulness in the online shopping context (Li and Huang, 2009), and this effect should be the same in the cloud computing service context (Bhattacharjee and Park, 2014). Therefore, the following hypothesis is formulated:

H1 Perceived risk is negatively related to the perceived usefulness of cloud computing services.

3.2 Mediating role of the usefulness of cloud computing services

The TAM is based on the premise that an individual's attitude toward utilising and intention to use new IT is influenced by an individual's assessment of the utility offered by such technology (Davis, 1989). Empirical findings from various technology applications demonstrate the power of perceived usefulness in predicting individuals' adoption of new IT (Sharma et al., 2016; Ovčjak et al., 2015; Sohn, 2017). Thus, we formulated the following hypotheses:

H2 Perceived usefulness of cloud computing services has a positive and significant effect on individuals' decision to adopt cloud computing services.

H3 The relationship between perceived risk and the adoption of cloud computing services is mediated by the perceived usefulness of cloud computing services.

Job opportunity refers to the user's impression of the extent to which new technology increases his/her future employability (Sharma et al., 2016). New skills acquired through the use of new technologies thus increase the attractiveness of the individual in the labour market and the chance of a better-paid job. Many IT experts believe that most traditional computing will eventually shift to emerging platforms like cloud computing and big data, creating additional job opportunities for skilled workers. Thus, skilled workers with previous experience in cloud computing would have the upper hand in the job market. Moreover, prior research, (e.g., Nyembezi and Bayaga, 2014; Ratten, 2015) suggests that the extent to which individuals believe that a technical breakthrough will assist them in

achieving their objectives affects the perceived performance expectations of innovative technology. For instance, Nyembezi and Bayaga (2014) found that performance expectancy (benefits derived from using cloud computing services) is closely associated with high school students' intention to use cloud computing services in South Africa. Similarly, Ratten (2015) confirmed that people with a higher level of performance expectancy of cloud computing services tend to have a higher purchase intention of cloud computing services in the USA and Turkey. Since cloud computing services have diverse uses depending on why an individual adopts the technology, higher performance perceptions may lead to more people using these services. Based on the following, we hypothesised the following:

- H4 Job opportunity has a significant positive effect on the perceived usefulness of cloud computing services.
- H5 The user's perception of the usefulness of cloud computing services mediates the relationship between job opportunities and individuals' decision to adopt cloud computing services.

4 Methodology

We used convenience sampling to collect data. This sampling strategy is suitable when researchers rely on the target population immediately accessible and interested in participating in a survey (Etikan, 2016). The survey was performed anonymously and online using Google form. The study's questionnaire comprised three sections. In the first section, the respondents were informed about the study's goals and an explanation of cloud computing services. The second section was used to collect demographic information about the respondents, such as gender, age, education, and experience with various cloud computing solutions. The last sections included items used to measure constructs of interest (perceived risk, job opportunity, perceived usefulness of cloud computing service, and individual's decision to adopt cloud computing services). All constructs in the present study were measured using items validated in previous studies (Burda and Teuteberg, 2014; Sharma et al., 2016). Responses to all the items were assessed using a five-point Likert scale anchoring from 1 = strongly disagree to 7 = strongly agree. All questions were obligatory, implying that incomplete responses could not be recorded. At the end of the survey period – January 2021, we received 125 completed responses. The sample was gender-balanced (52.0% male and 48.0% female) and mainly composed of young users under 30 years old (47.2%). Considering the computing services used, respondents most often utilised SaaS (83.2%). One-third of participants have used platforms as a service, while one-fifth has used IaaS.

5 Results

We evaluated the measurement and structural models using the partial least squares (PLS) method. The Smart PLS 3.0 program was utilised to estimate measurement and structural models in our study. The assessment of measurement and structural models was conducted following the guidelines provided by Hair et al. (2019). Using three

criteria proposed by Hair et al. (2019), we evaluated the construct's reliability and validity in the measurement model, including Cronbach's alpha and composite reliability (CR). Convergent validity was assessed by outer loadings, average variance extracted (AVE), whereas discriminant validity was evaluated by using the heterotrait-monotrait ratio of correlation (HTMT). The results of reliability and convergent validity are shown in Table 2.

Table 2 Assessment of constructs' reliability and validity

<i>Latent variable</i>	<i>Item</i>	<i>Outer loading</i>	<i>Cronbach's alpha</i>	<i>CR</i>	<i>AVE</i>
Job opportunity	I think adopting CC will create new job opportunities	0.890	0.672	0.819	0.612
	Learning CC will provide more job options to me in the future.	0.877			
	Organisations adopting CC will require more experts in the future.	0.526			
Perceived risk	There is a high potential for loss involved in using cloud provider for personal archiving.	0.739	0.894	0.921	0.797
	There is a considerable risk involved in using cloud storage for personal archiving.	0.963			
	A decision to use cloud storage for personal archiving is risky.	0.959			
Perceived usefulness	I think CC services improve my performance.	0.912	0.893	0.933	0.823
	I think CC services improve my productivity.	0.920			
	I think CC services are useful for my overall work.	0.889			
Individual's decision to adopt CC services	I am using CC services	0.878	0.886	0.928	0.812
	I recommend the use of CC services to peers	0.915			
	I will be using cloud computing services in the future.	0.909			

Source: Author's research

The values of Cronbach's alpha varied from 0.672 to 0.894 for all constructs, and CR ranged from 0.822 to 0.933, indicating the reliability of all constructs. We assessed convergent validity, which examines the link between latent constructs and the manifest variables associated with that construct, by utilising the values of average variance extracted (AVE) and outer loadings related to each latent variable. Adequate convergent validity occurs when outer loadings are greater than 0.5, and AVE is above 0.50. Based on the established criteria and our results, we can affirm that convergent validity is established in our study. Finally, as indicated in Table 3, the HTMT ratio correlation scores for all the constructs reached the cut-off ratio of 0.85, suggesting adequate discriminant validity for all constructs. The HTMT ratio of correlation is a new criterion for assessing discriminant validity in PLS-SEM models proposed by Henseler et al.

(2015). The HTMT is the average value of the indicator correlations across constructs, (i.e., the heterotrait-heteromethod correlations) relative to the (geometric) mean of the average correlations for the indicators measuring the same construct (i.e., the monotrait-heteromethod correlation) (Henseler et al., 2015). According to Henseler et al. (2015), the value of the HTMT higher than this threshold (0.85 or 0.90), indicates the lack of discriminant validity.

Table 3 Assessment of discriminant validity using HTMT

<i>Latent variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
Job opportunity (1)				
Perceived risk (2)	0.172			
Perceived usefulness (3)	0.499	0.183		
Individual's decision to adopt CC services (4)	0.578	0.241	0.547	

Source: Author's research

Testing the significance, strength, and direction of the anticipated path coefficients was carried out using the bootstrapping technique with 5.000 subsamples. Our results confirmed the significant relationship between perceived risk and perceived usefulness of cloud computing services ($\beta = -0.1448$; $p = 0.058$) and job opportunity and perceived usefulness of cloud computing services ($\beta = 0.378$; $p = 0.000$), which leads to the acceptance of research Hypotheses H1 and H4. Also, our results indicate that the perceived usefulness of cloud computing services has a positive and significant effect on an individual's decision to adopt cloud computing services ($\beta = 0.501$; $p = 0.000$), supporting Hypothesis H2. Considering the indirect effect of perceived risk on an individual's decision to adopt cloud computing services, we found that the indirect effect is negative and significant at a significance level of 10%. Therefore, Hypothesis H3 is supported. Also, our results suggest an indirect effect of job opportunity on individuals' decision to adopt cloud computing services via the perceived usefulness of cloud computing services, supporting H5. Our mediation analysis showed that at the significance level of 5%, the perceived usefulness of cloud computing services mediates the link between job opportunity and individuals' decision to adopt cloud computing services. We performed the effect size analysis according to the criteria proposed by Cohen (1988) to evaluate the effect size of the exogenous variables on the endogenous variables ($f^2 < 0.02$ indicating small effect; $0.02 < f^2 < 0.35$ indicating medium effect and $f^2 > 0.35$ indicating large effect). Results shown in Table 4 suggest that perceived risk has a small effect on the perceived usefulness of cloud computing services ($f^2 = 0.026$). In contrast, the job opportunity has a medium effect on the perceived usefulness of cloud computing services ($f^2 = 0.168$). Also, it was found that the perceived usefulness of cloud computing services has a medium effect on an individual's decision to adopt cloud computing services ($f^2 = 0.335$). Regarding the effect size, which is an indicator of the relative effect of causes factors (exogenous variables) on the outcome factors (endogenous variables), the following can be concluded:

- a perceived risk has a small effect on the perceived usefulness of cloud computing services
- b job opportunity has a medium effect on perceived usefulness of cloud computing services

- c the perceived usefulness of cloud computing services mediate the link between job opportunity and adoption of cloud computing services but does not mediate the link between perceived risk and adoption of cloud computing services.

Table 4 Results of the structural model

<i>Path relationship</i>	<i>Direct effect</i>	<i>Indirect effect</i>	<i>t-value</i>	<i>p-value</i>	<i>Effect size (f²)</i>
H1: Perceived risk → Perceived usefulness of CC services	-0.148		1.575**	0.058	0.026 (S)
H2: Perceived usefulness of CC services → Adoption of CC services	0.501		6.154***	0.000	0.335 (M)
H3: Perceived risk → Perceived usefulness of CC services → Adoption of CC services		-0.074	1.463*	0.072	
H4: Job opportunity → Perceived usefulness of CC services	0.378		4.456***	0.000	0.168 (M)
H5: Job opportunity → Perceived usefulness of CC services → Adoption of CC services		0.189	3.164**	0.001	
	<i>R² adjusted</i>	<i>Q²</i>			
Perceived usefulness of CC services	0.170	0.118			
Adoption of CC services	0.245	0.190			

Source: Author's research

The predictive significance of the structural model was evaluated using the Stone-Geisser Q^2 technique. The results of the blindfolding technique revealed that the Q^2 values for two endogenous variables were more than '0' with $Q^2 = 0.118$ for 'perceived usefulness of cloud computing services' and $Q^2 = 0.190$ for 'adoption of cloud computing services', suggesting acceptable levels of predictive relevance. In addition, the coefficient of determination for 'perceived usefulness of cloud computing services' was 0.170, indicating that 17.0% of the variance in the perceived usefulness of cloud computing services can be explained by an individual's perception of risk and job opportunities. Moreover, the coefficient of determination for 'adoption of cloud computing services' suggests that 24.5% of the variance in individuals' decision to adopt cloud computing services can be explained by perceived risk, job opportunity, and individual's perception of cloud computing usefulness (see Table 4).

6 Conclusions

This study aimed to investigate the effect of human-related factors (job opportunity) and system-related factors (perceived risk and perceived usefulness) on individuals' voluntary adoption of cloud computing services. In line with previous studies, we found that perceived risk hinders an individual's decision to adopt cloud computing services (e.g., Burda and Teuteberg, 2014; Ho et al., 2017). In other words, people who feel that cloud computing services provide an unsecured environment in which they might lose personal data will be less likely to use cloud computing services.

Furthermore, job opportunity positively affects individuals' cloud computing adoption both directly and indirectly through perceptions of the utility of cloud computing services. It should be mentioned that the indirect effect of job opportunities on an individual's adoption of cloud computing services is stronger than the indirect effect of perceived risk. It seems that perceived benefits (job opportunity) surpass the perceived costs (perceived risk), indicating that people tend to assign higher importance to benefits than the costs when deciding to adopt cloud computing. Also, our results suggest that perceived usefulness has a pivotal role in the process of cloud computing adoption at an individual level. Namely, the perceived usefulness mediates the perceived risk – cloud computing adoption link and the relation between job opportunity and perceived usefulness of cloud computing services.

The present study has practical implications for cloud computing service providers. Since perceived risk decreases the perceived usefulness of cloud computing services and demotivates people to adopt cloud computing services, cloud computing service providers should focus on network and software security. Thus, cloud computing service providers should invest in technology and processes that mitigate cloud security threats, enhancing both the actual and perceived cloud security among end-users. According to the study's findings, the availability of employment opportunities impacts the use of cloud computing services. Therefore, cloud computing providers should raise awareness about the future potential of these services in terms of their growing use in the business world and the employability value they provide. Aiming to boost the perceived usefulness of cloud computing services, cloud computing service providers must be able to show how cloud computing services can increase productivity in the workplace. Due to the rising competition in the cloud computing market, cloud service providers should develop effective branding strategies. Therefore, cloud computing service providers should enhance brand exposure across communication media, mainly via social networking sites (e.g., Facebook, Instagram, LinkedIn). Moreover, cloud computing service providers should encourage current users to share their brand experiences online using videos and photos. The higher level of brand awareness will establish brand credibility and familiarity, reducing users' perception of the risk associated with cloud computing.

This study has some limitations. First, we measured only one facet of the perceived risk (e.g., other risks); therefore, future research capturing different dimensions of the perceived risk of cloud computing services is welcomed. Second, the present study is based on the TAM. Thus, future research should try to integrate factors from other adoption technology models such as technical, organisational, environment (TOE), unified theory of acceptance and use of technology (UTAUT), and task-tech fit (TTF).

References

- Ajzen, I. and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.
- Alsmadi, D., Halawani, M., Prybutok, V. and Al-Smadi, R. (2022) 'Intention, trust and risks as core determinants of cloud computing usage behavior', *Journal of Systems and Information Technology*, Vol. 24, No. 3, pp.178–201.
- Arpaci, I. (2016) 'Understanding and predicting students' intention to use mobile cloud storage services', *Computers in Human Behavior*, Vol. 58, No. 5, pp.150–157.

- Asadi, Z., Abdekhoda, M. and Nadrian, H. (2020) 'Cloud computing services adoption among higher education faculties: development of a standardized questionnaire', *Education and Information Technology*, Vol. 25, No. 1, pp.175–191.
- Bachleda, C. and Ait Ouaziz, S. (2017) 'Consumer acceptance of cloud computing', *Services Marketing Quarterly*, Vol. 38, No. 1, pp.31–45.
- Bhatnagar, A., Misra, S. and Rao, H.R. (2000) 'On risk, convenience and internet shopping behavior. Association for computing machinery', *Communications of the ACM*, Vol. 43, No. 11, pp.98–110.
- Bhattacharjee, A. and Park, S.H. (2014) 'Why end-users move to the cloud: a migration-theoretic analysis', *European Journal of Information Systems*, Vol. 23, No. 3, pp.357–372.
- Burda, D. and Teuteberg, F. (2014) 'The role of trust and risk perceptions in cloud archiving-results from an empirical study', *Journal of High Technology Management Research*, Vol. 25, No. 2, pp.172–187.
- Caldarelli, A., Ferri, L. and Maffei, M. (2016) 'Expected benefits and perceived risks of cloud computing: an investigation within an Italian setting', *Technology Analysis and Strategic Management*, Vol. 29, No. 2, pp.167–180.
- Cheng, S., Lee, S.-J. and Choi, B. (2019) 'An empirical investigation of users' voluntary switching intention for mobile personal cloud storage services based on the push-pull-mooring framework', *Computers in Human Behavior*, Vol. 92, No. 3, pp.198–215.
- Cohen, J. (1988) *Statistical Power Analysis for the Behavioral Sciences*, Routledge Academic, New York, NY.
- Costa, R.L.D., Diamantino, J., Pereira, L., Dias, A., Gonçalves, R. and Teixeira, N. (2022) 'Impact and future of artificial intelligence', *International Journal of Services, Economics and Management*, Vol. 13, No. 2, pp.131–151.
- Davis, F.D. (1989) 'Perceived usefulness, perceived ease of use and user acceptance of information technology', *MIS Quarterly*, Vol. 13, No. 3, pp.319–340.
- Etikan, I. (2016) 'Comparison of convenience sampling and purposive sampling', *American Journal of Theoretical and Applied Statistics*, Vol. 5, No. 1, pp.1–4.
- European Commission (2019) 'COM (2019). 374 final Data protection rules as a trust-enabler in the EU and beyond – taking stock', *Eur-Lex* [online] <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0374> (accessed 13 August 2023).
- Gashami, J.P.G., Chang, Y., Rho, J.J. and Park, M. (2016) 'Privacy concerns and benefits in SaaS adoption by individual users: a trade-off approach', *Information Development*, Vol. 32, No. 4, pp.837–852.
- Hair, J.F., Sarstedt, M. and Ringle, C.M. (2019) 'Rethinking some of the rethinking of partial least squares', *European Journal of Marketing*, Vol. 53 No. 4, pp.566–584.
- Henseler, J., Ringle, C.M. and Sarstedt, M (2015) 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', *Journal of Academy of Marketing Science*, Vol. 43, No. 1, pp.115–135.
- Ho, S.M., Ocasio-Velázquez, M. and Booth, C. (2017) 'Trust or consequences? Causal effects of perceived risk and subjective norms on cloud technology adoption', *Computers & Security*, Vol. 70, No. 9, pp.581–595.
- Im, I., Kim, Y. and Han, H.J. (2008) 'The effects of perceived risk and technology type on users' acceptance of technologies', *Information Management*, Vol. 45, No. 1, pp.1–9.
- Kajiyama, T., Jennex, M. and Addo, T. (2017) 'To cloud or not to cloud: how risks and threats are affecting cloud adoption decisions', *Information and Computer Security*, Vol. 25, No. 5, pp.634–659.
- Li, Y., Chang, K.C. and Wang, J. (2017) 'Self-determination and perceived information control in cloud storage service', *Journal of Computer Information Systems*, Vol. 60, No. 2, pp.1–11.
- Li, Y-H. and Huang, J-W. (2009) 'Applying theory of perceived risk and technology acceptance model in the online shopping channel', *World Academy of Science, Engineering and Technology*, Vol. 53, No. 5, pp.919–925.

- Liu, X., Prybutok, V.R. and Rubino, E. (2019) 'An examination of factors that affect user intentions toward cloud computing switching', *International Journal of Services and Standards*, Vol. 13, Nos. 1/2, pp.1–21.
- Menard, P., Gatlin, R. and Warkentin, M. (2014) 'Threat protection and convenience: antecedents of cloud-based data backup', *The Journal of Computer Information Systems*, Vol. 55, No. 1, pp.83–91.
- Mikkonen, I. and Khan, I. (2016) 'Cloud computing – SME company point of view', in *Management Challenges in the 21st Century*, pp.59–79, Vysokáškola manažmentu: Bratislava, Slovakia.
- Nyembezi, N. and Bayaga, A. (2014) 'Performance expectancy and usage of information systems and technology: cloud computing (PEUISTCC)', *International Journal of Educational Sciences*, Vol. 7, No. 3, pp.579–586.
- Ovčjak, B., Heričk, M. and Polančič, G. (2015) 'Factors impacting the acceptance of mobile data services – a systematic literature review', *Computers in Human Behavior*, Vol. 53, No. 3, pp.24–47.
- Patel, H.B. and Kansara, N. (2021) 'Cloud computing deployment models: a comparative study', *Journal of Innovative Research in Computer Science & Technology (JIIRCST)*, Vol. 9, No. 2, pp.45–50.
- Peltz, J. and Street, A.C. (2020) 'Artificial intelligence and ethical dilemmas involving privacy', in Masakowski, Y.R. (Ed.): *Artificial Intelligence and Global Security*, pp.95–120, Emerald Publishing Limited, Bingley.
- Ratten, V. (2015) 'Factors influencing consumer purchase intention of cloud computing in the United States and Turkey: the role of performance expectancy, ethical awareness and consumer innovation', *EuroMed. Journal of Business*, Vol. 10, No. 1, pp.80–97.
- Santoso, N., Kusyanti, A., Catherina, H.P.A. and Sari, Y.A.L. (2018) 'Trust and security concerns of cloud storage: an Indonesian technology acceptance', *International Journal of Advanced Computer Science and Applications*, Vol. 9, No. 6, pp.453–458.
- Sharma, S.K., Al-Badi, A.H., Govindaluri, S.M. and Al-Kharusi, M.H. (2016) 'Predicting motivators of cloud computing adoption: a developing country perspective', *Computers in Human Behavior*, Vol. 62, No. 5, pp.61–69.
- Sim, J.J., Kong, F.M., Lee, V.H., Tan, G.W.H. and Teo, A.C. (2012) 'Determining factors affecting broadband services adoption? An empirical analysis of Malaysian consumers', *International Journal of Services, Economics and Management*, Vol. 4, No. 3, pp.236–251.
- Sohn, S. (2017) 'A contextual perspective on consumers' perceived usefulness: the case of mobile online shopping', *Journal of Retailing and Consumer Services*, Vol. 38, No. 5, pp.22–33.
- Song, C. and Sohn, Y. (2022) 'The influence of dependability in cloud computing adoption', *Journal of Supercomputing*, Vol. 78, No. 1, pp.12159–12201.
- Tan, X. and Kim, Y. (2015) 'User acceptance of SaaS-based collaboration tools: a case of Google docs', *Journal of Enterprise Information Management*, Vol. 28, No. 2, pp.423–442.
- Tatić, K., Džafić, Z., Haračić, M. and Haračić, M. (2018) 'The use of business intelligence (BI) in small and medium-sized enterprises (SMEs) in Bosnia and Herzegovina', *Economic Review – Journal of Economics and Business*, Vol. 16, No. 2, pp.23–37.
- Venkatesh, V. and Goyal, S. (2010) 'Expectation disconfirmation and technology adoption: polynomial modeling and response surface analysis', *MIS Quarterly*, Vol. 34, No. 2, pp.281–303.
- Wang, D., Guo, H. and Liu, L. (2017) 'One goal, two paths: how managerial ties impact business model innovation in a transition economy', *Journal of Organizational Change Management*, Vol. 30, No. 5, pp.779–796.
- Wharton, C. and Lin, K.L. (2015) 'Comparative legislation, corporate policy and citizen concerns: legal solutions for privacy protection in cloud computing', in *Proceedings of International Carnahan Conference on Security Technology (ICCST)*, Taipei, Taiwan, pp.19–24.

- Widjaja, A.E., Chen, J.V., Sukoco, B.M. and Ha, Q. (2019) 'Understanding users' willingness to put their personal information on the personal cloud-based storage applications: an empirical study', *Computers in Human Behavior*, Vol. 91, No. 2, pp.167–185.
- World Economic Forum (2021) *Responsible Use of Technology: The Microsoft Case Study*, in collaboration with the Markkula Center for Applied Ethics at Santa Clara University, USA.
- Wu, K., Vassileva, J. and Zhao, Y. (2017) 'Understanding users' intention to switch personal cloud storage services: evidence from the Chinese market', *Computers in Human Behavior*, Vol. 68, No. 3, pp.300–314.
- Yang, H. and Lin, S. (2015) 'User continuance intention to use cloud storage service', *Computers in Human Behavior*, Vol. 52, No. 12, pp.219–232.
- Yuvaraj, M. (2015) 'Problems and prospects of implementing cloud computing in university libraries: a case study of Banaras Hindu University library system', *Library Review*, Vol. 64, Nos. 8/9, pp.567–582.