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Moderating Effects of Age and Experience on the Factors Influencing the Actual Usage of Cloud Computing

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ABSTRACT

Cloud computing technology (CCT) has attracted extensive attention of organizations to enhance their agility, flexibility and competitive advantage. Successful implementation of CCT depends on its acceptance and use by senior IT managers in the organizations. This study proposes an extended technology acceptance model (TAM) to predict actual CCT usage by the managers. A questionnaire is used to collect data. Exploratory and confirmatory factor analyses are performed to analyze the factor structure and measurement model. Structural equation modeling is used to analyze the structural model. The results supported all the hypotheses of the model. The moderating effect of experience and age is also tested through multi-group analysis. Based on findings of the study, implications for CCT usage in the organizations are discussed.

KEYWORDS: Cloud computing technology; TAM, Actual usage; Multi-group analysis

INTRODUCTION

Cloud computing is an emerging technology and many organizations are embracing it to meet their computing requirements economically with less maintenance efforts. Cloud technology includes cloud computing and mobile cloud computing. Cloud computing is a technology that extends its services to the users through internet. According to Marston et al. (2011), cloud computing technology (CCT) as a service based technology that assimilates both hardware and software dispersed through a network on demand irrespective of time and location. It provides a flexible and highly scalable platform for business operations by outsourcing fractional or full information technology (IT) operations (Armbrust et al., 2010). By emphasizing the implication of cloud computing for practitioner and academics, Wang et al. (2011) considered cloud computing as a low-cost commodity which can be retrieved by many businesses and individual customers. CCT comes with

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three types of service models -Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). SaaS allows the particular application runs on the cloud in the absence of installation and running of the same on a client computer; In PaaS, the suitable platform is provided through cloud to develop and deploy applications without procuring and managing the related hardware and software; and IaaS provides complete IT infrastructure like storage and other computing resources like server, hardware, software, network etc. as a service on cloud (Marston et al, 2011).CCT comes with four types of deployment models - public, private, community and hybrid cloud. Public cloud is an economical way to deploy IT solutions by cloud service provider through internet; whereas a private cloud is managed within the organization with security features; a community cloud is shared by a common community of organizations with common interests; and a hybrid cloud model is a blend of both public and private deployment models(Marston et al, 2011).According to Forrester Research report (2016), 79 percent of Indian companies have already adopted or planning to adopt cloud computing within the organization and 89% of these companies believe that cloud computing is suitable for their organization. CCT offering new opportunities for Indian companies internationally as well as locally as per Salesforce.com.

CCT also comes with several issues related to security, privacy and reliability issues irrespective of its several uses and promises According to Truong (2009), security is a vital challenge of CCT because protecting confidential and sensitive information is difficult on a public cloud. Constant and high speedy internet connectivity is another notable obstacle for CCT (Lin and Chen, 2012). Switching over to another cloud service provider is difficult because of poor standardization of application program interfaces and platform technologies, hence lack of interoperability can become as barrier for firms to adopt CCT (Armbrust et al., 2010).According to Marston et al. (2011), the biggest factor that will hinder adoption of cloud computing are data privacy, data access to audit requirements and data location requirements at local, national and international level. As per Aleem et al. (2012) suggestions, security, governance and a lack of control over service availability are the topmost concerns of organizations. They also reported that data loss and leakage as the topmost threat to CCT, followed by controlling of account, service and traffic. Adjei (2015) found that trust as an essential factor for CCT adoption by financial institutions and growth of trust depends on cloud service provider's honesty towards users' interest.

Data security and lack of control on IT infrastructure are the primary concern of chief information officers (CIOs) in India irrespective of challenges and business risks involved in cloud computing (Rautrupam, 2013). Rautrupam (2013) found that CIOs are aware about opportunities and benefits of CCT to business and

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reported that more than 70 percent of CIOs are ready to adopt it in the near future. International information corporation (IDC) predicted that CCT adoption will increase about $3.5 billion market in India by 2018. Considering the risks, benefits and also usefulness related to cloud computing, this study motivated on analyzing usefulness and actual usage of CCT in the organization by investigating various other factors like perceived ubiquity, perceived cost, perceived benefit, perceived risks, perceived ease of use and job relevance.

There are numerous theories and models projected to elucidate the adoption of technology in an organization. Technology acceptance model (TAM), theory of reasoned action (TRA), technology-organization-environment (TOE) model, Resource Based View (RBV) theory and diffusion of innovation (DOI) model are some of the theories that are used in this direction. Organization-level IT adoption was addressed by TOE, DOI and RBV theories. Individual-level IT adoption was addressed by TAM and TRA theories and models. According to Venkatesh et al. (2003), TAM is highly cited and most prominent model for understanding user acceptance of IT. Most of the previous studies related to user acceptance of cloud computing based on TAM focused on cognitive and personal traits related factors that influence cloud computing adoption (Wu, 2011; Behrend et al., 2011; Obeidat and Turgay, 2012; Aharony, 2015; Arpaci, 2017). This study is highly motivated to include both cognitive and technological factors in analyzing actual usage of cloud computing. According to Venkatesh and Davis (2000), cognitive factors focus on perception of an individual on the match between job related works and the consequences of performing the tasks using a system in the workplace. Technological factors deal with the characteristics of the technologies that can affect the adoption process (Tornatzky et al, 1990).This study used an extended TAM model to analyze post adoption perceptions of managers and to examine how cloud computing experience forms their cloud computing usage behavior. This study also explores that how age and experience of managers affect the factors influencing actual usage of cloud computing in the organizations.

LITERATURE REVIEW

Davis and Olson (1985) highlighted that any technology adoption in the organization can be viewed as support for business activities through usage of tools and techniques pertinent to that technology. TRA and TAM are the two renowned models proposed to assess the technology adoption at an individual level in the area of information research. These models are used to determine the factors that influence individual adoption and usage behavior within organizations. Roger's diffusion of innovation theory i.e. DOI of Rogers (1995) and TOE of Tornatzky et

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al (1990) have been widely incorporated to the studies related to adoption and diffusion of technology in organizations. The present study is intended to examine actual usage of cloud computing at individual level.

Technology acceptance model originate from TRA proposed by Fishbein and Ajzen (1975). According to this theory, behavioral intentions to perform action determine individual behavior, that is, individuals' subjective probability of performing a behavior. Davis et al (1985) developed TAM based on TRA by replacing many of the measures of attitude of TRA with the two measures of acceptance of technology- perceived ease of use and perceived usefulness. He proposed system use as a response that can be predicted or explained by user motivation, which is directly influenced by an external stimulus consisting of actual system's features and capabilities.

The extended versions of TAM were developed to address various concerns related to different technologies.TAM2 of Venkatesh and Davis (2000) is an important extension to base TAM. By highlighting the limitation of TAM in explaining the reasons for which a person would perceive a system useful, they proposed some additional variables as factors of perceived usefulness. They considered subjective norm, voluntariness and image under social influence processes and job relevance, output quality, result demonstrability and perceived ease of use under cognitive influence processes. Venkatesh (2000) proposed another significant extension to TAM by incorporating factors of perceived ease of use. He found two main groups of factors for perceived ease of use – anchors and adjustments. Anchors included computer self-efficacy, perception of external control, computer anxiety and computer playfulness, whereas adjustments included perceived enjoyment and objective usability. Anchors were based on general beliefs about the systems and system usage, whereas adjustments were the beliefs formed after having direct experience with the system. Another important extension of TAM was carried out by Venkatesh and Bala (2008), which is referred to as TAM3. They intended to suggest an incorporated model of factors of perceived usefulness and perceived ease of use, empirically validate the model, and make use of the model as a facilitator to recommend future research directions on interventions. These interventions were based on factors of perceived usefulness and perceived ease of use in order to help managers make efficient decisions about application of interventions for the successful use of new ITs.

TAM was initially developed to predict initial adoption of a new IT after a very short interaction with a system. It is also used to explain and predict future user behavior. This pre-adoption situation was prevailing in the works of Davis (1989) on wordprocessor, Szajn (1995) on e-mail system, Venkatesh and Davis (1996) on

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graphics systems, Venkatesh (1999) on virtual workplace system, Venkatesh and Davis (2000) on a proprietary IS, and Venkatesh and Morris (2003) on a data retrieval system, where TAM was used to predict the behavioral intention of user in the future. TAM was applied to examine adoption intentions of the user after IT was already adopted and was in use (Karahanna et al., 1999; Taylor and Todd, 1995). TAM was extended further and used in post-adoption situations by Bhattacherjee (2001). Taylor and Todd (1995) examined usage intentions of a computing service facility by the students that had already been widely used by many of them. Davis (1989)studied adoption of an e-mail system and a text editor by the IBM employees that were already in use in the organization at the time of study. Lederer et al. (2000) studied the active newsgroup users with the TAM framework. Similarly, Konana and Balasubramanian (2005) applied TAM to investigate the online investing adoption based on interviews and a survey of experienced online investors. According to Hong et al. (2006), in the situations where the users had been using the technology for an extended period, these studies in reality examined experienced users' continuance intention to use and actual usage of the technology.

Cloud computing adoption model

Numerous authors (Truong, 2009; Dwivedi and Mustafee, 2010; Low et al., 2011; Garrison et al., 2012; Lin and Chen, 2012; Gupta et al. 2013; Alshamaila et al.2013; Oliveira et al., 2014; Hsu et al., 2014; Doherty et al., 2015; Gangwar et al., 2015; Gutierrez et al., 2015; Yigitbasioglu, 2015; Li et al., 2015; Senyo et al., 2016) studied adoption of cloud computing at organizational level with the help of theories of TOE, DOI, Resource Based View (RBV), Human-Organization-Technology fit (HOT-fit).This study is intended to examine the cloud computing adoption at individual level.

TRA and TAM and its extensions are helpful in developing models related to individual's adoption of cloud computing. Benlian and Hess (2011) examined into the risks and opportunities associated with adoption of SaaS in the perspective of IT executives within adopter and non-adopter firms by using TRA as theoretical model. They stated that IT executives' overall risk perceptions were influenced by security threats that were the dominant factors for both adopters and non-adopters of SaaS and also found cost advantage as the most important factor regarding opportunities of SaaS. Wu (2011) established an explorative model to examine the adoption of SaaS with a total of eight constructs- Media Influence (MI), Social Influence (SI), Perceived Benefits (PB), and Attitude toward Technology Innovations (ATI), PU, PEOU, and BI by using TAM-diffusion theory model and used PLS path modeling to test the hypotheses. Their results showed that PU and

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PEOU are the two key factors of BI. Behrend et al. (2011) examined a sequence of factors and outcomes that influence cloud computing adoption in urban and rural community colleges of higher education with the help of a path analytic model based on TAM3. They found perceived usefulness influences the ability of students to travel to campus and perceived ease of use influences direct experiences with the platform and instructor support. It was understood that cloud computing usage influences ease of use perceptions and accessibility to alternative tools and perceived ease of use perception was a much stronger factor of adoption than the perceived usefulness. Wu et al. (2013) used the duo-theme decision making trial and evaluation laboratory (DEMATEL) with TAM in developing an evaluation framework and analyzing the root causes that hinder the internal cloud computing acceptance in a Taiwan university.

Obeidat and Turgay (2012) applied the Social Exchange Theory into TAM for formulation and validation of Technology Trade Theory (Triple-T) model that can be used to evaluate cloud computing adoption. They found that cloud computing adoption takes place when there is a sense of balance of cloud benefits over costs and adoption of cloud computing should take place in order to improve the overall performance of the firms that originate from cloud benefits, such as cost reduction, time and space efficiencies, automation, flexibility, scalability and output quality.

From the perspective of librarians and information specialists, Aharony (2015) made an exploratory study using TAM to examine the factors that may influence librarians and information specialists in making decision to adopt cloud computing in their organizations. Their results showed that personal characteristics were the major influencing factors. From the perspective of IT executives, Lal and Bharadwaj (2016) applied TAM to examine the factors that influence the adoption of cloud computing and its impact on the organizational flexibility. They informed that cloud computing provided relative advantage in terms of scalability, accessibility, and deployment of service on demand and the factors of easy to use interface, experience, and cloud service provider expertise and top management support had a significant positive effect on the decision of cloud computing adoption. Sabi et al. (2016) assimilated DOI with TAM to examine the tendency of users who are experts and responsible for decision making in the universities of sub-Saharan Africa to make recommendations in adopting cloud computing based on the variables of PU and PEOU. They found that addition of socio-cultural factors provided a more significant assessment of the motivation of universities in the adoption of cloud computing. By extending TAM, Sharma et al. (2016) integrating three external variables of computer self-efficacy, trust, and job opportunity to evaluate the factors that influence cloud computing adoption by IT professionals. Their results indicated that computer self-efficacy, perceived usefulness, trust,

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perceived ease of use, and job opportunity are the best predictors of cloud computing adoption.

Arpaci (2017) examined the antecedents and outcomes of cloud computing adoption in education to attain knowledge management (KM) through the application of TAM as base model. He examined the causal relationship between the expectations for KM practices and the perceived usefulness of cloud computing services and the causal relationships among innovativeness, training and education, and PEOU. It was found that the expectations for knowledge storage and sharing had a stronger relationship with the perceived usefulness than other KM practices. It was also found that innovativeness and training and education were significantly related to the ease of use perceptions. Asadi et al. (2017) investigated the factors influencing cloud computing adoption in the banking sector from the customer's perspective and developed a model based on TAM-diffusion theory model. Their results showed that trust, cost, security and privacy constructs had a strong positive influence on perceived usefulness, perceived ease of use, and trust. Their study also concluded that perceived usefulness, perceived ease of use, cost, attitude towards cloud and trust significantly influence user's behavioral intention to adopt cloud computing.

None of the earlier studies used TAM to examine the factors that influence actual usage of cloud computing in the firms. Earlier studies were not tested the moderating effect of age and experience on factors influencing cloud computing adoption.

HYPOTHESES AND RESEARCH MODEL

This study is intended to examine the factors that influence actual usage of cloud computing in organizations, by applying the extended TAM approach. In addition to the two major factors of TAM (perceived usefulness and perceived ease of use), this study included some additional factors, such as, perceived ubiquity, perceived costs, perceived benefits and perceived risks. This study also examined the factors like perceived ease of use and job relevance that influence perceived usefulness of cloud computing. While developing hypotheses and a theoretical research model to test, all these variables have been considered as separate constructs that take part in the model.

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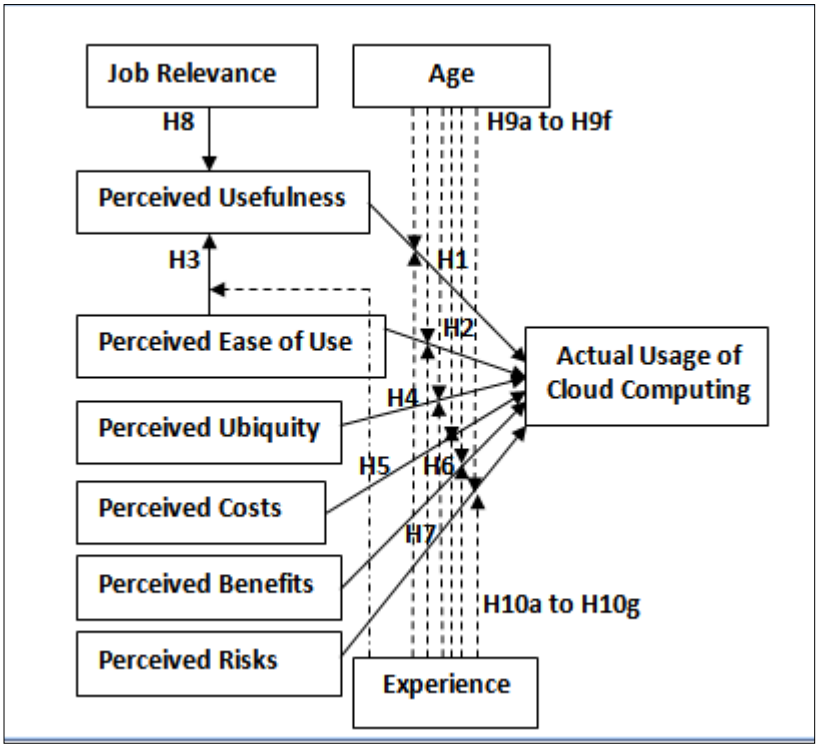
Figure 1. Research Model



As discussed by Davis (1989) and Adams et al. (1992), ease of use and usefulness are thought to be potentially important determinants of system use. This is also consistent with the views of Rogers (1995) claims that adoption is a function of a variety of factors, including relative advantage and ease-of-use of the innovation. Krahanna and Straub (1999) also found that system use is affected by perceived usefulness which is, in turn, affected by perceptions of the ease-of-use of IT.

H1: Perceived usefulness positively influences actual usage of cloud computing.

Many researchers found that perceived ease of use has a significant influence on actual usage (Adams et al., 1992; Davis, 1989). According to Davis (1989), perceived ease of use had a significant effect on current and future system usage. The findings of Behrend et al. (2011) also showed that perceived ease of use is significantly related to usage of CCT by students. Therefore it is hypothesized that there is positive influence of perceived ease of use on actual usage of cloud computing.

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H2: Perceived Ease of Use positively influences actual usage of cloud computing.

According to Davis (1989), perceived ease of use has a significant direct influence on perceived usefulness. When there are two systems performing the same set of functions, the user should opt the system that is easier to operate and more useful. Therefore, perceived ease of use may have a positive influence on perceived usefulness in cloud computing adoption.

H3: Perceived Ease of Use positively influences Perceived Usefulness.

The concept of perceived ubiquity came into existence in 2002 (e.g., Balasubramanian, Peterson, and Jarvenpaa 2002; Barnes 2002b; Watson et al. 2002) majorly from the information systems perspective. Junglas and Watson (2006) popularized the concept of ubiquity in electronic commerce. They proposed a world where commercial activities are facilitated through wireless technology and would enable user to overcome barriers of time, space and device while performing commercial activities. Access of cloud computing does not have any geographical boundaries and hence it can be accessed anywhere and at any time. Cloud computing can help users overcome physical hassles in carrying devices along with interfaces to access needful information systems and applications. Therefore it can be hypothesized that perceived ubiquity has an effect on actual usage of cloud computing.

H4: Perceived Ubiquity positively influences actual usage of cloud computing.

Pagani (2004); Wu and Wang (2005) found that perceived cost was found to be a significant antecedent to actual usage of mobile commerce. According to Lian et al (2014), to establish a platform for cloud computing, it requires investments in hardware, software and systems integration and therefore cost play an important role in the organizations to decide on cloud computing adoption. Therefore, it can be hypothesized that perceived cost has an effect on actual usage of cloud computing.

H5: Perceived Costs influences actual usage of cloud computing.

Rao et al. (2007) found that perceived benefit is an important determinant of actual usage. In case of cloud computing, perceived benefits refer to operational benefits that are expected from a firm from its adoption such as mobility, efficient reduction of costs of computing, easy installation and maintenance and easy analysis of data over internet (Armbrust et al., 2010; Hsu et al., 2014). Perceived benefits of cloud computing represent cost reduction, scalability, portability, as well as reduced

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software and hardware obsolescence (Ross and Blumenstein, 2013). Therefore perceived benefits may have a positive effect on actual usage of cloud computing.
H6: Perceived Benefits positively influence actual usage of cloud computing.

Perceived risk has been defined as the consumer's perceptions of the uncertainty and the possible undesirable consequences of using the system (Lee 2005). In case of cloud computing, public clouds raise data ownership and intellectual property (IP) right issues because data may be stored offshore in multiple locations and/or shifted from one location to another without the knowledge of the client. (Ross and Blumenstein, 2013). According to Truong (2009), security, privacy and data integrity are the concerns that make firms hesitant in adopting cloud computing technology. Therefore perceived risks may have a negative effect on actual usage of cloud computing.

H7: Perceived Risks negatively influence actual usage of cloud computing.

According to Venkatesh and Davis (2000), job relevance is the degree to which an individual believes that the target system is applicable to his or her job. Venketesh and Davis (2000) and Venketesh and Bala (2008) found that job relevance as one of the determinant of perceived usefulness. Hence it can be hypothesized job relevance has an effect on perceived usefulness.

H8: Job relevance influences perceived usefulness.

Moderating Effect of Age

Earlier researchers (Chung et al., 2010; Venkatesh et al., 2003; Wang et al., 2003) suggested that age is an important demographic variable that has direct and moderating effects on behavioral intention, adoption, and acceptance of technology. Chung et al, (2010) and Phang et al. (2006) had considered that the inclusion of age as a moderator would increase the explanatory power of a TAM. EUROSTAT (2011) reported that younger users are least affected by acceptance problems, unlike older users.

Venkatesh et al. (2003) also reported that age was an important moderator within their UTAUT model. They found that the relationship between performance expectancy (similar to PU) and BI was stronger for younger employees as they will give greater weightage to extrinsic rewards (i.e. perceived usefulness), which in turn motivate them to use the new system. On the other hand, older users will be more influenced by the opinion of others (Sun and Zhang, 2006; Venkatesh et al.,

2003). Therefore it is hypothesized there is moderating effect of age on the relationship between perceived usefulness and actual usage.

H9a: Age moderates the relationship between perceived usefulness and actual usage.

Morris et al. (2005) found that ease of use may be a most important factor for older users who may be less confident in their ability to use technology.

H9b: Age moderates the relationship between perceived ease of use and actual usage.

Several earlier studies have focused on the study of the moderating effect of age on technological change. Different perspectives suggest that older workers do not adapt well to changing technology. A first explanation for this is that cognitive skills are lost with age (Touron et al. 2004), as are the skills to acquire new technical skills (Czara et al. 2008; Korupp and Szydlik 2005). Moreover, the willingness and ability of older workers may impede technological change and innovation. Older workers are less flexible to change and less likely to adopt new technologies than young workers (Aubert et al. 2006). Technological innovations are like barrier to older workers to adopt and use of the technology (Shih-Yung and Pearson 2011). Loss of technological skills, the lack of adaptation to change, and the age of the entrepreneur determine the actual usage of the technology for older workers in the firms (Aubert et al. 2006).Therefore, it is hypothesized that the impact of technological influence processes like perceived ubiquity, perceived costs, perceived benefits and perceived risks on actual usage of cloud computing will be moderated by age of the managers.

H9c: Age moderates the relationship between perceived ubiquity and actual usage.
H9d: Age moderates the relationship between perceived costs and actual usage.
H9e: Age moderates the relationship between perceived benefits and actual usage.
H9f: Age moderates the relationship between perceived risks and actual usage.

Moderating Effect of Experience

Saeed et al. (2008) and Karahanna et al. (1999) found that the relationship between relative advantage (similar to usefulness) and post adoption IS usage is stronger for user's with higher level of experience.

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H10a: Experience moderates the relationship between perceived usefulness and actual usage.

Experience will moderate the effect of perceived ease of use on adoption such that the effect will be weaker with increasing experience. Perceived ease of use means that how easy or difficult a system is to use (Venkatesh, 2000). However, once individuals get familiarized to the system and gain practical experience with the system, the effect of perceived ease of use on adoption will draw away into the background. Consequently, experienced users will place less importance on perceived ease of use while adopting the system.

H10b: Experience moderates the relationship between perceived ease of use and actual usage

According to Davis and Venkatesh (2004) and Venkatesh and Davis (2000), perceived usefulness and perceived ease of use are considered high-level and low-level actions respectively. They suggested that, with increasing experience, the influence of perceived ease of use (a low-level action) on perceived usefulness (a high-level action) will be stronger as users will be able to form an opinion of their possibility of achieving high-level goals (i.e., perceived usefulness) based on information achieved from experience of the low-level actions (i.e., perceived ease of use).For example in the context of a word processing software use, a high-level action can be writing a high quality report and a low level action can be use of a specific feature of the software (Davis and Venkatesh, 2004).

H10c: Experience moderates the relationship between perceived ease of use and perceived usefulness.

Fishbein and Ajzen (1975) state that an individual's positive experience with a given item in the past will have a decisive impact on current behavior toward that item. Users with more IT experience will find that the risk associated with the adoption of the technology will reduced, and thus it improve their perception of usefulness and motivates their actual usage over time (O'Cass and Fenech, 2003; Brynjolfson and Smith, 2001). Several authors (Burton et al., 2000; Castaneda et al., 2007; Citrin et al., 2000; Hsu et al., 2007; Liao and Cheung, 2001; Miyazaki and Fernández, 2001) observed that individuals with previous experience in online purchasing will be more likely to buy products online, motivated by higher expected benefits and fewer difficulties with the online media (Dholakia and Uusitalo, 2002). It has been shown that the adoption of e-commerce (Kwak et al., 2002) and mobile services (Ristola, 2010) is influenced by the previous experience of individuals with the internet, which, in turn, improves their actual usage

(Niemelä-Nyrhinen, 2009). Therefore, in this study experience has been taken as moderator that moderates the impact of technological influence processes such as perceived ubiquity, perceived costs, perceived risks and perceived benefits on actual usage of technology.

H10d: Experience moderates the relationship between perceived ubiquity and actual usage.
H10e: Experience moderates the relationship between perceived costs and actual usage.
H10f: Experience moderates the relationship between perceived benefits and actual usage.
H10g: Experience moderates the relationship between perceived risks and actual usage

RESEARCH METHODOLOGY

Survey Instrument

The proposed research model consists of 8 constructs and a total of 31 items or indicators. The measurement scales for all the constructs adapted from previous studies are widely recognized and used. A questionnaire has been developed to collect data relevant to the study. There are two parts in the questionnaire. First part consists of demographic profile of managers such as age, gender and overall experience. Second part consists of questions/items related to the constructs under study. To measure the construct of perceived usefulness, the three items of usefulness, efficiency, effectiveness, and performance, as reported by Davis (1989) and Venkatesh and Davis (2000), have been transformed into three meaningful questions. Similarly the six items of perceived ease of use as reported by the above authors have been transformed into the respective questions under the construct specified. The three measures of the construct, Job Relevance, as adopted from Venkatesh and Davis (2000) have been converted into three questions. All the specified literature sources are linked to technologies other than cloud computing and hence the measures adopted from such studies have been modified, so as to reflect a cloud computing context.

In the present work, to measure the dependent variable, actual usage, three questions were developed based on the three items, namely, longevity, intensity, and frequency of use, as reported by Davis (1989). Similarly, three questions have been developed to measure perceived ubiquity of cloud computing by using the three items of providing communication and network accessibility, anytime-and-

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anywhere communication and connectivity, and using technology for personal and business purposes, adopted from Kim and Garrison (2009). In the same way, following the research report of Hsu et al. (2014), three items of perceived benefits and seven items of perceived risks have been transformed into same number of meaningful questions. The above scales of measurement were found applicable to cloud computing and they have been adopted without any changes in this study. Following the reports of Premkumar and Roberts (1999) and Kuan and Chau (2001), the three measures of the construct of Perceived Costs (set-up, training and running/maintenance of software and hardware) have been transformed into three relevant questions in this study. All the items of measures are shown in the appendix.

Sample selection

In the present study, there are 31 items included in the measurement instrument. The sample population aresenior managers (CIO, IT manager and other senior staff) of cloud computing adopter firms in India,who are responsible for making IT decisions in the organizations and at least two years of experience in using cloud computing.The respondents are selected from the database of a project consultancy company, NIIR (National Institute of Industrial Research), which includes 7448 of SMEs and large firms of India. These firms belong to the sectors of IT, service, manufacturing, finance and telecommunication. The selection of these industries is in accordance with the CIO report (2010) that these industries have high cloud computing adoption rate. The locations of the companies are Hyderabad, Bangalore, Mumbai, Chennai and Delhi. This study used the survey instrument to gather data from these organizations. Simple random sampling was performed to select the sample from the sampling frame. Questionnaires were sent to 1000 senior managers of the adopter firms. Out of 1000, only 550 responses were obtained. 12 questionnaires had missing values so final sample size came down to 538.Table 1 shows the demographic information of the respondents. Table 2 shows the demographic information of the firms.

Table 1. Demographic Profile of Respondents

Age Groups:	**Respondents**
25-30	265
30-40	178
40-50	72
>50	23

Gender:	**Respondents**
Male	464
Female	74
Overall Experience:	**Respondents**
2-5 years	138
5-10 years	293
10-15 years	65
>15 years	42

Table 2. Firm's data of respondents

Types of Industry	**Number of firms**
IT	270
Services	145
Finance	44
Manufacturing	36
Others (Pharmaceuticals, Telecommunications, Retail)	43
Firm Size	**Number of firms**
Small	149
Medium	49
Large	340
Organizational Structure	**Number of firms**
Simple	215
Hierarchical	229
Functional	41
Others (Matrix and Divisional)	53

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Data analysis techniques

The data collected as per the survey instrument developed and from the sample selected should be processed and analyzed with the help of suitable statistical techniques. This study used two important statistical techniques - Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) for data analysis. SEM comprises two important stages – Confirmatory Factor Analysis (CFA) and Path Analysis. When there is very less a priori knowledge of structural model developed, it is best to conduct EFA before proceeding to CFA (Ruscioand Roche, 2012). So an initial EFA was performed to test the fundamental structure of the factor. Then CFA was performed to examine construct reliability and validity and also to evaluate the goodness of model fit. Finally, path analysis has been applied to examine the proposed hypotheses and also to assess the structural model fit. SPSS 20 and AMOS 20 applications were used for EFA and SEM.

RESULTS

In this study, the KMO value is derived as 0.878, which is in the acceptable range. This result reveals adequacy of data to perform factor analysis. Bartlett's test produced a significant test result by rejecting the null hypothesis. Hence the observed correlation matrix is statistically different from a singular matrix, confirming the existence of linear combinations. The factor analysis with PCA is performed to assess construct validity. According to Hair et al. (2010), all the primary factor loadings with values greater than 0.5 without cross-loadings establish fit between the items and their constructs. In this study, a total of eight factors are extracted with factor loadings above 0.5 and without cross-loadings. This result indicates satisfactory factor loadings with all the used items. In PCA, it is assumed that the factors can account for total variance of the variables. In this study, overall 8 clear factors are extracted from the exploratory factor analysis that accounted for explaining 77.99 % of the variance. In PCA, the first factor always explains the maximum variance followed by other factors. The first factor accounted for 16.055% of the variance, which is greater than all the other factors. Common method bias was checked through Harman's one-factor test which showed that nine factors are present and the covariance explained by one factor in the dataset was 28.316%. This indicates that common method bias is unlikely a problem in this study. Multicollinearity check was done using SPSS by examining tolerance and the Variance Inflation Factor (VIF) where it was found the tolerance values are greater than 0.1 and VIF are greater than 1 and less than 10.

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Results of Confirmatory Factor Analysis (CFA)

This study applied SEM in two ways – CFA of the measurement model and path analysis of the structural model. CFA is used for validation and reliability checks. This study conducted the validation check of the measurement model by examining reliability, convergent validity, and discriminant validity. It also analyzed the model fit indices. The four items PR1 to PR4 of the construct perceived risks were eliminated from the study as their standardized factor loadings were very low compared to other items (0.427, 0.548, 0.511, and 0.415).Confirmatory factor analysis of the measurement model was done with remaining 27 items. Construct reliability (CR), convergent and discriminant validity were checked. Composite reliability values are used to determine internal consistency of observed variables and to check construct reliability. Table 3 presents the results derived for CR, AVE along with factor loadings and Cronbach's alpha. All the CR values were found above 0.7 as recommended by Hair at al. (2010). According to Fornell and Larcker (1981), standardized factor loadings and AVE are used to assess convergent validity. Both standardized factor loadings and AVE should be above 0.5 to ensure convergent validity (Fornell and Larcker, 1981; Wixom and Watson, 2001; Hair et al., 2010). The results of CFA show that that all standardized factor loadings are above 0.5. All the constructs have AVE values above 0.5, hence it satisfy the criteria of adequacy of discriminant validity as recommended by Chin (1998). It can be observed that the square root of variance distributed between a construct and its items is more than the correlations between the constructs hence; it establishes discriminant validity as recommended by Fornell and Larckers (1981). As shown in Table 4, all diagonal AVE values exceed the squared correlations between the constructs and hence, the results established discriminant validity of the measurement model.

Table 3. Construct Reliability and Convergent Validity

Constructs	Items	Factor loadings	Composite Reliability (CR)	AVE AVE= $\sum \lambda^2/n$	Cronbach's Alpha
Perceived Usefulness	PU1	0.877	0.91	0.78	0.91
	PU2	0.902			
	PU3	0.862			

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Perceived Ease of Use	PEOU 1	0.874	0.94	0.74	0.94
	PEOU 2	0.819			
	PEOU 3	0.854			
	PEOU 4	0.832			
	PEOU 5	0.887			
	PEOU 6	0.895			
Perceived Ubiquity	PUB1	0.825	0.89	0.74	0.89
	PUB2	0.904			
	PUB3	0.846			
Job Relevance	JR1	0.757	0.81	0.58	0.81
	JR2	0.777			
	JR3	0.755			
Perceived Benefits	PB1	0.785	0.86	0.68	0.83
	PB2	0.925			
	PB3	0.757			
Perceived Risks	PR5	0.942	0.95	0.85	0.95
	PR6	0.915			
	PR7	0.913			
Perceived Costs	PC1	0.755	0.85	0.65	0.85
	PC2	0.84			
	PC3	0.821			
Actual Usage	AU1	0.824	0.87	0.70	0.87
	AU2	0.837			
	AU3	0.847			

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Table 4. Discriminant Validity

S.No.	Constructs	1	2	3	4	5	6	7	8
1	Perceived Usefulness	**0.78**							
2	Perceived Ease of Use	0.18	**0.74**						
3	Perceived Ubiquity	0.22	0.24	**0.74**					
4	Job relevance	0.10	0.13	0.21	**0.58**				
5	Perceived Benefits	0.56	0.02	0.13	0.05	**0.68**			
6	perceived Risks	0.04	0.18	0.02	0.05	0.08	**0.85**		
7	Perceived Costs	0.08	0.09	0.06	0.05	0.04	0.03	**0.65**	
8	Actual Usage	0.21	0.20	0.35	0.18	0.14	0.05	0.05	**0.7**

Note: Diagonal values are AVE values.

The most important aspect of CFA is to examine goodness of fit of a model. The overall goodness of fit is assessed using χ^2 test. The goodness of fit statistics is reported in Table 4. A value less than or equal to 5 for χ^2/df ensures an adequate fit between the model proposed in the study and the sample data (Wheaton et al, 1977). In this study, the value of χ^2/df is derived as 2.30 at $p < 0.001$ which can be well accepted. For the incremental fit indices of NFI, CFI, TLI and IFI, Hu and Bentler (1999) reported that a value of 0.90 or above indicates acceptable model fit. In the present study, the derived values of NFI, RFI, IFI, TLI and CFI are 0.939, 0.928, 0.965, 0.958 and 0.965 respectively as shown in Table 5. All these values are above 0.90, hence fall in the acceptable range. This study derived RMSEA as 0.049, which is in good agreement with the ranges of values reported by Hair et al. (2010) and Byrne (2001).

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Table 5. Model Fit Indices for the measurement model

Model Fit Indices	Recommended Value	Observed Value
I. **χ2/df**	<3 (Mclver and Carmines, 1981)	2.30
(χ2 = 2504.635; df = 638)	<5 (Bagozzi and Yi, 1988, Hair et al., 2010)	
II.**Baseline Comparisons**		
NFI **RFI** **IFI** **TLI** **CFI**	>=0.9 (Schumacker and Lomax, 2010), > = 0.9, or Near 0.9 (Ho, 2006)	0.939 0.928 0.965 0.958 0.965
III. **RMSEA**	<=0.08 (Byrne, 2001)	0.049

Results of Structural Equation Modeling (SEM)

The hypotheses of the research model were tested with two structural equation path models using AMOS version 20. The first model involved testing H1–H8 with the full sample (N = 538). Another model involved testing the hypotheses related to the moderating effect of age and experience i.e. H9a to H9f and H10a to H10g. To test the moderating effect, the total sample was divided into two groups based on age and experience. This study divided the entire sample into two subgroups according to age and experience that are two age groups of less than 30 and more than 30 years and two experience groups of less than 8 and more than 8 years. The entire data set was split into, respectively, 265 and 273 cases.

The result showed that squared multiple correlation orR^2 value of 'Perceived Usefulness' is derived as 0.226. This indicates that the antecedent, 'Perceived Ease of use' and 'Job Relevance' explain 22.6% of the variance of 'Perceived Usefulness'. The R^2 for the construct 'Actual Usage' is 0.439. This means that the six antecedents, namely, 'Perceived Ease of use', 'Perceived Usefulness', 'Perceived Ubiquity', 'Perceived Benefits', 'Perceived Risks' and 'Perceived Costs' explain 43.9% of the variance of 'Actual Usage'. Based on the significance of the β (standardized coefficients) values, supported hypotheses can be determined. The un-standardized estimates of each structural path and the loadings

of the items on the respective constructs are tested for their significance. As shown in the Table 6, it can be observed that out of eight hypotheses, six are supported at $p < .01$ significance level.

Table 6. Hypotheses Tested

Hypothesis	Statement	Standardized coefficients (β values)	P Values	Result
H1	Perceived Usefulness → Actual Usage	0.057	***	Supported
H2	Perceived Ease of Use → Actual Usage	0.042	0.268	Not Supported
H3	Perceived Ease of Use → Perceived Usefulness	0.037	***	Supported
H4	Perceived Ubiquity → Actual Usage	0.051	***	Supported
H5	Perceived Costs → Actual Usage	0.039	0.604	Not Supported
H6	Perceived Benefits → Actual Usage	0.050	***	Supported
H7	Perceived Risks → Actual Usage	0.039	***	Supported
H8	Job Relevance → Perceived Usefulness	0.057	***	Supported

Moderation model results

The moderating effect of experience and age is also tested through multi-group analysis. This study divided the entire sample into two subgroups according to age and experience that are two age groups of less than 30 and more than 30 years andtwo experience groups of less than 8 and more than 8 years. The entire data set was split into, respectively, 265 and 273 cases. The objective of multi-group simultaneous path analysis is to determine whether the path coefficients for the relationships between perceived usefulness, perceived ubiquity, perceived benefits, perceived risks and actual usage were equivalent across the two age and experience groups. Also the path coefficient between perceived ease of use and perceived usefulness was checked across two experienced groups. SEM results showed that

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perceived costs and perceived ease of use do not influence actual usage of cloud computing, therefore moderating effect of age and experience was checked for other five paths.Chi square(χ^2) difference test was done between constrained and un-constrained models to check whether the two models are different across the two groups or groups are different at the model levels. Then path by path analysis was done using AMOS by placing the constraint on the particular path. If χ^2value of this constraint path is more than the threshold chi-square value then this means that, the particular path or relationship is different across the groups. Table 7 showed theχ^2difference comparison test and provide evidence that there is significantdifference between the two age groups($\Delta\chi^2/\Delta df = 1.74$, $p < .05$) and two experience groups ($\Delta\chi^2/\Delta df = 5.33$, $p < .05$), suggesting significant moderating effects of age and experience. Table 8 shows the results of multi-group comparison test for all the five paths.

Table 7. Structural Equations Results for Moderating Effect Models

Basic Model		χ^2	**df**	**RMSEA**	**CFI**	χ^2**/df**	**P-value**
		1064.1	301	0.069	0.930	3.54	0.001
Unconstrained Model							
Moderating Variable	**Models**	χ^2	**df**	**RMSEA**	**CFI**	$\Delta\chi^2/\Delta$**df**	**P-value**
AGE	Unconstrained Model	1496.5	606	0.052	0.918	1.74	<0.01
	Fully Constrained Model	1540	631				
EXPERIENCE	Unconstrained Model	1539.7	609	0.054	0.909	5.33	<0.01
	Fully Constrained Model	1662.3	632				

Note: P-value denotes the probability that the two groups are significantly different.

The result of multi-group analysis showed that the effect of perceived usefulness on actual usage had relatively higher strength in the young age group (βyoung =

0.068, p-value= <0.01; βolder = 0.063, p-value<0.01). In the same way, the negative effect of perceived risk on actual usage appeared to be relatively stronger in case of older age managers (βyoung = 0.047, p-value= <0.01; βolder = 0.051, p-value<0.01). Similarly the effect of perceived ubiquity, perceived benefits on actual usage had relatively higher strength in case of young mangers. With regard to experience moderating effect, all of the antecedents including perceived usefulness, perceived benefits and perceived ubiquity showed stronger effects on actual usage of cloud computing in case of more experienced group of managers. In terms of the high experienced group, the influence of perceived ease of use on perceived usefulness become stronger (βless_exp = 0.036, p-value<0.01; βmore_exp = 0.038, p-value<0.01). Similarly the negative impact of perceived risks on actual usage of cloud computing appeared to be relatively weaker in more experienced managers (βless_exp= 0.054, p-value<0.01; βmore_exp = 0.053, p-value<0.01).

Table 8. Structural Equations Results for Moderator Hypotheses

Hypotheses	Constrained Paths	Basic Model		Moderating Model							
				AGE				EXPERIENCE			
				AGE GROUP1		AGE GROUP2		EXP GROUP1		EXP GROUP2	
		β Estimates	P value	β Estimates	P value	β Estimates	P value	β Estimates	P value	β Estimates	P value
H9a and H10a	PU → AU	0.041	***	0.068	***	0.063	***	0.069	0.043	0.079	0.006
H10c	PEOU →PU	0.037	***			0.046	***	0.036	***	0.038	***
H9c and H10d	PUB → AU	0.047	***	0.072	***	0.061	***	0.067	***	0.068	0.015
H9e and H10f	PB → AU	0.049	***	0.069	0.006	0.068	0.04	0.036	***	0.038	***
H9f and H10g	PR → AU	0.035	***	0.047	***	0.051	0.002	0.054	***	0.053	***

PU: Perceived UsefulnessPEOU: Perceived Ease of UseAU: Actual UsagePUB: Perceived UbiquityPB: Perceived Benefits PR: Perceived Risks
*** p<0.01 ** p<0.5 * p<0.1

DISCUSSION AND CONCLUSION

This study is first of its kind that has extended TAM in the context of actual usage of cloud computing. It comes out with additional factors (perceived ubiquity, perceived benefits, perceived risks and job relevance) that influence perceived usefulness and actual usage of cloud computing. Another important finding of the study was that perceived cost and perceived ease of use were not found significant in influencing actual usage. The influence of perceived ease of use on actual usage was found insignificant in this study which is in good agreement with the findings

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of Venketesh and Davis (2000) and Venketesh and Bala (2008) in the case of application of TAM2 and TAM3 that effect of perceived ease of use diminishes over time once the user gets acquainted with the system or technology. According to Davis (1989), the effect of perceived ease of use on adoption will move away into the background, because the individuals now gain more technical understanding or experience of using the technology.

The relationship between perceived costs and actual usage was found insignificant. This result is well agreeing with the findings of Kuan and Chau (2001) that perceived cost is not a factor of concern in the case of adoption of technology in large sized firms. In addition, Premkumar and Roberts (1999) found that larger companies have the excess organizational resources to invest in the technologies and so, perceived cost is not a factor of concern for adoption of new technology in these firms. In this study, most of the respondents belong to large-sized firms in India and hence the derived result is well justified. Another possible reason could be given by Premkumar and Roberts (1999) that firms perceiving greater cost effectiveness, i.e. benefits from adoption of new technology greater than the costs, are more likely to be adopters of the technology. In addition, Palvia et al. (1994) pointed out that cost is not a bottleneck for small businesses to adopt new information technologies due to introduction of powerful PC's, rapidly deteriorating hardware and software prices and the availability of end user-friendly software packages. Therefore, perceived cost is no longer a factor of concern for adopting cloud computing technology for small, as well as for large-sized firms.

In case of age as moderator variable, multi-group analysis results showed that the effect of perceived usefulness on actual usage had relatively higher strength in the young age group that was well agreeing with the findings of Venkatesh et al., 2003 that younger users will give greater importance to perceived usefulness while adopting the technology. In case of technological factors, the result also showed that the positive effect of perceived ubiquity, perceived benefits on actual usage had relatively higher strength in case of young mangers which is well agreeing with the findings of Touron et al. (2004); Czara et al. (2008); Korupp and Szydlik (2005) and Aubert et al. 2006 that older workers do not adapt well to changing technology and willingness and ability of older workers may hamper technological change and innovation. The result also showed that the negative effect of perceived risks appeared to be relatively stronger in case of older age managers which is concurrent with the findings of Aubert et al. (2006)the older people have less resistance to change and show less adaptability to new technologies.

In case of experience as moderator variable, multi-group analysis result showed that all of the antecedents including perceived usefulness, perceived benefits and

perceived ubiquity showed stronger effects on actual usage of cloud computing in case of more experienced group of managers which was concurrent with the findings of Kwak et al. (2002); Ristola (2010) and Niemelä-Nyrhinen (2009) that adoption of technology is influenced by the previous experience of individuals with the technology and their familiarity with the benefits and usefulness of the technology, which, in turn, improves their actual usage. The result also showed that the negative impact of perceived risks on actual usage of cloud computing appeared to be relatively weaker in more experienced managers which is well agreeing with the findings of O'Cass and Fenech (2003); Brynjolfson and Smith (2001) that experienced users' perception of risk will decrease over time and which in turn improve their perception of usefulness and finally increase their actual usage over time. In terms of the high experienced group, the influence of perceived ease of use on perceived usefulness become stronger that is well agreeing with the result of Venkatesh and Davis (2000) and Davis and Venketesh (2004) that with increasing experience, the influence of perceived ease of use on perceived usefulness will be stronger as users are more comfortable with the system and able to utilize the technology in different other ways to achieve their goals. In case of cloud computing, if the user become well versed with the cloud computing or finds it easier to use with experience, he or she can utilize, design and customize the cloud services according to the needs of the organization such as data analysis and data storage on cloud simultaneously, application development with the help of software development tools provided by cloud computing etc.

IMPLICATIONS AND LIMITATIONS

This study contains several important implications for managers and the organization as a whole to note and pay attention to specific factors that affect successful adoption of cloud computing. The empirical analysis of data also gives several insights into the contribution and significance of these factors. When a firm either plans or implements cloud computing, it is important to consult the managers who have knowledge and experience in cloud computing. The managers can analyze not only the benefits but also the challenges and business impacts of cloud computing adoption. This study analyzed the data collected from such managers of adopter firms of cloud computing. Hence, the results derived have proper relevance to help the managers.

Since the study found that factor of perceived risks has a negative influence on actual usage of cloud computing, it provides an important managerial insight that the firms should focus more on promoting cloud benefits by ensuring privacy of information and security of data to avoid any risks associated with cloud computing

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adoption. The findings are consistent with the CIO report (2010) that security and privacy are the foremost concern with regard to cloud computing adoption in India. This study demonstrated that most of the large sized firms are currently adopting cloud computing in India, as these firms are economically viable with their mature IT infrastructure and can handle the risks associated with data privacy and security in cloud. The study has also examined the direct influence of perceived usefulness on actual usage as well as direct influence of job relevance on perceived usefulness. This mean that cloud computing technology is capable of supporting the set of tasks of a manager's job in the organization. Therefore, based on the job, the suitable application available in the cloud can be accessed and used by the user. In addition, cloud providing firms should develop a cloud computing paradigm with job relevance in mind.

The results can benefit the senior managers of organizations in the successful cloud computing adoption in their organizations by understanding significance of different cognitive (perceived usefulness, perceived ease of use and job relevance) and technological factors (perceived ubiquity, perceived benefits and perceived risks) that influence actual usage of cloud computing. From results of this study, IT professionals and managers are able to understand that in future, cloud computing adoption is affected by job relevance, benefits and risks such as reliability, privacy and security. Hence, this study will also help the senior managers to take corrective decisions and actions in implementing and adopting cloud computing in the organization. The present study suggests that managers should have the goal of not just making use of the system, but to motivate employees to make use of the cloud computing system. This study suggests that the managers should present a conversion plan for the employees to shift from legacy system to cloud computing paradigm along with the implementation of a training program for the users wherever necessary. In addition, cloud providers should develop a cloud computing paradigm with job relevance in mind so that it will be capable of supporting the set of tasks performed by a manager in the organization.

In spite of drawing significant results and implications, this study has some limitations in terms of geographical locations, sample population and mediating effects of other factors. The research was conducted in India, particularly in the metropolitan cities like Hyderabad, Bangalore, Chennai, Mumbai and Delhi and thus it might not a true representation of the suitable population of India. Hence the future research may be directed to enhance the sample size by covering all the metropolitan cities of India proportionally. Another limitation is that this study reveals the situation of cloud computing adoption in India only. To enhance its scope and validity of its results, the sample size should include other countries which are active in cloud computing adoption.

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REFERENCES

Adams, D. A., Nelson, R. R., and Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: A replication. *MIS quarterly*, 227-247.

Adjei, J. K. (2015). Explaining the role of trust in cloud computing services. *info*, *17*(1), 54-67.

Aharony, N.(2015). An exploratory study on factors affecting the adoption of cloud computing by information professionals. *The Electronic Library*, 33(2), 308-323.

Aleem, A., and Ryan Sprott, C. (2012). Let me in the cloud: analysis of the benefit and risk assessment of cloud platform. *Journal of Financial Crime*, *20*(1), 6-24.

Alshamaila, Y., Papagiannidis, S., and Li, F. (2013). Cloud computing adoption by SMEs in the north east of England: A multi-perspective framework. *Journal of Enterprise Information Management*, *26*(3), 250-275.

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A. andZaharia, M. (2010). A view of cloud computing. *Communications of the ACM*, 53(4), 50-58.

Arpaci, I. (2017). Antecedents and consequences of cloud computing adoption in education to achieve knowledge management. *Computers in Human Behavior*, *70*, 382-390.

Asadi, S., Nilashi, M., Husin, A.R.C. and Yadegaridehkordi, E. (2017). Customers perspectives on adoption of cloud computing in banking sector. *Information Technology and Management*, 18(4), 305-330. https://doi.org/10.1007/s10799-016-0270-8

Aubert, P., Caroli, E., and Roger, M. (2006). New technologies, organisation and age: firm-level evidence. *The Economic Journal*, *116*(509), F73-F93.

Bagozzi, R. P., Yi, Y., and Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative science quarterly*, 421-458.

ISSN: 1941-6679-On-line Copy

Balasubraman, S., Peterson, R. A., and Jarvenpaa, S. L. (2002). Exploring the implications of m-commerce for markets and marketing. *Journal of the academy of Marketing Science*, *30*(4), 348-361.

Barnes, S. J. (2002). Provision of services via the wireless application protocol: a strategic perspective. *Electronic Markets*, *12*(1), 14-21.

Behrend, T. S., Wiebe, E. N., London, J. E., and Johnson, E. C. (2011). Cloud computing adoption and usage in community colleges. *Behaviour and Information Technology*, *30*(2), 231-240.

Benlian, A., and Hess, T. (2011). Opportunities and risks of software-as-a-service: Findings from a survey of IT executives. *Decision Support Systems*, *52*(1), 232-246.

Bhattacherjee, A. (2001). Understanding information systems continuance: an expectation-confirmation model. *MIS quarterly*, 351-370.

Brynjolfsson, E., and Smith, M. D. (2001). The great equalizer? Consumer choice behavior at Internet shopbots.

Burton, S. Pulendran, andC. Sauer (2000).Internet Use (and Non Use), A Comparison of Internet and Alternative Channel Shopping by Early Web Adopters. *Proceedings of the Western Decision Sciences*, pp. 1240-1243.

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *International journal of testing*, *1*(1), 55-86.

Castañeda, J. A., Muñoz-Leiva, F., and Luque, T. (2007). Web Acceptance Model (WAM): Moderating effects of user experience. *Information and management*, *44*(4), 384-396.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern methods for business research*, *295*(2), 295-336.

Chung, J. E., Park, N., Wang, H., Fulk, J., and McLaughlin, M. (2010). Age differences in perceptions of online community participation among non-users: An extension of the Technology Acceptance Model. *Computers in Human Behavior*, *26*(6), 1674-1684.

  ISSN: 1941-6679-On-line Copy

CIO Report (2010).Cloud computing in India: a CIO research center report. Available at: http:// cioresearchcenter.com/wordpress/wp-content/plugins/download-monitor/download.php?id=3 (accessed August 2012).

Citrin, A., Sprott, D. E., Silverman, S. N., and Stem Jr, D. E. (2000). Adoption of Internet shopping: the role of consumer innovativeness. *Industrial management and data systems*, *100*(7), 294-300.

Czaja, S., Lee, C., Nair, S., and Sharit, J. (2008). Older adults and technology adoption. *Proceedings of Human Factors and Ergonomics Society*, 52, 139–143.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Davis, G. B., and Olson, M. (1985). Management information systems: Conceptual foundations, methods and development. *McGraw-Hill, New York*.

Davis, F. D., and Venkatesh, V. (2004). Toward preprototype user acceptance testing of new information systems: implications for software project management. *IEEE Transactions on Engineering management*, *51*(1), 31-46.

Dholakia, R., and Uusitalo, O. (2002). Switching to electronic stores: consumer characteristics and the perception of shopping benefits. *International Journal of Retail and Distribution Management*, *30*(10), 459-469.

Doherty, E., Carcary, M., and Conway, G. (2015). Migrating to the cloud: Examining the drivers and barriers to adoption of cloud computing by SMEs in Ireland: an exploratory study. *Journal of Small Business and Enterprise Development*, 22(3), 512-527.

Dwivedi, Y. K., and Mustafee, N. (2010). It's unwritten in the Cloud: the technology enablers for realising the promise of Cloud Computing. *Journal of Enterprise Information Management*, *23*(6), 673-679.

EUROSTAT (2011). Individuals using selected mobile devices to access the Internet. Available at http://www.epp.eurostat.ec.europa.eu/portal/page/portal/product_details/

ISSN: 1941-6679-On-line Copy

Fishbein, M., and Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*.

Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.

Gangwar, H., Date, H., and Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, *28*(1), 107-130.

Garrison, G., Kim, S., and Wakefield, R. L. (2012). Success factors for deploying cloud computing. *Communications of the ACM*, 55(9), 62-68.

Gupta, P., Seetharaman, A., and Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium businesses. *International Journal of Information Management*, 33(5), 861-874.

Gutierrez, A., Boukrami, E., and Lumsden, R. (2015).Technological, organisational and environmental factors influencing managers' decision to adopt cloud computing in the UK. *Journal of Enterprise Information Management*, 28(6), 788-807.

Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. (2010). Multivariate Data Analysis. (7th Edition).*NJ: Prentice Hall.*

Hong, S., Thong, J. Y., and Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision support systems*, *42*(3), 1819-1834.

Hsu, M. H., Ju, T. L., Yen, C. H., and Chang, C. M. (2007). Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations. *International journal of human-computer studies*, *65*(2), 153-169.

Hsu, P. F., Ray, S., and Li-Hsieh, Y. Y. (2014). Examining cloud computing adoption intention, pricing mechanism, and deployment model. *International Journal of Information Management*, 34(4), 474-488.

Hu, L. and Bentler, P. (1999). Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.

Junglas, I. and Watson, R. T. (2006). The u-constructs: four information drives.*Communications of the Association for Information systems*, Vol. 17 No. 1, pp. 369-592.

Karahanna, E., Straub, D. W., and Chervany, N. L. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS quarterly*, 183-213.

Kim, S., and Garrison, G. (2009). Investigating mobile wireless technology adoption: An extension of the technology acceptance model. *Information Systems Frontiers*, 11(3), 323-333.

Konana, P., and Balasubramanian, S. (2005). The social–economic–psychological model of technology adoption and usage: an application to online investing. *Decision Support Systems*, *39*(3), 505-52

Korupp, S. E., and Szydlik, M. (2005). Causes and trends of the digital divide. *European Sociological Review*, *21*(4), 409-422.

Kuan, K. K., and Chau, P. Y. (2001). A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework. *Information and management*, *38*(8), 507-521.

Kwak, H., Fox, R. J., and Zinkhan, G. M. (2002). What products can be successfully promoted and sold via the Internet? *Journal of Advertising Research*, *42*(1), 23-38.

Lal, P., and Bharadwaj, S. S. (2016). Understanding the Impact of Cloud-Based Services Adoption on Organizational Flexibility: An Exploratory Study. *Journal of Enterprise Information Management*, 29(4).

Lederer, A. L., Maupin, D. J., Sena, M. P., and Zhuang, Y.(2000). The technology acceptance model and the World Wide Web. *Decision support systems*, *29*(3), 269-282.

  ISSN: 1941-6679-On-line Copy

Lee, E., Kwon, K. and Schumann, D. (2005). Segmenting the non-adopter category in the diffusion of internet banking.*International Journal of Bank Marketing*, Vol. 23 No. 5, pp. 414-37.

Li, M., Zhao, D., and Yu, Y. (2015). TOE drivers for cloud transformation: direct or trust-mediated? *Asia Pacific Journal of Marketing and Logistics*, 27(2), 226-248.

Lian, J. W., Yen, D. C., andWang, Y. T. (2014).An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital. *International Journal of Information Management*, 34(1), 28-36.

Liao, Z., and Cheung, M. T. (2001). Internet-based e-shopping and consumer attitudes: an empirical study. *Information and management*, *38*(5), 299-306.

Lin, A., and Chen, N. C. (2012).Cloud computing as an innovation: Perception, attitude, and adoption. *International Journal of Information Management*, 32(6), 533-540.

Low, C., Chen, Y., and Wu, M. (2011).Understanding the determinants of cloud computing adoption. *Industrial management and data systems*, 111(7), 1006-1023.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., andGhalsasi, A. (2011). Cloud computing—the business perspective. *Decision Support Systems*, 51(1), 176-189.

McIver, J., and Carmines, E. G. (1981). *Unidimensionalscaling* (Vol. 24). Sage.

Miyazaki, A. D., and Fernandez, A. (2001). Consumer perceptions of privacy and security risks for online shopping. *Journal of Consumer affairs*, *35*(1), 27-44.

Morris, M. G., Venkatesh, V., and Ackerman, P. L. (2005). Gender and Age Differences in Employee Decisions about New Technology: An Extension to the Theory of Planned Behavior. IEEE Transactions on Engineering Management (52:1), pp. 69-84.

Niemelä-Nyrhinen, J. (2009). Factors affecting acceptance of mobile content services among mature consumers. *Jyväskylä studies in business and economics*, (72).

  ISSN: 1941-6679-On-line Copy

O'cass, A., andFenech, T. (2003). Web retailing adoption: exploring the nature of internet users Web retailing behavior. *Journal of Retailing and Consumer services, 10*(2), 81-94.

Obeidat, M. A., andTurgay, T. (2012). Empirical Analysis for the Factors Affecting the Adoption of Cloud Computing Initiatives by Information Technology Executives. *Journal of Management Research,* 5(1), 152-178.

Oliveira, T., Thomas, M., andEspadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information and Management*, 51(5), 497-510.

Pagani, M. (2004). Determinants of adoption of third generation mobile multimedia services. *Journal of InteractiveMarketing*, 18, 46–59.

Palvia, P., Dwight Jr, B., and Jackson, W. M. (1994). Determinants of computing in very small businesses. *Information and Management*, *27*(3), 161-174.

Phang, C. W., Sutanto, J., Kankanhalli, A., Li, Y., Tan, B. C., & Teo, H. H. (2006). Senior citizens' acceptance of information systems: A study in the context of e-government services. *IEEE Transactions on Engineering Management*, *53*(4), 555-569.

Premkumar, G., and Roberts, M. (1999). Adoption of new information technologies in rural small businesses. *Omega*, *27*(4), 467-484.

Rao, S.S., Truong, D., Senecal, S. and Le, T.T. (2007). How buyers' expected benefits, perceived risks, and e-business readiness influence their e-marketplace usage.*Industrial Marketing Management*, Vol. 36 No. 8, pp. 1035-45.

Rautrupam, (2013).Cloud Computing in India – Opportunities and Way Forward. Available at https://salesforcedev401.wordpress.com.

Ristola, J. (2010). *Information technology service management for cloud computing* (Doctoral dissertation, M. Sc dissertation, Aalto University School of Science and Technology).

Rogers, E., M. (1995).Diffusion of innovations. *New York*.

  ISSN: 1941-6679-On-line Copy

Ross, P., and Blumenstein, M. (2013). Cloud computing: the nexus of strategy and technology. *Journal of Business Strategy*, 34(4), 39-47.

Sabi, H. M., Uzoka, F. M. E., Langmia, K., andNjeh, F. N. (2016).Conceptualizing a model for adoption of cloud computing in education. *International Journal of Information Management*, *36*(2), 183-191.

Saeed, K. A., and Abdinnour-Helm, S.(2008). Examining the effects of information system characteristics and perceived usefulness on post adoption usage of information systems. *Information and Management*, *45*(6), 376-386.

Schumacker, R. and Lomax, R.(2010). Model Fit. In: A Beginner's Guide to Structural Equation Modeling. *Routledge*, ISBN-10: 1136968555, pp. 73-120.

Senyo, P. K., Effah, J., and Addae, E. (2016). Preliminary insight into cloud computing adoption in a developing country. *Journal of Enterprise Information Management*, 29(4).

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 Behaviour*, *62*, 61-69.

Shih Yung, C. and Pearson, J.M. (2011). A Demographic Study of Information Technology Professionals' Organizational Citizenship Behavior. *Journal of Management Research*, 3(2).

Sun, H., and Zhang, P. (2006). The role of moderating factors in user technology acceptance. International Journal of Human–Computer Studies, 64(2), 53–78.

Szajna, B. (1995). Empirical evaluation of the revised technology acceptance model. *Management science*, *42*(1), 85-92.

Taylor, S., and Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information systems research*, *6*(2), 144-176.

Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). The processes of technological innovation. Issues in organization and management series. *Lexington Books. Available at http://www. amazon. com/Processes-*

Technological-Innovation-Organization/Management/dp/0669203483. Accessed June, 10, 2013.

Touron, D.R., and Hertzog, C. (2004). Distinguishing age differences in knowledge, strategy use, and confidence during strategic skill acquisition. Psychology and Aging, 19, 452–466.

Truong, D. (2009). How cloud computing enhances competitive advantages: A research model for small businesses. *The Business Review, Cambridge,* 15(1), 59-6.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, *11*(4), 342-365.

Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision sciences*, *27*(3), 451-481.

Venkatesh, V., and Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 46(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Venkatesh, V., and Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, 39(2), 273-315.

Wang, W. Y. C., Rashid, A., and Chuang, H. M., (2011). Toward the trend of cloud computing. *Journal of Electronic Commerce Research*, *12*(4), 238.

Wang, Y. S., Wang, Y. M., Lin, H. H., and Tang, T. I., (2003). Determinants of user acceptance of internet banking: An empirical study.*International journal of service industry management*, *14*(5), 501-519.

Watson, R.T., Pitt, L.F.,Berthon, P. and Zinkhan, G.M. (2002). U-commerce: Expanding the universe of marketing. *.Academy of Marketing Science Journal*, Vol. 30 No. 4, pp. 333–348.

  ISSN: 1941-6679-On-line Copy

Wheaton, B., Muthen, B., Alwin, D., F., and Summers, G. (1977). Assessing Reliability and Stability in Panel Models", Sociological *Methodology*, 8 (1), 84-136.

Wixom, B. H., & Watson, H. J. (2001). An empirical investigation of the factors affecting data warehousing success. *MIS quarterly*, 17-41.

Wu, W. W. (2011). Developing an explorative model for SaaS adoption. *Expert systems with applications*, *38*(12), 15057-15064.

Wu, W. W., Lan, L. W., and Lee, Y. T. (2013). Factors hindering acceptance of using cloud services in university: a case study. *The Electronic Library*, 31(1), 84-98.

Wu, J. H., & Wang, S. C. (2005). What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information & management*, *42*(5), 719-729.

Yigitbasioglu, O. M. (2015). The role of institutional pressures and top management support in the intention to adopt cloud computing solutions. *Journal of Enterprise Information Management*, *28*(4), 579-594.

APPENDIX. ITEMS OF MEASURES

Perceived Usefulness (PU) [Davis *et al*., 1989; Venkatesh and Davis, 2000]	
PU1	Increase productivity
PU2	Accomplish the tasks more quickly
PU3	Effective for the tasks
Perceived Ease of Use (PEOU) [Davis *et al*., 1989; Venkatesh and Davis, 2000]	
PEOU1	Easy to learn
PEOU2	Require less mental effort
PEOU3	Interaction is clear and understandable
PEOU4	Flexible
PEOU5	Easy to become skillful
PEOU6	Simple to use
Job Relevance (JR) [Venkatesh and Davis, 2000]	
JR1	Usage of cloud computing is relevant for my job.
JR2	For my future work in my company, cloud computing is important.
JR3	In my job, usage of cloud computing is important.
Perceived Ubiquity (PUB) [Kim and Garrison, 2009]	
PUb1	In my job, cloud computing providing communication and network accessibility "anytime-and-anywhere" is very crucial.
PUb2	In my job, cloud computing provides me anytime-and-anywhere communication and connectivity.
PUb3	How frequently do you use cloud computing for personal and business purposes?
Actual Usage (AU) [Davis, 1989; Taylor and Todd, 1995]	
AU1	Frequency of usage in a week
AU2	Duration of usage in a week
AU3	Frequency of usage in a month
Perceived Benefits (PB) and Perceived Risks (PR)[Pei-Fang Hsu, Soumya Ray and Yu-Yu Li-Hsieh, 2014]	
PB1	Customization
PB2	Easily analyze data on Internet
PB3	Ubiquitous access
PR1	Service outages
PR2	Underperformance
PR3	Vendor lock-in
Perceived Costs (PC) [Premkumar, G., and Roberts, M. (1999)	
PC1	Set-up cost

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PC2	Maintenance cost
PC3	Training cost

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