Computing, Information Systems & Development Informatics Journal
Vol. 13 No. 4, December, 2022 - www.isteams.net/cisdijournal

Cloud Computing Adoption and Use: A Systematic Review

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ABSTRACT

The advent of Cloud Computing has brought tremendous growth to businesses. Enterprises, known for their cost savings, flexible and scalable features, are better managed today. Unfortunately, high dependency on service providers, data security issues, and high set-up costs are becoming major issues along with low adoption rates in developing countries. Despite the infrastructure deficit, there is a need for studies to focus on theories of adoption and use. Therefore, this study aims to systematically review empirical studies on the adoption and use of cloud computing in general to identify relevant factors determining organizational intention to use, actual use, and the impact of cloud computing services on performance. This study investigated the causal factors responsible for the adoption, use and performance of cloud computing through a systematic literature review. This study examined 150 related studies in various databases such as IEEE Xplore, Emerald, Springer link and Science Direct. Thirty-six (36) main factors were identified and the results showed that thirteen factors appeared most frequently: top management support, relative advantage, compatibility, security, complexity, technology readiness, firm size, competitive pressure, trial, cost savings, Perceived usefulness, perceived ease of use and personal innovativeness. Most of these factors are related to technology. This study serves as a foundation for future research and advancement of theory development in the adoption, use, and performance of cloud computing. It also provides inside information on user preferences and is crucial for service providers, business owners and government.

Keywords: Cloud Computing, adoption, systematic literature review, determinants, utilization, performance.

CISDI Journal Reference Format
Atuluku, A.R*, Osang, F.B. & Adebiyi, A. A. (2022): Cloud Computing Adoption and Use: A Systematic Review. Computing, Information Systems, Development Informatics & Allied Research Journal. Vol 13 No 4, Pp 29-64
Available online at www.isteams.net/cisdijournal.
dx.doi.org/10.22624/AIMS/CISDI/V13N4P3

1. INTRODUCTION

Cloud computing is a fairly new business model in the computing world. According to NIST's official definition, "Cloud computing is a model that provides ubiquitous, convenient, on-demand network access to a shared pool of composable computing resources" (Mell & Grance, 2011). It is considered the technological revolution of the 21st century. The need for data centers is shifting from physical form to virtual form with current cloud computing capabilities such as business process transformation, real-time application delivery, lower IT spending, unlimited computing power and mobilization. Organizations today are considering cloud-based solutions to achieve business efficiency (Yahsueh et al., 2011).

The cloud is essential to keeping businesses up and running. From virtual conferencing to new employees working from home, companies just need to embrace this new reality to survive and thrive in the new business as usual. Indicated below are some of the statistics in the cloud industry. The global cloud market continues to be dominated by tech giants Amazon (32%), Microsoft (18%), Google (8%), IBM (5%), Alibaba (5%), Salesforce (3%), Oracle (2%), Tencent (2%) and Rackspace (2%) (Synergy Research, 2020, Osang, 2022). The Software-as-a-Service (SaaS) cloud computing market segment is forecast to reach $138.3 billion, the infrastructure-as-a-Service (IaaS) market at $82.2 billion, and the Platform-as-a-Service market (PaaS) $69 billion by 2022. (Statista, 2021).

According to Logic Monitor (2020), 74% of global IT decision makers, 95% of all workloads, will be in the cloud in the next five years. Meanwhile, a study by MacDonald (2018) revealed that 60% of organizations surveyed say the majority of their IT will be off-premises within the next two years. As of Q1 2020, 56% of US small business owners spent up to $600,000 per year on public cloud expenses. (Flexera, 2020). Similarly, it was predicted that by 2020, 78% of small businesses would have fully adopted cloud computing in their operations. (Flexera, 2020). Additionally, 84% of small business owners think cloud services are important to their operations and overall performance. (SBEC and Techno Metrica, 2020).

User acceptance or rejection of a new technology has long been cited as the biggest help or hindrance to the success of any new technology 46. [Osang, 2022; Osang and Longe, 2021; Muhambe, 2011). Numerous technology adoption studies focused on predicting factors that influence behavioural intention and behavior in using different technologies have been conducted mainly in the United States, Europe, Australia, China, Japan, Singapore, and Malaysia. Studies on the adoption and use of cloud computing services have been conducted in the same regions, but it is worth noting that these regions of the world have a highly developed Internet infrastructure, a high level of Internet penetration, and a high level of use of the Internet and related services to developing countries such as Nigeria. A significant number of these studies have contributed immensely to the success of these technologies by enabling stakeholders to understand and exploit the causal factors that influence “behavioural intention” and “use behaviour” (Muhambe, 2011). Success in the adoption and use of cloud computing technology depends on the capabilities of the technology drivers; researchers and marketers/providers to identify and exploit factors that influence behavioural intention and usage behaviour.

Most studies have either focused on intention to use cloud computing services, usage, or performance; however, no longitudinal analysis considered intention to use, use, and outcome performance. This paper investigated the causal factors responsible for the adoption and use of cloud computing through a systematic literature review to formulate a theoretical framework for cloud computing and its use in the context of developing countries.
The findings of the study would be useful for three categories of people; academic researchers in terms of theory development, Cloud Computing service providers and Cloud Computing service users. The remaining part of the paper will be methodology, literature review, findings and discussion. The last section presented the conclusion and future work.

2. RESEARCH METHODOLOGY

This research study used a systematic literature review method to investigate the factors determining organizations' adoption, use, and performance of cloud services. A systematic literature review is a critical evaluation and analysis of primary research papers. The primary purpose of a systematic review is to find the main approaches developed in a particular field of study and then to define the problems that still need to be addressed in that field. This is achieved by using a well-documented research methodology in the literature search strategy.

It followed basic guidelines for conducting an effective literature review. The studies used existing literature from various databases. These databases provide access to leading IS journals and high-quality peer-reviewed publications from IS conferences. In addition, online databases are a convenient and practical resource for literature review on the current phenomenon such as cloud computing (Yang and Tate, 2012).

2.1 Search Process

In order to identify related articles, the search emphasized the combination of keywords such as "cloud computing adoption determinant", "organizational cloud computing adoption", Factors affecting cloud computing adoption, "Cloud service usage and performance", "cloud computing" with "by receiving', 'using' or 'adopting' as well as the entire string of keywords.

To ensure that relevant selected articles were analysed, the search criteria were based on the title of the articles. The year of publication ranged from 2011 to 2021. Publication types were focused only on journals or anthologies. Initially, a total of 150 articles were identified using search queries from selected databases (Science direct, Emerald, Springer link and IEEE Xplore). The selection of recommended articles involved reading the abstract to determine the relevance of the articles to the research topic. After due consideration, the criteria were refined by excluding repetitive, non-English articles and articles on ongoing research. These exclusion criteria define the sample of articles so that a literature review is practically manageable. After performing the quality assessment, only 83 articles were considered for further analysis. Table 1 shows the details of the search according to the criteria discussed earlier.

Table 1: Selected studies related to the criteria.

Database	Total No of Research	No of Excluded Studies	No of Selected Studies
Science Direct	72	51	32
Emerald Insight	53	29	24
Springer Link	28	20	10
IEE Xplore	32	21	11
Total	**185**	**121**	**77**

Table 2: Distribution of articles in 2011-2021

YEARS	NUMBER OF ARTICLES REVIEWED
2011	3
2012	2
2013	9
2014	11
2015	10
2016	15
2017	11
2018	10
2019	2
2020	3
2021	1
TOTAL	**77**

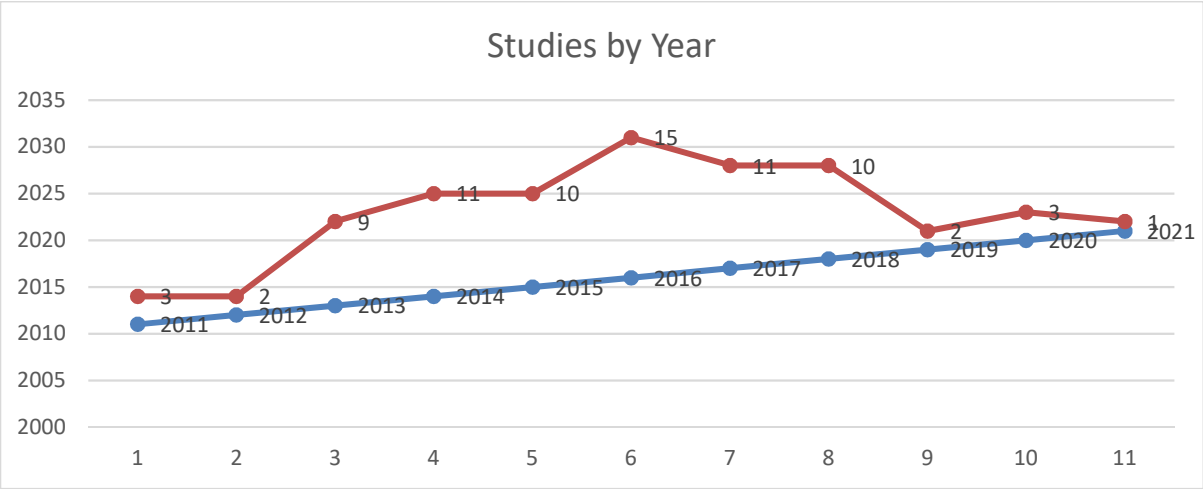

Figure 1: Study by Year

3. RELATED STUDIES ON ADOPTION, USAGE AND PERFORMANCE OF CLOUD COMPUTING TECHNOLOGY

Several studies from different areas and fields have been conducted to investigate the factors influencing the adoption and use of cloud computing services using different theories of technology adoption. The studies highlighted the models, theories and factors contributing to the adoption and use of cloud computing technology. Table 3 shows a summary of the studies reviewed. Lists authors, year of study, adoption theory, country, sector, research method, factors, nature of adoption theory/model used and type of factors.

Table 3. Empirical studies of factors affecting adoption and use of cloud computing services

YEAR 2011							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Behrend et al., (2011)	TAM	USA	Education	Quantitative	Access to software, ease of travel, Personal innovativeness, technology anxiety, instructor support, usefulness, ease of use, actual usage, intentions for future use and future usefulness	Single	Adoption and usage

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Low et al. (2011)	TOE	Taiwan	High tech firms	Quantitative	Top management support, firm size, relative advantage, competitive pressure and trading partner pressure	Single	Adoption/intention to use
Tan and Kim (2011)	IS continuance model	The USA	Education	Quantitative	Cost saving, flexible IT management, accessible IT resources and services, reliability, control, security and privacy and organizational learning	Single	Usage
YEAR 2012							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Lin and Chen (2012)	DOI	Taiwan	IT	Quantitative	Relative Advantage, Compatibility, Competitive Pressure, trialability and observability	Single	Adoption/ intention to use
Opitz et al, (2012)	TAM	Germany	IT	Quantitative	job relevance, image, and perceived usefulness	Single	Usage

YEAR 2013							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Alshamaila et al.(2013)	TOE	North east England	SME	Quantitative	Relative Advantage, uncertainty, geo-restriction, compatibility, trialability, firm size, Top Management Support, prior experience, innovativeness, industry, supplier efforts and external computing support	Single	Adoption/ intention to use
Saedi and Iahad ,2013	TOE and DOI	Malaysia	SMEs	Quantitative	Relative advantage, compatibility, complexity, trialability, IT innovativeness, and IT knowledge	Combined	Adoption/ intention to use
Chang et al,2013	TOE and DOI	Vietnam	High-Tech	Quantitative	Technological complexity, relative advantage, organization size, top management support, infrastructure availability, formalization, trading partners' pressure, and competitive pressure	Single	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Militaru et al,2013	TOE	Different countries	SMEs	Quantitative	Technology readiness, firm size, and top management support	Single	Adoption/ intention to use
Borgman et al,2013	TOE	Different countries	Different Industries	Quantitative	Competitive pressure, relative advantage, and top management support.	Single	Adoption/ intention to use
Morgan and Conboy,2013	TOE	Ireland	High-Tech	Quantitative	Technology readiness, firm size, and top management support	Single	Adoption/ intention to use
Gupta et al,2013	TAM	Malaysia	SMEs	Quantitative	Cost reduction, privacy, security, and ease of use	Single	Adoption and Usage
Yazan Y. A (2013)	TOE	England	SME	qualitative and quantitative	Relative advantage, uncertainty, innovativeness, and external computing support	Single	Adoption/ intention to use
Wu et al.(2013)	DOI &IPV	USA	Manufacturing and retail industries	Quantitative	*Business process complexity, *Compatibility, *Entrepreneurial culture, *Application functionality	Combined	Adoption/ intention to use Adoption/ intention to use

YEAR 2014							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
William, 2014	TOE		Education	Quantitative	Relative advantage, complexity, compatibility, institutional size, technology readiness, perceived barriers, regulatory policy, and the level of service provider support	Single	Adoption/ intention to use
Sulaiman and Magaireah,2014	TOE	Jordan	Health	Quantitative	Top Management Support, reliability, privacy, security, government policy, legal environment, Technology Readiness and competition	Single	Adoption/ intention to use
Oliveira et al,2014	TOE and DOI	Portugal	Manufacturing & Service	Quantitative	Security concerns, cost savings, Relative Advantage, compatibility, complexity technology readiness, Top Management Support, firm size, competitive pressure, regulatory support, CCA	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Alsanea et al,2014	TOE and Iacovou	Saudi Arabia	SMEs	Quantitative	Cost, security, usefulness, quality of service, privacy, technology readiness, and organization size, trust, feasibility, government support, organizational structure, industry type, external pressure as well as direct and indirect benefits	Combined	Adoption/ intention to use
Lian et al.,2014	TOE and HOT-fit	Taiwan	Health	Quantitative	Human: CIO innovativeness, perceived technical competence; technology: data security, compatibility, complexity, costs, organization: Relative Advantage, Top Management Support, adequate resource, benefits; Environment: government policy and perceived industry pressure	Combined	Adoption/ intention to use
Hsu et al. (2014)	TOE-DOI	Taiwan	ICT, service and manufacturing	Quantitative	Technology (perceived benefits, Perceived concerns , organization (IT capability), environment (external pressure); Firm Size, AI, pricing mechanism and deployment model	combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Mangula et al. (2014)	TOE-DOI	Indonesia	IT	Quantitative	Relative Advantage, compatibility, complexity, trialability, observability, organizational readiness, Top Management Support, market pressure, market competition, vendor marketing effort, trust in vendor and government support	Combined	Adoption/ intention to use
Stieninger and Nedbal (2014)	UTAUT	Austria	SME	Quantitative	Image, Relative Advantage, perceived security and safety, facilitating conditions, costs, Perceived Usefulness, effort expectation, technological availability, voluntariness of use, performance expectancy, technological characteristics (usability), trust, compatibility, Perceived Ease of Use, regulatory framework, observability, trialability and energy efficiency	Single	Usage

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Nedev (2014)	TOE	UK	manufacturing	Quantitative	Relative Advantage, redundancy, compatibility, complexity, firm size, technology readiness, Top Management Support, security, competitive pressure and innovativeness	Single	Adoption/ intention to use
Tehrani and Shirazi (2014)	TOE-DOI	North America	SME	Quantitative	Relative Advantage, cloud knowledge, security, privacy, compatibility, employees' cloud knowledge, information intensity, external support, innovativeness and intention to use	Combined	Adoption/ intention to use
Ratten, 2014	Social Cognitive theory and TAM	Turkey and USA	Education	Quantitative	performance expectancy, ethical awareness and consumer innovation	Combined	Adoption/ intention to use
				YEAR 2015			
Sallehudin et al,2015	TOE and DOI	Malaysia n	Government/ Public	Quantitative	Relative advantage, compatibility, complexity, trialability, IT innovativeness, and IT knowledge.	Combined	Adoption/ intention to use
Gangwar et al.,2015	TOE and TAM	Indian	Different Industries	Quantitative	Top management commitment, complexity, relative advantage, compatibility	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Gutierrez et al,2015	TOE	UK	Different Industries	Quantitative	Technology readiness, complexity, competitive pressure, and trading partner pressure.	Single	Adoption/ intention to use
Alhammadi et al,2015	TOE and DOI	Saudi Arabia	IT	Quantitative	Security, compatibility, top management support, firm size, organization readiness, and government support.	Combined	Adoption/ intention to use
Alkhater et al.,2015	TOE and DOI	Saudi Arabia	IT	Quantitative	Trialability, trust, privacy, reliability, compatibility, relative advantage, and security are the technological factors that affect adoption. Organizational factors include technology readiness, organization size, and top management support, while the environmental factors are external support, physical location, regulatory compliance, and culture.	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Polyviou and Pouloudi,2015	TOE	Germany, Greece, Italy, Poland, and the United Kingdom	Government/ Public	Qualitative	Compatibility, relative advantage, and complexity are significant technological factors. The organizational factors include transparency of processes, decrease in IT management, interoperability, environmental policies, and security, legal issues, bureaucracy, and political matters	Single	Adoption/ intention to use
Tashkandi and Al-Jabri,2015	TOE	Saudi Arabia	Education	Quantitative	Relative advantage. Data concern and complexity,	Single	Adoption/ intention to use
Wahsh and Dhillon,2015	Tech & non tech model	Iraq	Government/ Public	Quantitative	Complexity, compatibility, relative advantage, IT knowledge, and security influence	Combined	Adoption/ intention to use
Wilson et al.,2015	TOE and DOI	Indian	SMEs	Quantitative	Compatibility, complexity, interoperability, technical expertise, top management support, organization size, trust, business requirement, physical location, government policies, and competitive pressure	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Abdullah J. and Seng L.(2015)	TAM	Malaysia	Health		Perceived Usefulness, Perceived Ease of Usage, Attitude toward Use, Perceived Risk and Institutional Trust	Single	Adoption/ intention to use
			YEAR 2016				
Mohammed et al.,2016	DOI and a task-technology fit model	Yemen	Government/ Public	Quantitative	Task, relative advantage, complexity, compatibility, trialability, and security.	Combined	Adoption/ intention to use
Al-Jabri and Alabdulhadi,2016	TOE	Saudi Arabia	Different Industries	Quantitative	Top management support	Single	Adoption/ intention to use
Senyo et al,2016	TOE	Ghana	Different Industries	Quantitative	Security concerns, technology readiness, relative advantage, trading partner pressure, top management support, and competitive pressure	Single	Adoption/ intention to use
Kumar and Samalia,2016	TOE	India	SMEs	Quantitative	Relative advantage, security, cost benefits, availability, reliability, technological risk, top management support, and competitive pressure	Single	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Albugmi et al.,2016	TOE and DOI	Saudi Arabia	IT	Quantitative	Upfront cost, support from top management, trust, and data security	Combined	Adoption/ intention to use
Alharbi et al.2016	TOE, IS and HOT-fit	Saudi Arabia	Health	Quantitative	Soft financial analysis and hard financial analysis	Combined	Adoption/ intention to use
Sabi et al., 2016	TAM and DOI	Different countries	Education	Quantitative		Combined	Adoption/ intention to use
Al-Mascati and Al-Badi,2016	TOE and DOI	Oman	Oil & Gas	Quantitative	Adequate telecom services, service providers' support, top management support, financial incentive, and trialability	Combined	Adoption/ intention to use
Ratten (2016)	Social Cognitive theory	Australia	IT Manager	Quantitative	Personal attitude, continuance use of CC,perceived behavioural control, risk, innovativeness and creativity	Single	Usage
Alismaili et al. (2016)	Actor Network Theory (ANT) and TOE	Australia	SME	Quantitative	Market scope, industry, competitive pressure, is knowledge, innovativeness, TMS, firm size, trialability, uncertainty, complexity, compatibility, Relative Advantage and Security	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Arpaci (2016)	TAM-TRA	Turkey	Education (Students)	Quantitative	Perceived Usefulness, subjective norm and trust	Combined	Adoption/ intention to use
Sharma et al. (2016)	TAM	Oman	IT	Quantitative	Perceived Usefulness, individuals decision to adopt CC services, Perceived Ease Of Use, computer self-efficacy, trust and job opportunity	Single	Adoption/ intention to use
Hwang et al. (2016)	TAM-DEMATEL	Taiwan	IT and Education	Quantitative	Compatibility, complexity and Relative Advantage	Combined	Adoption/ intention to use
Harfoushi et al. (2016)	TOE	Jordanian	Hospitals (Health)	Quantitative	*Technology factors, *Organisational factors, *Environmental factors	Single	Adoption/ intention to use
Noor (2016)	motivators and inhibitors model	Saudi Arabia	Education	Quantitative	ubiquitous network access and on demand (self-service), availability, reliability, security, compliance, and privacy		Adoption and Usage

YEAR 2017							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Liang et al.,2017	Grounded Theory	China	Government/ Public	Quantitative	Cloud trust, technology driving, cloud provider support, organizational readiness, and environmental stimulus.	Single	Adoption/ intention to use
Lian (2017)	IS success model	Taiwan	Hospital (Health)	Quantitative	*Information quality, *System quality, Service quality, *Trust	Single	Adoption/ intention to use
Ashtari and Eydgahi,2017	TOE	Saudi Arabia	Health	Quantitative	Perceived usefulness, low cost and perceived risk	Single	Usage
Deil and Brune,2017	TOE and DOI	Germany	SMEs	Qualitative	Data privacy, data security, and availability of broadband internet access	Combined	Adoption/ intention to use
Karim and Rampersad,2017	TOE and Hofstede	Saudi Arabia	Education	Mixed	Top management support, compatibility, relative advantage, readiness, competitive pressure, regulatory support, high individualism, and high masculinity, high uncertainty avoidance, high power distance, and data security	Combined	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Albar and Hoque, 2017	TOE and DOI	Saudi Arabia	IT	Quantitative	Top management support, regulatory concern, relative advantage, complexity, infrastructure, ICT skills, and competitive pressure	Combined	Adoption/ intention to use
Hassan, 2017	TOE	Malaysia	SMEs	Quantitative	IT resources	Single	Adoption/ intention to use
Mohammed et al., 2017	DOI & Fit-Viability	Yemen	Government/ Public	Quantitative	Trialability, relative advantage, data security, compatibility, return on investment, and technology readiness.	Combined	Adoption/ intention to use
Ayoobkhan and Asirvatham, 2017	TOE	Sri Lanka	Health	Quantitative	Top management support, compatibility, relative advantage, readiness, competitive pressure,	Single	Adoption/ intention to use
Lee (2017)	Conceptual riskmodel	Taiwan	manufacturing and service	Quantitative	Risks (technology, image, finance, performance, security, user decision and time), CC knowledge and CCA intention	Single	Adoption/ intention to use
Author (Year)	**Adoption**	**Country**	**Sector**	**Research**	**Identified**	**Nature of**	**Type of**

	Theory		(Industry)	Method	Factors	Adoption Theory used	Factor
Rahi et al. (2017)	TOE	Indian	semiconductor	Quantitative	Improvement in organizational performance, computational efficiency, better scalability, on demand product and service availability, competitive advantage, better trading partner, time to market, size of organization.	Single	Usage
YEAR 2018							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Kandil et al.,2018	TOE	Egypt	Government/ Public	Quantitative	Telecommunication infrastructure and internet service providers	Single	Adoption/ intention to use
Ming et al.,2018	TOE	Malaysia	SMEs	Quantitative	Top management support, cost-saving, and technology readiness	Single	Adoption/ intention to use
Mugunti and Opiyo,2018	TOE	Kenya	IT	Mixed	Top management support, right skills, worker attitudes (organizational factors), trading partner pressure, industry competition (environmental factors), compatibility, complexity	Single	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Al–Shura et al,2018	TOE	Jordan	Health	Quantitative	Relative advantage, complexity, compatibility, technology readiness, top management support, organization size, trading partner pressure, and competitive pressure	Single	Adoption/ intention to use
Alsmadi, and Prybutok (2018)	UTAUT	USA	Education	Quantitative	Performance expectancy, effort expectancy, peer influence and facilitating condition	Single	Usage
Trenz et al. (2018)	Social-influence model	Germany	Internet User(IT)	Quantitative	Word of mouth, uncertainty, continued usage, peer use and subjective norm	Single	Adoption and Usage
Hsieh and Lin (2018)	Dual factor model	Taiwan	Health	Quantitative	System quality, intention to use, information quality use, service quality, intention to use, resistance to use, regret avoidance, inertia, perceived value, perceived threats and system use, peer influence and facilitating condition	Single	Usage

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Ali et al. (2018)	TOE- DOI-DF	Australia	Government IT	Quantitative	Cost, security, Top Management Support, organization size, employees' knowledge, government regulation, information intensity, compatibility, complexity and anticipated benefits	Combined	Adoption/ intention to use
Ooi et al. (2018)	UTAUT-TOE	Malaysia	manufacturing	Quantitative	Performance expectancy, effort expectancy, firm size, top management support, absorptive capacity, innovativeness and firm performance	Combined	Adoption/ intention to use
Stieninger M .et al (2018)	Multi-theoretical	Austria	IT	Quantitative	Compatibility, relative advantage, security & trust, as well as, a lower level of complexity	Single	Adoption/ intention to use
YEAR 2019							
Singh and Manstora,2019	TOE	Indian	Education	Quantitative	Technology readiness, service quality, expert scarcity, top management support, company size, perceived utility	Single	Adoption/ intention to use

Author (Year)	Adoption Theory	Country	Sector (Industry)	Research Method	Identified Factors	Nature of Adoption Theory used	Type of Factor
Idoga et al,2019	UTAUT	Nigeria	Health	Quantitative	Cloud knowledge, IT infrastructure, and performance expectancy	Single	Adoption/ intention to use
YEAR 2020							
Ogwel et al,2020	TAM, TOE and TPB	Kenya	Health	Quantitative	Technology readiness, service quality, expert scarcity, top management support, company size, perceived utility, perceived simplicity of use, and social impact.	Combined	Adoption/ intention to use
Qasem et al,2020	TAM, TOE, and DOI	Different countries	Education	Quantitative	Complexity, capability, top management support, computer self-efficacy, and external pressure	Combined	Adoption/ intention to use
Omar A. et al (2020)	TOE & DOI	Australia	Government	Quantitative	Compatibility, complexity, cost, security concerns, expected benefits and organization size.	Combined	Adoption/ intention to use
YEAR 2021							
Author (Year)	**Adoption Theory**	**Country**	**Sector (Industry)**	**Research Method**	**Identified Factors**	**Nature of Adoption Theory used**	**Type of Factor**
Thabit A. et.al (2021)	TAM	Jordan	SME	Quantitative	perceived ease of use, perceived usefulness, cost, perceived risk	Single	Adoption/ intention to use

Table 4 shows a summary of some previous related studies on cloud service adoption and organizational performance.

Table 4: Summary of reviewed studies

Author/Year	Topic	Country	Research Method	Findings	Type of Study
Bagiwa (2016)	Impact of Cloud Adoption on the Performance of Organizations: A Facebook and Linked in Survey-Based Analysis	Nigeria	Quantitative	CC affect the organizational efficiency, flexibility, scalability, organizational trustworthiness	Organizational performance
Schniederjans and Hales (2016)	Cloud computing and its impact on economic and environmental performance: A transaction cost economics perspective	US	Quantitative	CC has significant effect on the economic and environmental performance. Collaboration affected the economic performance and mediated its effect on economic performance.	Economic performance Environmental performance
El Alami et al. (2015)	Cloud computing & the organizational performance: Different approach of assessment	Review	Review	Cloud computing can enhance the organizational performance from several perspectives.	Organizational performance
Hussein and Mohamed (2015)	Cloud Computing and Its Effect on Performance Excellence at Higher Education Institutions in Egypt (an Analytical Study)	Egypt	Review	Cloud computing can improve the performance of organizations.	Organizational performance

Author/Year	Topic	Country	Research Method	Findings	Type of Study
Algrari (2017)	The Impact of Cloud Based Information Systems on Organization's Performance	Iraq	Review	CC can affect the organizational measures such as ROA, quality and customer welfare.	Organizational performance
Gupta et al., (2018)	Role of cloud ERP on the performance of an organization: Contingent resource-based view perspective	USA	Quantitative	CC ERP affect the supply chain performance, financial and marketing performance. Complexity moderated the effect of cloud ERP on marketing and financial performance.	Organizational performance
Chen (2017)	Perceived Risk and Trust in the Adoption of Cloud Computing Services and Their Effects on Organizational Performance	Taiwan	Quantitative	Risk negatively affects usefulness and ease of use. Trust has a positive effect. Ease of use and usefulness affect the intention to use CC and intention to use CC has positive effect on performance.	Organizational performance

4. FINDINGS AND DISCUSSION

Findings from the peer-reviewed articles are presented after frequency analysis performed to measure quantitative aspects of behavior. Findings presented include: frequency of factors in peer-reviewed studies, most important perspective/context of factor categorization in peer-reviewed studies, use of adoption theories/frameworks by peer-reviewed articles, Type of technology Adoption theory used for Studies, Summary of studies on factors influencing cloud adoption in different sectors and research methods used for studies.

4.1 Determining Factors Affecting Adoption, Use, and Performance of Cloud Computing Services

Figure ii shows that 78% of studies examined factors related only to the intention to use cloud computing services, 10% examined factors related to only the use of cloud services, 5% examined the intention to use and actual use of cloud services, while 7% only examined organizational performance in use cloud services. This finding suggests that previous studies have focused more on the predictors of cloud computing service adoption to understand the factors that lead an organization to adopt and use this technology, while there is no longitudinal analysis with respect to empirical studies on cloud computing adoption, actual use of CC, and its impact on organizational performance.

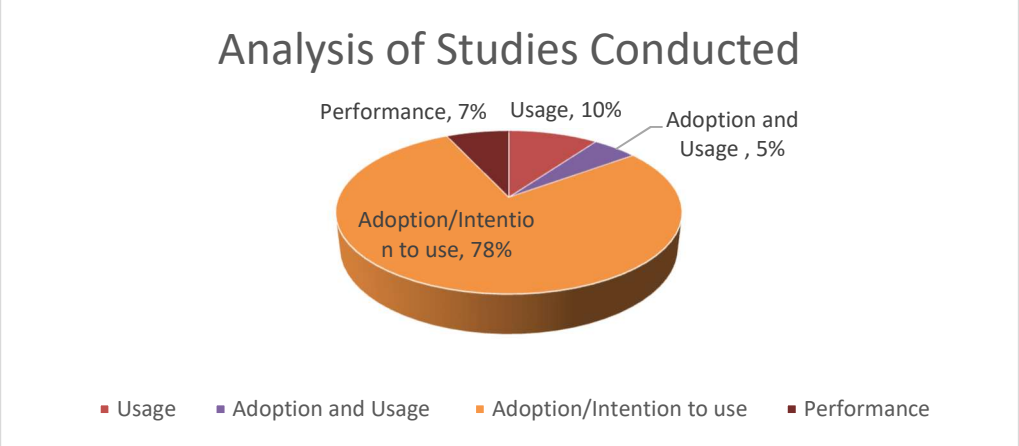

Figure 2: Analysis of Studies Conducted

4.2 Categorization of factors by dimension from peer-reviewed studies

Several researchers have used various theories of technology adoption to conduct studies on the adoption of cloud computing by organizations. These models and theories have highlighted the factors contributing to the adoption and use of cloud computing technology. Based on the literature review and factor similarity, the 36 most frequent influencing factors from past studies were categorized into five dimensions: technological, organizational, environmental, human and business. Table 5 shows the list of 36 factors obtained from the literature analysis, their frequency and dimension.

Table 5. Categorization of factors according to dimensions

DIMENSION	FACTORS	FREQUENCY	TYPE
Technological	Relative advantage	29	Technological
	Compatibility	28	Technological
	Security	24	Technological
	Complexity	21	Technological
	Trialability	11	Technological
	Perceived Usefulness	9	Technological
	Perceived Ease of Use	9	Technological
	IT Knowledge	8	Technological
	Perceived Risk	8	Technological
	Privacy	6	Technological
	Uncertainty	5	Technological
	Reliability	4	Technological
	IT Infrastructure	3	Technological
	Internet availability	2	Technological
	Accessibility	1	Technological
	Intention to use	5	Technological
	Continued usage/actual usage	2	Technological
	Flexibility	1	Technological
	Scalability	1	Technological
	Efficiency	1	Technological
Organizational	Top management support	31	Organizational
	Technology readiness	18	Organizational
	Firm size,	17	Organizational
	Trust	8	Organizational
Environmental	competitive pressure	17	Environmental
	Trading partner pressure	8	Environmental
	Compliance with regulation	8	Environmental
	Cloud Provider Support	4	Environmental
	External Support	4	Environmental
	Image	3	Environmental
	Social Impact	2	Environmental
	Environmental Stimulus	1	Environmental
	Culture	1	Environmental
Human	Personal Innovativeness	9	Human
	workers attitude	1	Human
Business	Cost saving	11	Business

Therefore, a frequency analysis was performed to identify the most important factors based on the number of times they appear in the studies. The results identified thirty-six (36) factors with constant names. Of these, thirteen (13) factors with frequencies from 9 to 31 were rated as the most important. The study shows that top management support (31), relative advantage (29), compatibility (28), security (24) and complexity (21) were very common. This is followed by technological readiness (18), company size (17), competitive pressure (17), trial and error (11), cost savings (11). Perceived usefulness, perceived ease of use, and personal innovativeness have a frequency of (9). IT knowledge, perceived risk, trust, pressure on business partners and regulatory compliance have a frequency (8). Privacy has a frequency of (6), uncertainty and intention to use both have a frequency of (5). Reliability, cloud provider support, and external support have a frequency of (4) each. IT infrastructure and image have frequency (3). Internet availability, sustained use, and social impact have frequency (2). This was followed by flexibility, scalability, efficiency, environmental stimulus, culture and worker attitude, which had the lowest frequency (1).

The findings showed that top management support is the most influential factor and organizational construct factor in TOE. Top management has the authority to accept or reject new technologies for the organization to use (Alsaad et al., 2017). Positive support from top management will impact adoption and implementation of cloud computing, such as new infrastructure budget, training and employee motivation. Top management is the key and decisive factor for project implementation. Supportive management will always motivate employees to do excellent work and help employees feel more comfortable with new technologies.

The findings of the study also revealed that 56% of the influential factors are technological, which had the greatest impact on cloud adoption, use and performance, followed by the environmental dimension with 25%, then 11% organizational, 6% people and finally, 2% of factors related to business, which is considered less significant (Figure 3).

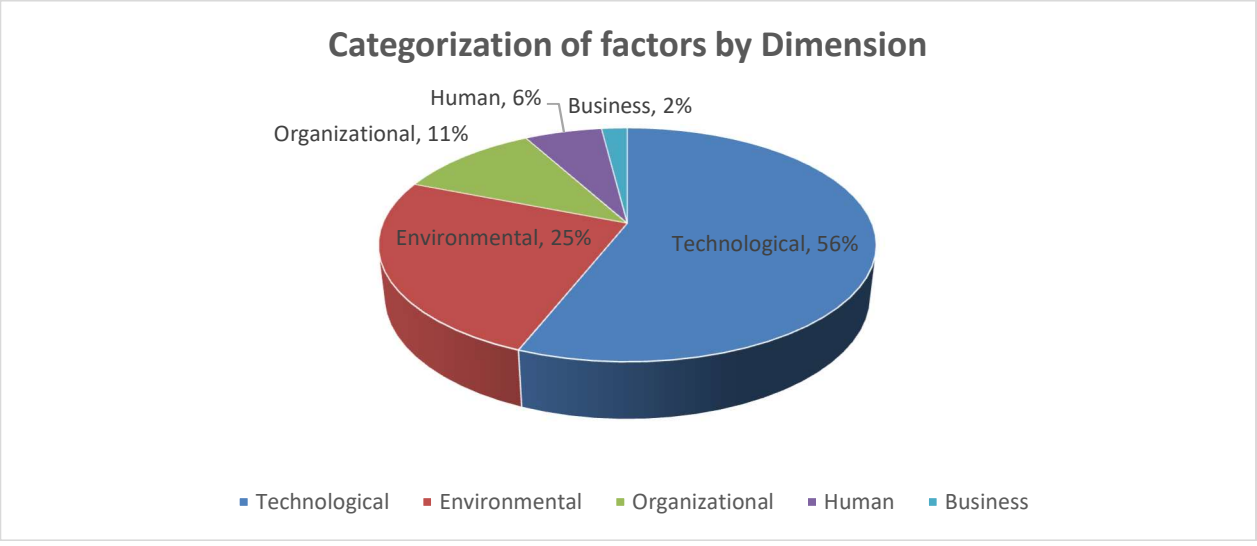

Figure 3: Dimension by factor categorization in reviewed studies

4.3 Use of adoption theory / Model according to peer-reviewed articles

The findings of the study showed that four (4) frameworks/models were mostly used, with TOE being the most prevalent model followed by a combination of TOE & DOI, then TAM and finally UTAUT. Other models were used once in the studies. Table 6 shows the theoretical models. Additionally, some studies deployed a single theoretical model, while others used multiple models. Figure iv shows that 53% of studies used a single theory, while 40% used multiple theories, 7% conducted an overview.

Table 6: Use of Adoption Theory/Model by Reviewed Articles

S/No	Theoretical Model	Frequency of use in the studies
1	TOE	25
2	TOE & DOI	15
3	TAM	6
4	UTAUT	3
5	TOE & Lacovou	1
6	TOE & HOT-FIT	1
7	TOE & TAM	1
8	Tech & Non-Tech	1
9	TOE, IS Triangle & Hot-fit	1
10	DOI & TAM	1
11	TOE & Hofstede	1
12	Fit-viability & DOI	1
13	UTAUT	1
14	TAM, TOE &TPB	1
15	DOI & Task Tech Fit Model	1
16	TAM, TOE & DOI	1
17	Grounded Theory	1
18	Multi-theoretical	1
19	TOE-DOI-DF	1
20	UTAUT-TOE	1
21	Social-influence model	1
22	Dual factor model	1
23	IS continuance model	1
24	DOI	1
25	Social Cognitive theory and TAM	1
26	Social Cognitive theory	1
27	ANT-TOE	1
28	TAM and TRA	1
29	TAM-DEMATEL	1
30	Conceptual risk model	1
31	IS Success model	1
32	DOI & IPV	1
33	Motivators and inhibitors model	1
34	Review/Not stated	5
	Total	**83**

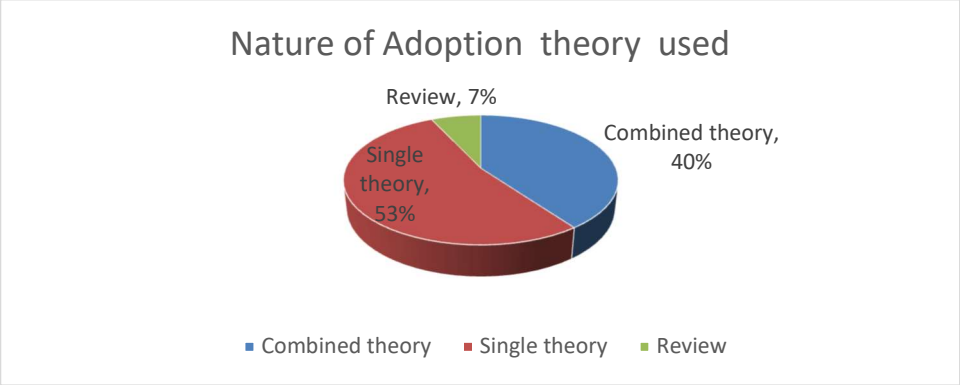

Figure 4: Nature of technology Adoption theory used for Studies

4.4 Studies conducted in sectors

The findings showed that 25% of the studies were conducted on SMEs, followed by IT (17%), education (16%), healthcare (14%), government/public (10%), various industries (7%), manufacturing and services (6%), high technology (4%) and oil and gas (1%).

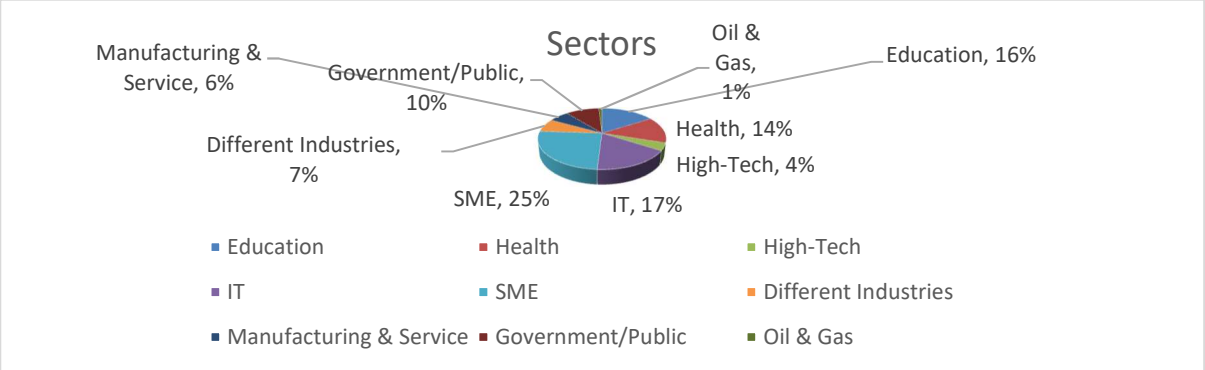

Figure 5: Studies conducted on sectors

4.5 The research method used for the studies

The findings showed that 94% of the researchers, which is the majority, used the quantitative method from the peer-reviewed articles in their studies. While 4% used a mixed method, 2% of the studies were conducted using a qualitative method.

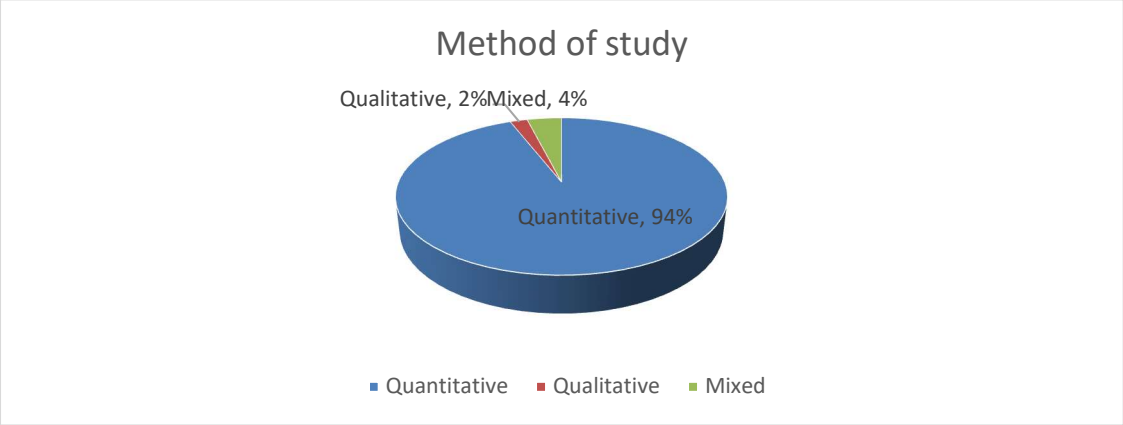

Figure 6: Research Method applied for studies

4.6 Country Distribution according to conducted studies

The findings showed that the majority of studies were conducted in developed countries (55%) and developing countries (45%).

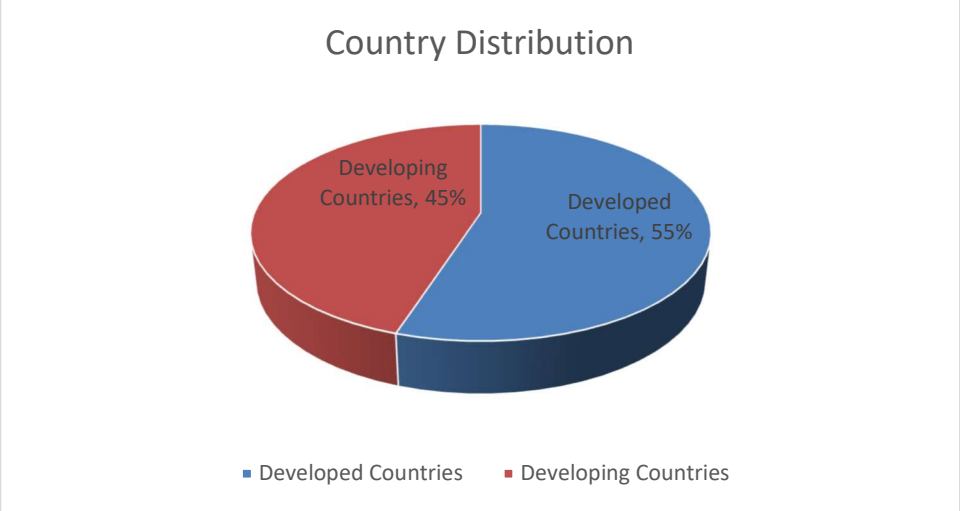

Figure 7: Country Distribution according to conducted studies

5. CONCLUSION

This study reviewed empirical studies on cloud computing adoption in general to identify the relevant factors and underlying theories behind the factors affecting organizational intention to use, actual usage and performance of cloud computing services. Based on frequency analysis, a total of eighty-three (83) articles were reviewed to identify thirty-six (36) factors.

This suggests that the factors have a high potential to influence the intention to use, actual usage and performance of organizations in using cloud computing services. The findings showed that the thirteen (13) most common and most important factors influencing the adoption, use and performance of Cloud Computing services are top management support, relative advantage, compatibility, security, complexity, technology readiness, firm size, competitive pressure, trial, cost savings, perceived usefulness, perceived ease of use and personal innovativeness. The study identified the Technology, Organization and Environment (TOE) framework as the most frequently used theory in the study of cloud computing adoption in peer-reviewed articles. Although the TOE framework has been implemented by many researchers for various technological innovations, some researchers argue that the TOE framework does not include all variables in every context. Therefore, for the adoption of new complex technologies such as Cloud Computing, more than one theoretical framework is needed to convey a better understanding of adoption decisions (Low et al., 2011). The gaps found in current models, as identified by the study, explain the need for further research aimed at providing models with higher explanatory power. The study proposed an integrated model that examines in detail the key usage intention, cloud usage and fit construct, as well as the relationship between satisfaction and performance outcomes when using cloud services.

The literature has clarified that there are different motivations for potential adopters and existing users of Cloud Computing services. Thus, the contributions of this study are that it provides a comprehensive view of the decision-making process of cloud computing adoption, use, and performance. This study also provides managers with practical insights for adopting cloud computing during each stage of the adoption process. It contributes to the understanding of progressive changes in the impact of behavioural beliefs and cognitive factors on the behavioural intention to use cloud computing in adopting and non-adopter firms. This is one of the first studies to conduct a longitudinal analysis to determine the factors that influence behavioural intention, usage behavior, and performance of cloud computing services. This study is also the first of its kind to identify differentiating factors related to behavioural intention to use cloud computing from adopters to non-adopters. This review unifies the literature and can be of benefit to decision-makers in organizations that intend to adopt or use cloud computing services. In addition, it laid the groundwork for the future part of this work, which presents a conceptualization of a model for cloud computing adoption, usage, and performance.

5.1 Recommendations for future research

This finding is based solely on an extensive literature review; thus, it is likely that some other influencing factors are missing in real cases. Therefore, future research should design an appropriate model that can be tested to measure validity and reliability using appropriate statistical and quantitative tools.

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