

## Systematic Investigation of Influential Adopting Factors of Software as a Service (SaaS) in SMEs

Zulfiqar Hussain Pathan<sup>1,3</sup>, M. Zahid Tunio<sup>2,5</sup>, Zahid Latif<sup>1</sup>, Suhail Memon<sup>1</sup>, Zuhaib Hassan Qureshi<sup>4</sup>

<sup>1</sup>School of Economics and Management, Beijing University of Posts and Telecommunications, China

<sup>2</sup>School of Software Engineering Beijing University of Posts & Telecommunication, China

<sup>3</sup>Mehran University of Engineering & Technology, Jamshoro, Pakistan.

<sup>4</sup>Universiti Kuala Lumpur Business School, Universiti Kuala Lumpur, Malaysia.

<sup>5</sup>Dawood University of Engineering & Technology, Karachi

### \*Corresponding author

Zulfiqar Hussain Pathan

### Article History

Received: 09.09.2017

Accepted: 15.09.2017

Published: 30.09.2017

### DOI:

10.21276/sjbms.2017.2.9.3



**Abstract:** Cloud computing is a new technological paradigm that offers very powerful computing and cost effective, scalable network services to its end-users / organizations without considering the firm size. Aim of this study is to review systematically the influential adopting factors of Software as a Service (SaaS) by Small and Medium Enterprises (SMEs). Thirty-three research papers have been reviewed attentively from different quality journals and valid conference reports which were published on integration of SaaS and Cloud Computing in SMEs. Increasing number of studies conducted in the last half decade on the factor adoption reflects that organizations whether small or medium are very eager and enthusiastic to integrate SaaS framework in order to get competitive advantages and proliferation of business. Findings of this study segregated innovation variables and recapped TOE as I-TOE (innovational, technological, organizational and environmental perspectives) are the most influential adopting factors of SaaS in the context of SMEs.

**Keywords:** Software as a Service, SMEs, TOE, I-TOE, cloud computing

### INTRODUCTION

Rapid technological developments have given birth to various novel disruptive technologies, like cloud computing, big data, Internet of Thing (IoT) and internet plus. These strong technological platforms provide economic, effective, efficient methods for small scale firms in order to sustain their growth and development [1].

Limited capital investment and IT resources usually resist small and medium scale enterprises from the adoption of advanced technologies [2]. In addition to that governmental ignorance is also found a serious cause of the low diffusion rate of technologies in SMEs [3]. Like large scale firms, SMEs are not enjoying IT potential and services, due to low IT financial capital, minimum IT oriented staff and heavy maintenance cost of IT infrastructure. However, literature revealed that SMEs are more flexible to add or remove IT services from their business processes [4-6]. Due to small business nature, SMEs can adopt and de-adopt disruptive technology quicker, while for larger organizations it is not much easy to embrace of technologies, due to their long term planning.

Most inhibiting forces behind the slow adoption of technologies by SMEs are limited financial assets, lack of IT skilled work force, high cost of IT maintenance, unavailability of IT infrastructure and incomplete IT securities issues [7,8]. To cope up with these serious issues now-a-days, SMEs need to adopt most novel, cost effective and strong cloud services like

Software as a service (SaaS) according to their business nature and scope. Since SaaS offered various cost effective business applications for all kinds of firms particularly SMEs [9]. Moreover, SaaS also provides global access, vast storage of data, easily recoverable of data, without heavy capital investment of IT infrastructure along with very reasonable maintenance cost of services [10,11]. Therefore, SaaS framework offers an appealing alternative to SMEs in order to minimize the adoptional challenges.

Additionally, SaaS could provide scalable, accessible, flexible, simple deployed mechanism and services to SMEs at very reasonable price [12]. SMEs can get benefits those could not afford expensive IT infrastructure including hardware & software, applications and services without considering geographical boundaries, by an economics royalty payment process [13].

Several studies have already been conducted on the adoptional perspectives those were been supported by various theoretical backgrounds, their

findings revealed the technological diffusion rate affecting by several adopting factors at different time span. Although many empirical studies also explored factors those explains general propensity of the firms to add and use some particular technologies [14]. The main purpose of this study is to investigate the most influential adopting variables of SaaS by SMEs with the help of an in-depth and systematic literature review.

### **SaaS Advantages and Problems in SMES Perspective**

SaaS framework is a type of Cloud computing service, which usually provide business application software, like customer relation management (CRM), enterprise resource planning (ERP), enterprise asset management (EAM), inventory control (IC), supply chain management (SCM) via internet connectivity [15]. According to business nature, SMEs send request for cloud based service, then SaaS transform the real business processes of an organizations, designed real time apps or services at an affordable price, providing uncountable computing capabilities, with more scalable, flexible, and easy accessible services on the internet in order to achieve the business performance and growth [16,17 & 18]. For all size of enterprises, SaaS handover fast business integrated solution [9]. Basically, SaaS is an application / service which is delivered from centralized data centers via internet connectivity, allowing access, however end-user rent the services from centralized data source [16]. In the context of SMEs, literature described that SaaS offers various advantages including; no heavy IT infrastructural investment required, minimum total capital of ownership, low maintenance cost, no requirement of software or hardware licensing, minimum IT skilled staff, vast data storage capacity, fast retrieval of data at anytime from anywhere and data Connectivity [19,6,20 & 21]. Therefore, cloud based services particularly SaaS are well suited model for small scale firms [22] due to its cost effectiveness and efficient resource allocations.

However, still in developing countries particularly SMEs belongs to south east Asian location have not adopted yet cloud based services [1]. The reasons behind this scenario identified from literature and explored that maturity level related to cost and safety, risk assessment [22], lack of trust [23], cost management for SaaS [24], problems of data security, safety and protection [25, 26, 16, 27]. Even that executive level staff need to understand more in detail about the cloud computing service and should apply according to their business parameters [6].

### **Pattern of Research**

For this study, initially the collected research papers on adoption of software as a service have been reviewed. As this is newly emerged phenomena,

therefore it is better option to explore standard science related online data bases instead of a library search [27]. By applying first search total 130 research articles were found on the adoptional studies which have been published till February, 2017. The search process consisted of web of science, web of knowledge, IEEE Xplore, Blackwell online library, digital library, Emerald insights, ProQuest and AISel. As these online databases are more authentic, reliable, high quality papers and conference proceedings providers in the field of selected domain. Different terminology regarding the adoption, integration, diffusion, acceptance of technology along with software as a service in the specific domain of SMEs have been used to search in order to make sure the relevancy of articles.

In the next phase filtration of collected papers has carried out. Filtering process consisted of the manuscript those are in press and ready for publications and articles that were not composed in English. This filtration process eliminated the irrelevant studies [28]. The central idea and abstract of those selected papers have been carefully reviewed and only 33 papers selected for this study. Therefore, the remaining articles were omitted because of irrelevancy and out of scope of SMEs.

In the third step of research pattern extraction of data has been done. Various theories, framework and models have been used by several research scholars in order to support their studies. For the purpose of extraction of data, a pre-defined form has been designed to dig out most relevant information required from the reviewed papers according to research goals. In the designed form, the information collected about the core findings, variables, theories, framework, hypothetical assumptions, research methods used and applied analytical approach. The results of this extraction process provide exact data regarding methodology, proposed framework, supported theories, hypothetical statements and core findings. These outcomes are reviewed with very proper attentive and careful manner.

### **RESULTS**

Since 2009, publication process of papers related to terms of cloud computing, SaaS “diffusion”, “adoption”, “integration” and “acceptance” was started. No paper related to these terms published before the aforementioned time series. The first click on search given 130 published articles on the Software as a Service adoption within the time frame of 2011 to 2016, it clearly indicates the interest of researchers in the SaaS. Fig. 1, presents the statics of published papers on the chosen topic. These papers were published on technological adoption topic but in various fields like in education, health, large scale organizations and SMEs. Therefore, the second step of research pattern that is filtration was employed. Thirty-three papers scrutinized

after applying filtrations technique which are found more relevant to the selected topic and were being reviewed deeply. Fig 1b. presents the number of papers published after filtrations process. The third step of this

study research patterns provide the core and fundamental variables those were been identified by the scholar, the results of extraction has been tabulated in table 1.

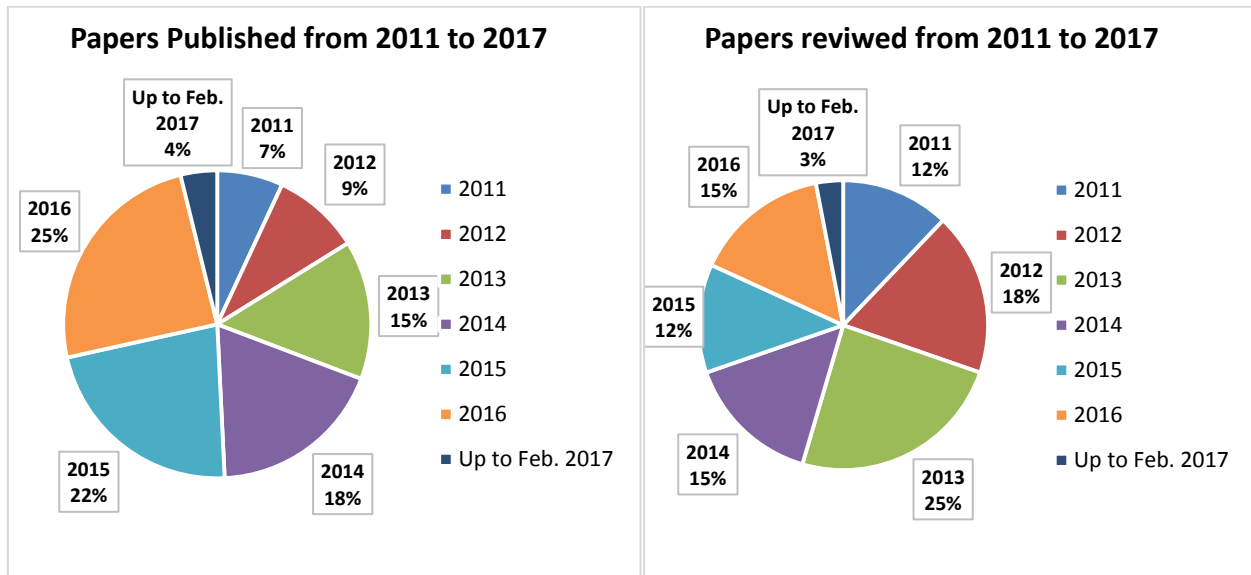
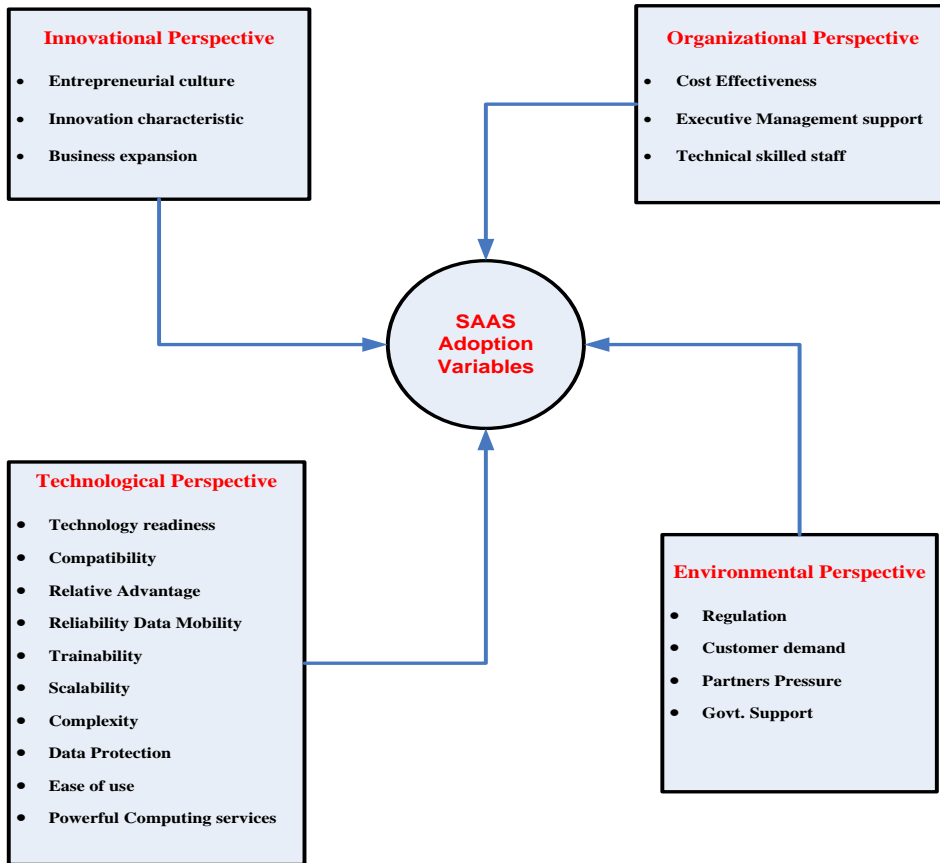


Fig-1: (a) Number of published papers on CC (b) Number of Papers reviewed after filtration

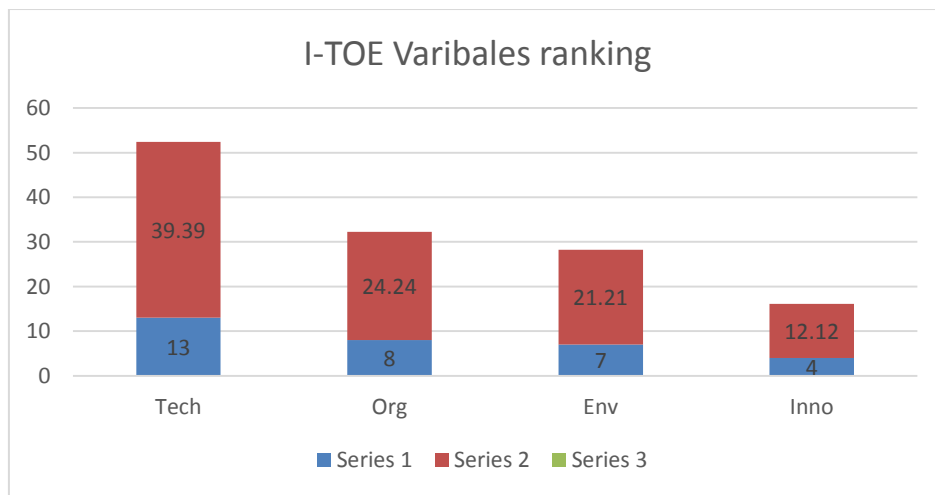
Table-1: Literature insights for core variable of Cloud Computing service / SaaS adoption

S. #	Group	Core Findings (Variables)	Theory / Mode	Author	Year	
1	Innovational Perspective	Entrepreneurial culture	RBV	[21]	2016	
			DOI	[29]	2013	
		Innovation characteristic	TOE / DOI	[8]	2014	
		Business expansion		[30]	2014	
2	Technological Perspective	Technology readiness	TOE	[31]	2016	
			TOE	[17][9]	2011	
			TOE	[7]	2013	
			TOE / DOI	[8]	2014	
		Compatibility	TOE	[31]	2016	
			TOE	[32]	2013	
			TOE	[7]	2013	
			DOI	[29]	2013	
		Relative Advantage	TOE	[31]	2016	
			TOE	[32]	2013	
			TOE	[31]	2016	
			TOE	[7]	2013	
				TOE / DOI	[8]	2014
					[33]	2013
				TOE	[31]	2016
				Reliability		[34]
				[18]	2015	
		RBV	[21]	2016		
		Data Mobility	TOE	[35]	2015	
		Trainability	TOE	[32]	2013	

		Scalability		[18]	2015
				[30]	2014
				[12]	2016
		Complexity	TOE	[7]	2013
			TOE / DOI	[8]	2014
				[11]	2012
		Data Protection		[34]	2013
		Ease of use		[34]	2013
Powerful Computing services		[12]	2016		
3	Organizational Perspective	Cost Effectiveness		[34]	2013
				[30]	2014
				[12]	2016
		Executive Management support	TOE	[35]	2015
			TOE	[31]	2016
			TOE	[17]	2011
			TOE	[7]	2013
		Affordability	TOE / DOI	[8]	2014
TOE	[31]		2016		
	[12]		2016		
4	Environmental Perspective	Competitive pressure	TOE	[35]	2015
			TOE	[31]	2016
				[34]	2013
			TOE / DOI	[8]	2014
			TOE	[31]	2016
		Regulation		[36]	2016
			TOE	[31]	2016
		Customer demand	TOE / DOI	[8]	2014
		Partners Pressure	TOE	[31]	2016
			TOE	[17]	2011
			TOE	[31]	2016
Govt. Support		[36]	2016		



**Fig-2: Core Variables for SAAS Adoption by SMEs (I-TOE) Modified**



**Fig-3: Identified Core variables ranked according to previous studies**

**DISCUSSION**

The revision of research papers clearly indicates that, most of the research scholars conducted their studies relevant to adoption factor have scientifically supported their work by TOE model. Since this review has been carried out according to research topic entitled and consist of only last half decade. Therefore the adoption of SAAS by SMEs also largely depend up on TOE but in addition to that the new variable of innovational perspective has been

added in this study. The core findings of previous studies merged many sub innovative factors with technology, organization and environmental (TOE), however this study segregated this new variable from the literature. Due to entrepreneurial culture and characteristics, novel business ideas come under the domain of innovational paradigm. Therefore, this study found all the variables those significantly influence the adoption of cloud based service like SaaS, IaaS and PaaS in the SMEs context and recapped TOE as I-TOE.

Usually, the findings of previous studies in the selected area belong to either developed or most developing countries, but now there are many opportunities available for SMEs sector in developing countries or least developing countries. Cited literature revealed that, small and medium enterprises are seriously affected by the lack of financial resources, unavailability of IT infrastructure, excessive paid salaries to IT skilled staff and heavy maintenance cost of IT equipment's / infrastructure. These variables are acting as inhibitors in the process of technological adoption and are the main reasons which negatively affect the performance, growth and development of SMEs particularly in developing countries like Pakistan, Srilanka, Bangladesh. So in order to overcome these challenges, the technological developments open new avenues for small businesses to adopt cost effective model like SaaS, and might empower the growth rate of SMEs.

SMEs have great importance in all over the world. These small business elements significantly contributed a healthy share in the GDP, reduce the poverty edge, provide numerous employment options and open export avenues. But in this digital age, SMEs must need to integrate novel technology according to their business scope in order to avoid the failure or shut down of their business.

Adoption process of technologies in SMEs context is very complex [37], but even that SMEs are being pushed by various driving forces to integrate with sophisticated ICT solutions according to their business nature and scope. According to literature, the organizational perspectives pressures are measured by the size of firm, executive managerial commitments & support, availability of IT oriented staff, while the environmental pressures are measured by the customer demand, partner requirements, flexible policy regulations and governmental organizations supports [38]. Furthermore, the technological aspect of adoption investigated as a determinant variable of TOE, measured by availability of advance technologies, accessibility, scalability, reliability, compatibility, data mobility, data connectivity, relative advantage, data protection, data security, data safety, data recovery, data storage. All these variables attract the adoption process of novel technologies like SaaS. Furthermore, the new added variable in TOE framework from innovational perspective is measured by entrepreneurial culture of organization and innovative characteristics of organizations [39]. Re-designed I-TOE framework is new adoption process model of technologies has been proposed to SMEs, which effectively stimulate the advantages for SMEs. All the cited variables are correlated with depended variable in fig. 2. Additionally, fig. 3 presents the ranking scale of I-TOE,

previous studies already investigated that most of scholars and authors explored the adoption of SaaS pushed by technological factor and around 39.39% studies found this factor as significant, followed by organizational factor that calculated as 24.24%. The environmental variable has been examined as significant in about 21.21% studies within the timeline as mentioned in the earlier section of this study. The new segregated variable of this study is novel categorized factor that put pressure on SMEs in order to integrate SaaS, has been calculated about 12.12%.

## CONCLUSION

The results of this systematic review conducted in the timeline of (2011 ~2016) on the adoption studies of cloud computing / SaaS by SMEs presents that technological factor is more enabler driving force and significant than innovational, organizational and environmental context. However, these factors also have marginal significance in the adoption process of SaaS This review endeavored to describe pattern in the the reception of Cloud based service of SaaS inside SMEs. The fundamental objective was to show the ebb and flow condition of research attempts in the reception of cloud computing inside SMEs, uncover any gaps, and propose future directions. Despite the fact that all endeavors were made among the eight noteworthy databases, this review can't be considered comprehensive because of the different outlets for productions of inquiry about cloud computing and the consistent increment in journals around the globe.

## Limitations and Future Research Direction

This study only conducted an in-depth literature review on a specific topic of SaaS adoption in the small and medium size business units within a time frame limit of 2011 to 2016, however findings only based on secondary source data and analyzed results those are being presented by frequency distribution method. This study attempt to fill the scarcity in the existing literature. Moreover, this study also put future research directions like to conduct empirical studies on the afore mentioned areas in many numerous different geographical locations by applying various analyzing tools and techniques in order to validate their findings. These findings may open new innovative and cost effective avenues for small and medium scale enterprises.

## REFERENCES

1. Li, Q., Wang, C., Wu, J., Li, J., & Wang, Z. Y. (2011). Towards the business-information technology alignment in cloud computing environment: an approach based on collaboration points and agents. *International Journal of Computer Integrated Manufacturing*, 24(11), 1038-1057.



2. Dai, W. (2010). The Impact of Emerging Technologies on Small and Medium Enterprises (SMEs). *Journal of Business Systems, Governance & Ethics*, 4(4).
3. Pathan, Z. H., Jianqiu, Z., Akram, U., Khan, M. K., Latif, Z., & Tunio, M. Z. (2017). Innovation-diffusion determinants of cloud-computing adoption by Pakistani SMEs. *Human Systems Management*, 36(3), 197-209.
4. Al-Qirim, N. A. (Ed.). (2004). *Electronic commerce in small to medium-sized enterprises: Frameworks, issues, and implications*. Igi Global.
5. Consoli, D. (2012). Literature analysis on determinant factors and the impact of ICT in SMEs. *Procedia-social and behavioral sciences*, 62, 93-97.
6. McAfee, A. (2011). What every CEO needs to know about the cloud. *Harvard Business Review*, 89(11), 124-132.
7. Makena, J. N. (2013). Factors that affect cloud computing adoption by small and medium enterprises in Kenya. *International Journal of Computer Applications Technology and Research*, 2(5), 517-meta.
8. Oliveira, T., Thomas, M., & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & Management*, 51(5), 497-510.
9. Haselmann, T., & Vossen, G. (2011, October). Software-as-a-service in small and medium enterprises: an empirical attitude assessment. In *International Conference on Web Information Systems Engineering* (pp. 43-56). Springer, Berlin, Heidelberg.
10. Bhat, J. M. (2013). Adoption of cloud computing by SMEs in India: a study of the institutional factors.
11. Venkatachalam, N., Fielt, E., Rosemann, M., & Mathews, S. (2012). Small and medium enterprises sourcing software as a service—a dynamic perspective on IS capabilities. *Small*, 7, 15-2012.
12. Kumar, D., & Samalia, H. V. (2016, October). Investigating Factors Affecting Cloud Computing Adoption by SMEs in Himachal Pradesh. In *Cloud Computing in Emerging Markets (CCEM), 2016 IEEE International Conference on* (pp. 9-16). IEEE.
13. Alkawsji, G. A., Mahmood, A. K., & Baashar, Y. M. (2015, May). Factors influencing the adoption of cloud computing in SME: A systematic review. In *Mathematical Sciences and Computing Research (iSMSC), International Symposium on* (pp. 220-225). IEEE.
14. Kitchenham, B. (2004). Procedures for performing systematic reviews. *Keele, UK, Keele University*, 33(2004), 1-26.
15. Ruivo, P., Oliveira, T., & Neto, M. (2015). Using resource-based view theory to assess the value of ERP commercial-packages in SMEs. *Computers in Industry*, 73, 105-116.
16. Hoch, F., Kerr, M., & Griffith, A. (2001). Software as a service: Strategic backgrounder. *Software & Information Industry Association (SIIA)*.
17. Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial management & data systems*, 111(7), 1006-1023.
18. Sultan, N. A. (2011). Reaching for the “cloud”: How SMEs can manage. *International journal of information management*, 31(3), 272-278.
19. Hofmann, P., & Woods, D. (2010). Cloud computing: The limits of public clouds for business applications. *IEEE Internet Computing*, 14(6), 90-93.
20. Saeed, I., Juell-Skielse, G., & Uppström, E. (2012). Cloud enterprise resource planning adoption: Motives & barriers. *Advances in Enterprise Information Systems II*, 429.
21. Salleh, S. M., Teoh, S. Y., & Chan, C. (2012, July). Cloud Enterprise Systems: A Review Of Literature And Its Adoption. In *PACIS* (p. 76).
22. Prasad, A., Green, P., & Heales, J. (2014). On cloud computing service considerations for the small and medium enterprises. In *Americas Conference on Information Systems*. Association of Information Systems-AIS.
23. Kett, H., Kasper, H., Falkner, J., & Weisbecker, A. (2012, November). Trust factors for the usage of cloud computing in small and medium sized craft enterprises. In *International Conference on Grid Economics and Business Models* (pp. 169-181). Springer, Berlin, Heidelberg.
24. Kuada, E., Adanu, K., & Olesen, H. (2013, July). Cloud computing and information technology resource cost management for SMEs. In *EUROCON, 2013 IEEE* (pp. 258-266). IEEE.
25. Carcary, M., Doherty, E., & Conway, G. (2013, September). Understanding and Supporting Cloud Computing Adoption in Irish Small and Medium Sized Enterprises (SMEs). In *European Conference on Information Management and Evaluation* (p. 10). Academic Conferences International Limited.
26. Abubakar, D. A., Bass, J., & Allison, I. (2014). Cloud Computing: Adoption Issues for Sub-Saharan Africa SMEs. *The Electronic Journal of Information Systems in Developing Countries*.
27. Yang, H., & Tate, M. (2012). A descriptive literature review and classification of cloud computing research. *CAIS*, 31, 2.
28. Okoli, C., & Schabram, K. (2010). A guide to conducting a systematic literature review of information systems research.
29. Wu, Y., Cegielski, C. G., Hazen, B. T., & Hall, D. J. (2013). Cloud computing in support of supply

- chain information system infrastructure: understanding when to go to the cloud. *Journal of Supply Chain Management*, 49(3), 25-41.
30. Yeboah-Boateng, E. O., & Essandoh, K. A. (2014). Factors influencing the adoption of cloud computing by small and medium enterprises in developing economies. *International Journal of Emerging Science and Engineering*, 2(4), 13-20.
  31. Senyo, P. K., Effah, J., & Addae, E. (2016). Preliminary insight into cloud computing adoption in a developing country. *Journal of Enterprise Information Management*, 29(4), 505-524.
  32. Alshamaila, Y., Papagiannidis, S., & 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.
  33. Seethamraju, R. (2013). Determinants of SaaS ERP Systems Adoption. In *PACIS* (p. 244).
  34. Gupta, P., Seetharaman, A., & 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.
  35. Wilson, B. M. R., Khazaei, B., & Hirsch, L. (2015, November). Enablers and barriers of cloud adoption among Small and Medium Enterprises in Tamil Nadu. In *Cloud Computing in Emerging Markets (CCEM), 2015 IEEE International Conference on* (pp. 140-145). IEEE.
  36. Saedi, A. (2016, August). Cloud computing adoption framework: Innovation translation approach. In *Computer and Information Sciences (ICCOINS), 2016 3rd International Conference on* (pp. 153-157). IEEE.
  37. Spinelli, R., Dyerson, R., & Harindranath, G. (2013). IT readiness in small firms. *Journal of Small Business and Enterprise Development*, 20(4), 807-823.
  38. Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing—The business perspective. *Decision support systems*, 51(1), 176-189.
  39. Prasad, A., Green, P., & Heales, J. (2014). On cloud computing service considerations for the small and medium enterprises. In *Americas Conference on Information Systems*. Association of Information Systems-AIS.