Original Research Article

Small and Medium Enterprises (SMEs): Key Factors Affecting the Adoption of Cloud Computing

Saud Ilahi[1*], Raziuddin Mohammed[2], Anis Souissi[2], Mohammed Yahya N Hamati[2], Rafik Smida[3]

[1]Assistant Professor, Department of Business Administration, Jazan University, KSA
[2]Lecturer, Department of Business Administration, Jazan University, KSA
[3]Lecturer, Department of Finance and Banking, Jazan University, KSA

*Corresponding author: Dr. Saud Ilahi
Assistant Professor, Department of Business Administration, Jazan University, KSA

Abstract

Cloud computing is a widely recognized innovative technology that has influenced various organizations including SMEs. It has emerged as one of the most debated themes among industrialists and technocrats worldwide to keep them abreast in the competitive environment. This research employs a comprehensive literature review to analyze research theories and frameworks, data collection methods, cloud-based services, and especially key adoption determinants of cloud computing services by SMEs. By analyzing the TOE framework this study has found a strong bond among the three elements that are technological, organizational, and environmental of this framework. The key determinants that played a major role in the adoption of cloud computing services by SMEs were: relative advantage, top management support, technical readiness, and competitive pressure.
Keywords: Small and Medium Enterprises (SMEs), Cloud advantages, Factors affecting cloud computing adoption.

INTRODUCTION

Over the years, cloud computing has become essential for most businesses and households worldwide. It has changed the way IT solutions are supplied and consumed by the end-users. Cloud computing has switched the traditional way of managing applications. Cloud trends are impelling organizations' digital business decision-making processes, investment plans, vendor and technology choices. It enables the efficacious and speedier adaptation and operation of corporate activities in fluctuating market situations. Now a day every organization is using some cloud computing services in day-to-day business activities even without realizing it (S. C. Nair, 2012). The global cloud services market size was valued at USD 454.20 billion in 2022 and it is anticipated to increase continuously, rising at a registered CAGR of 17.10% from 2023 to 2032 (Figure 1).
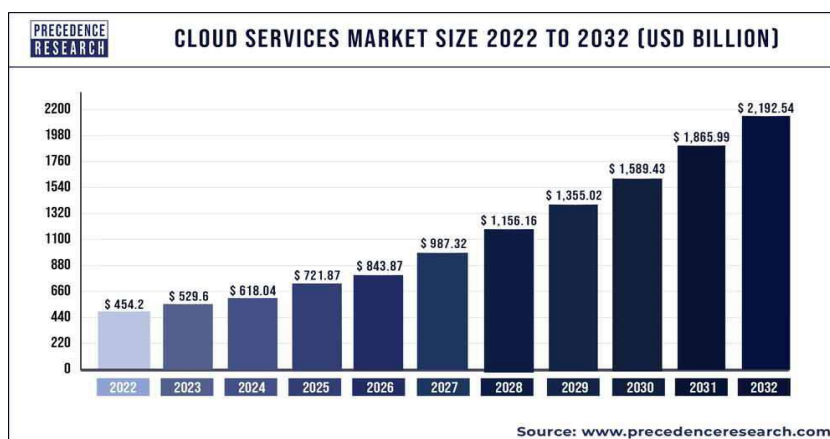

Figure 1: Cloud Service Market Size

Before proceeding further with a discussion of our conceptual framework it is essential first to define cloud computing. Cloud computing services have been defined in many ways, typically focusing on technical and service features.

Plummer *et al.*, (2008) defined cloud computing as "a style of computing where massively scalable IT-related capabilities are provided as a service using Internet technologies to multiple external customers". According to Wang *et al.*, (2010), cloud computing is "a set of network-enabled services, providing scalable, QoS guaranteed, normally personalized, inexpensive computing platforms on demand, which could be accessed in a simple and pervasive way". As per Leimeister *et al.*, (2010), many researchers mention cloud computing as a new paradigm and emerging technology (Lyer and Henderson, 2010; Zhang *et al.*, 2010), while others (Youseff *et al.*, 2008; Foster *et al.*, 2008; Dillon *et al.*, 2010) assume it is not really a new concept, as it uses traditional computing technologies. The National Institute of Standards and Technology (NIST) states that Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

In simple words, we can say, "Cloud computing is the on-demand delivery of information technology resources hosted on the internet such as data storage, networking, servers, databases, and software.

Cloud computing can be categorized based on the service model or the deployment model. The services hosted on the cloud can be divided into; Software as a service (SaaS), which serves the end user, Platform as a service (PaaS), which serves the application developers and Infrastructure as a service (IaaS), which serves the network architects (Goscinski, A., M. Brock, 2010). Based on the specific deployment model, it can be classified as a public cloud, private cloud, or a hybrid model cloud; depending on the relationship between the provider and the consumer (Buyya, R. *et al.*, 2011).

Cloud computing in Small and Medium Enterprises (SMEs)

SMEs are considered as an engine of economic growth and development. They provide employment opportunities, engage local youth, open new workplaces moreover, they contribute immensely to the sustainable growth of an economy. SMEs understand the needs of their local community; they are more likely to survive economic fluctuations by adapting themselves to the needs of the community. In the dynamic business environment, entrepreneurs are identifying new opportunities and setting up enterprises with the help of local community and government support systems, thereby contributing immensely to the development of the nation.

The use of information technologies can improve business competitiveness with numerous advantages for small and medium-sized enterprises (SMEs) enabling them to compete with large firms (Swash, 1998; Bayo-Moriones and Lera-Ló´pez, 2007). Besides large enterprises, cloud computing is also in the interest of small- and medium-sized enterprises as they tend to have limited resources in terms of money, expertise, and time (Jain Bhardwaj, 2010, Cragg and King, 1993; Wymer and Regan, 2005). Owing to limited resources SMEs face the challenges of adopting cloud-based services as compared to larger enterprises. The use of information and communication technology improves business competitiveness, and delivers genuine rewards for SMEs, enabling them to compete with large enterprises (Alpar, P. and S. Reeves, 1990). Some of the cloud applications often used by small businesses are website hosting, e-mail, file servers, and related features (Kwaku *et al.*, 2016). SMEs have different issues of acceptance of cloud computing as compared to large-scale enterprises. Practically, SMEs data in the cloud is often more secure than in-house data, which often lacks staff with technical expertise. (Javaid, M. A., 2014). Competition in the business market prompts enterprises to upgrade skills and technology for producing intended goods and services (Pauly, M., 2011). SMEs with limited resources face problems in upgrading their IT requirements but they understand the role of updated technology in the survival and success of their enterprises in the competitive environment. (Moneer Jlelaty, Y.M., 2012). Recently cloud computing acceptance has increased vastly among SMEs. For instance, in the UK acceptance rate is quite high with organizations investing more in hybrid clouds According to Neves *et al.*, (2011), cloud computing services and deploying models, offer the opportunity for SMEs to subscribe to pay-per-use at an affordable price and accomplish their operational needs to access platform, infrastructure and software over the Internet, without maintaining the services themselves.

Despite different perceived benefits of cloud-based technology, many organizations especially, SMEs are still uncertain while, large organizations are more open to this idea, so the number of cloud computing adoptions is increasing gradually (K. Hashizume *et al.*, 2013). Alshamaila, Y., & Papagiannidis, S.(2013) propounded that SMEs who didn't adopt cloud services claimed that the benefits of having cloud computing systems were not clear to them, and they were satisfied with existing infrastructure to meet their operational needs. A review of cloud computing studies indicates that the acceptance rate of cloud computing is slower than the anticipated rate (M. H. Raza *et al.*, 2015). Benefits of cloud computing for SMEs

Cloud computing is now growing rapidly and organizations of all shapes and sizes adapting to this new technology. IT experts believe that cloud-based services will continue to grow and develop even further in the coming few years. While cloud computing is undoubtedly beneficial for mid-size to large companies, it is not without its downsides, especially for smaller businesses. Figure 2 depicts the main advantages of cloud computing.
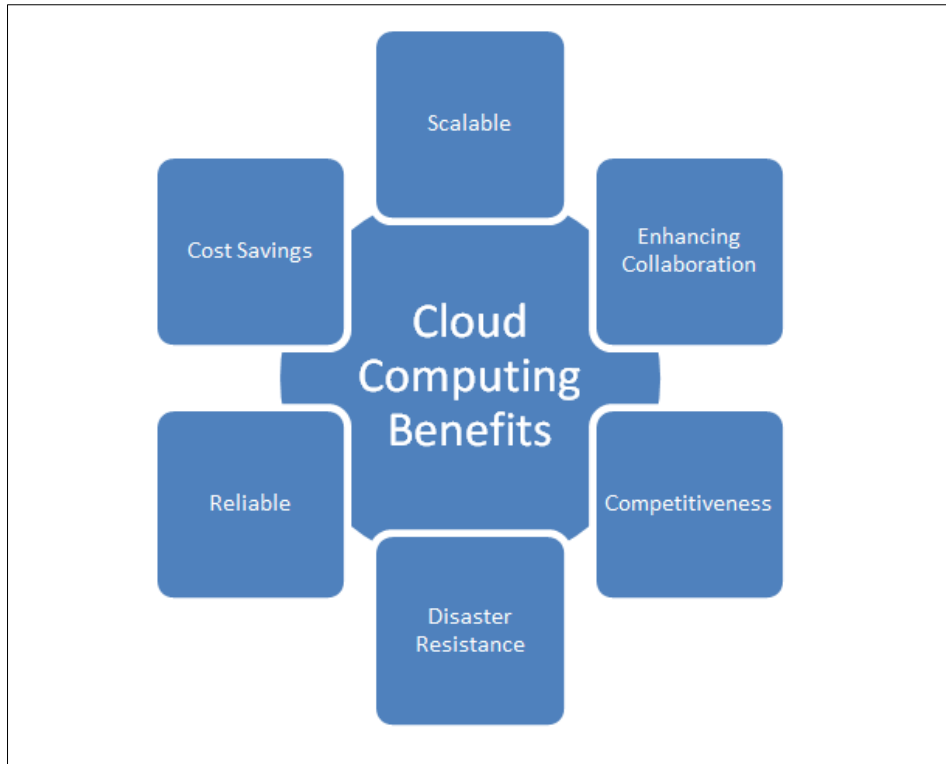
Figure 2: Benefits of cloud computing

Cost Saving:
Cloud computing can significantly reduce the cost of hardware, software, and maintenance, freeing up funds for other uses. Cloud computing is cost-effective and suitable for SMEs (Adane, 2018). In another study, Rath *et al*., (2012) propounded that affordability is the most striking aspect of cloud computing for SMEs, particularly in developing economies.

Enhancing Collaboration:
Cloud computing enhances collaboration by providing a centralized platform for data storage, IT management, share data and applications from any location. (Bartoletti, 2017). This improves team collaboration and resource sharing Korongo *et al*., (2013) mentioned that cloud computing facilitates collaboration between cross-functional teams through resource sharing and better usage of hardware, and removes duplication through integrated product teams that concentrate on creating customer-centric products.

Scalable:
Cloud computing allows SMEs to scale up or down depending on their needs without having to invest in required hardware or software, allowing them to respond quickly to the changes in demand. The scalability of computing resources is an important aspect of cloud-based technology for entrepreneurs (Tripathi & Jigeesh, 2013).

Reliable:
Cloud computing also offers improved security and reliability. Data is stored in secured, off-site servers that are backed up frequently, which eliminates the need for SMEs to manage their own networks and encounter unexpected hardware or software issues. Moreover, the levels of security are higher than most organizations can provide on their own. Cloud computing removes the need for physical security needed to protect IT infrastructure (Lalev, 2017)

Disaster Resistance:
Cloud computing safely stores and protects data. In the event of some crisis at the business premises, losing important data can devastate the enterprises. Data backup service providers conveyed this message a long ago, thereby providing the solution to this grave problem with the availability of cloud services

Competitiveness:
Cloud computing services offer enterprises competitive advantages by allowing them to optimize

expenses and achieve increased financial flexibility. Sheedy (2018) asserted that organizations that are using the public cloud are more competitive and promptly create new customer value by strengthening the ecosystem of partners and independent service providers.

This paper has used the technology, organization, and environment (TOE) framework presented by DePietro *et al.*, (1990) later which has been successfully applied to various studies. TOE was designed to cover organizations' applications in adopting and implementing technical innovations. In Figure 3, the main variables considered for each of the three contexts have been outlined.
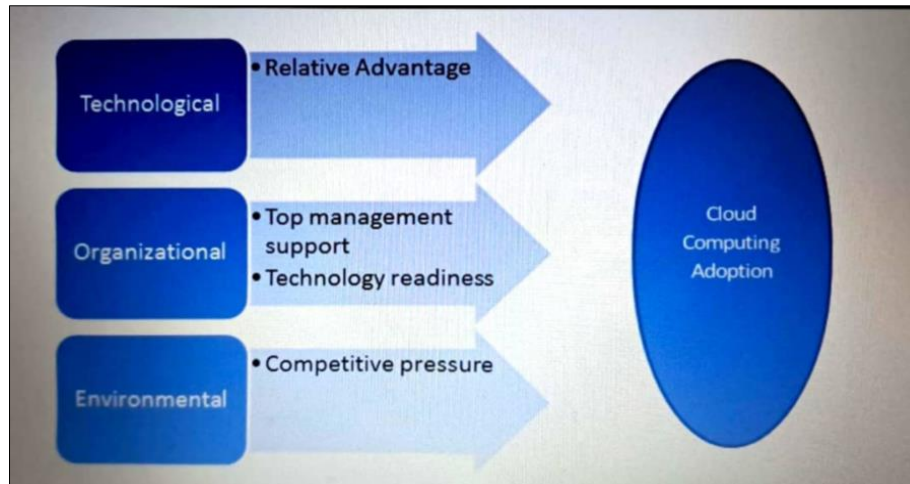
Figure 3: Cloud Adoption Framework

RESEARCH METHODODLOGY

The objective of our study is to determine the key factors that led to the adoption of cloud computing in SMEs. This study builds upon previous research studies and employs a comprehensive literature review to analyze research theories and frameworks, data collection methods, cloud computing services, and potent adoption determinants. We searched different databases and found various relevant articles. The most often used techniques were interpretative interpretation for qualitative data and PLS-SEM for quantitative data. The most often used model was the TOE framework to identify relationships among the variables that cause the acceptance and adoption of cloud computing in SMEs. We have focused on TOE framework studies aiming to contribute to a growing body of research on cloud computing.

RESULT AND DISCUSSION

A. Technological Context

Technological context refers to the internal and external technologies that are related to the organization (Rui, 2007; Oliveira and Martins, 2011) and influence its decision to adopt a new technology. It includes the technologies that are already being used by the firm and that are available in the market and are relevant to the firm to enhance its competencies.

I. Relative Advantage

Several authors have frequently mentioned the impact of relative advantage on technology adoption, which directs organizations in the adoption of cloud computing (A. Gutierrez, 2015; C-L. Hsu, and J. C-C. Lin, 2016; Premkumar and King, 1994; Gibbs and Kraemer, 2004; Lee, 2004; Ramdani and Kawalek, 2008; E. M. Rogers, 2003).

Cloud computing promises numerous benefits to organizations adopting it. The strong relationship between the relative advantages and opportunities of cloud-adopting computing is consistent with findings (Low *et al.*, 2011; Oliveira & Martins, 2011). The anticipated relative advantages include scalability, enabling faster access to information, competitive advantage, flexibility, and reduced costs (Hassan *et al.*, 2017). According to Marston *et al.*, (2011) cloud computing considerably lowers the cost of entry for SMEs to access the computing resources with no capital investment for a relatively short period. Miller (2008), propounded that cloud computing offers many advantages related to reliability, capacity, and flexibility. The relative returns of cloud computing are almost noticeable from an information and communication technology perspective (Sokolov, 2009). The probability of the adoption increases, when organizations perceive a relative advantage in an innovation besides other advantages (Lee, 2004; Thong *et al.*, 1994; Thong, 1999).

B. Organizational Context

The organizational context refers to the factors that will affect the intention of an organization to adopt the technology such as availability of resources, technology readiness, top management support,

communication processes, etc. (Andra *et al*., 2020; Weible, R. and Wallace, J., 1998). Kasse *et al*., (2015) specified that organizational factors play a major role in the adoption decision among SMEs.

I. Top Management Support

Top management support plays a crucial role in cloud computing adoption, as it involves the access of resources, replication of services, and re-engineering of procedures (Low *et al*., 2011). Top management support is substantial for bringing possible change in the organization and by communicating the significance of cloud computing among the workforce. (Thong, 1999). Quinn (1985) advocated that top management can offer lasting vision, support, suggestions, and the responsibility to produce a favorable environment for IT innovation. The management will be against its acceptance when they don't derive the anticipated advantages of cloud computing to their organization. The involvement of top management ensures that sufficient resources are assigned for adopting the new technologies (Premkumar and Potter, 1995; Annukka, 2008). Top management has a huge impact on adopting new technology, they must have relevant information for cloud services and investigate thoroughly if they want to implement the specific cloud service successfully (Low *et al*., 2011). In the modern era, information technology is used in all spheres of the corporates irrespective of place and size, so successful managers have plans for developing their firms based on the required information technology (Gottschalk, P. and H. Solli-Sæther, 2005; Salmeron *et al*., 2005)

II. Technical Readiness

Technology readiness is related to the level to which technological infrastructure and human resources influence the adoption of new technology (T.Oliveira *et al*., 2014). Technological infrastructure includes network technologies, installed hardware, software, and resources that are required for the operation of cloud computing services while human resources refer to the availability of skilled manpower with IT knowledge to operate and manage cloud computing services (Lian *et al*., 2014). If the organizations have the essential infrastructure and technical efficiency, cloud computing can be adopted easily as compared to the firms that do not have technological readiness and are not ready for the acceptance of cloud computing. (S. Trigueros-Preciado *et al*., 2013). Nowadays institutions emphasize eliminating paperwork and increasing the use of information technology in all spheres which increases the need for knowledgeable, skilled, and experienced human resources at various levels to accomplish the task efficiently, effectively, and competitively. This enables the organization for technological readiness which may lead to the adoption of cloud computing (Lian *et al*., 2014). Various studies have found that prior experience with technologies such as cluster computing, and virtualization may have a direct impact on user

discernment regarding cloud computing services. (Lippert and Forman, 2005; Hunter, 1999; Bandura, 1977; Igbaria *et al*., 1995; Kuan and Chau, 2001).

C. Environmental Context

Environmental context is concerned with the sphere such as industry, suppliers, competitors, technology service providers, etc., which affect the performance of the business (E. O. Yeboah-Boateng and K. A. Essandoh, 2014; L. G. Tornatzky, Annukka, *et al*., 1990)

I. Competitive Pressure

The pressure encountered by entrepreneurs due to the policies of their competitors in similar businesses is termed competitive pressure (T.Oliveira *et al*., 2014). The competitive pressure faced by an organization is a potent enticement to embrace relevant new technologies (Majumdar *et al*., 1992). Moreover, better choice of new technologies contributes to cost reduction which ultimately increases the market share with better returns. (Majumdar *et al*., 1992). Time and again competitive pressure has been recognized as an essential determinant of technology adoption among SMEs. (Iacovou *et al*., 1995; Crook and Kumar, 1998; Grover, 1993) Premkumar and Roberts (1999) stated the importance of competitive pressure as an adoption driver in SMEs.

Business organizations often face pressures during business operations, due to intense competition and the frequent changes in technologies, so they search for new alternatives to compete and adopt the new technologies like cloud computing. (Low *et al*., 2011). Even in the outsourcing literature, where many firms outsourced their IT infrastructure for better results, competitive pressure played its role. (Lacity and Willcocks, 1998). The studies by Low *et al*., (2011) and Senyo *et al*., (2016) determined that competitive pressure has a positive effect on the acceptance of cloud computing services.

CONCLUSION

Based on our analysis of relevant studies, the key factors for adopting cloud computing in SMEs were developed. These factors were investigated by different researchers in the TOE framework. After a detailed analysis of several studies it was found that the most potent factors that have been emphasized by the researchers frequently and prompt the SMEs in accepting and adopting cloud computing were four i.e. relative advantage, (Technological context) factors such as top management support and technical readiness (Organizational context) and competitive pressure (Environmental context). These findings have significant implications and boundless value to the research community, students, entrepreneurs, managers, and information technology service providers, in terms of formulating better strategies and for fresh research. This study further recommends that forthcoming research can

focus on both the qualitative and quantitative methods, investigating other factors such as complexity, innovativeness, compatibility, firm size, market scope, and regulatory support.

REFERENCES

- Adane, M. (2018). Cloud computing adoption: Strategies for Sub-Saharan Africa SMEs for enhancing competitiveness. *Africa Journal of Science, Technology, Innovation and Development, 10*(2), 197-207.
- Alpar, P., & Reeves, S. (1990). Predictors of MS/OR application in small businesses. *Interfaces*, *20*(2), 2-11.
- 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.
- Andra, I. N., Anamaria, C. R., Gheorghe, Z., Ivona, S., & Florian, R. (2020). Cloud Computing Usage in SMEs. *An Empirical Study Based on SMEs Employees Perceptions*. Sustainability.
- Annukka, V. (2008). "Organisational factors affecting IT innovation adoption in the Finnish early childhood education", Paper No. 133, ECIS 2008 Proceedings, *16th European Conferenceon Information Systems, ECIS*, Galway, Ireland, 9-11 June.
- Aziz, S., Afaq, Z., & Bashir, U. (2018). Behavioral intention to adopt Islamic banking in Pakistan: a study based on theory of planned behavior. *Journal of Islamic Business and Management*, *8*(2).
- Bandura, A. (1977). *Social Learning Theory*, Prentice Hall, New York, NY.
- Bartoletti, D. (2017). *Optimize Your Cloud Organization For Speed And Customer Delight*. Forrester. Forrester.com. Retrieved August 10, 2018, from https://www.forrester.com/report/Optimize+Your+Cloud+Organization+For+Speed+And+Customer+Delight/-/E-RES136430
- Buyya, R., Voorsluys, W., & Broberg, J. (2011). Introduction to Cloud Computing, in Cloud Computing: Principles and Paradigms. 1st ed. Hoboken, NJ, USA. John Wiley & Sons, Inc.
- Crook, C. W., & Kumar, R. L. (1998). Electronic data interchange: a multi-industry investigation using grounded theory. *Information & Management*, *34*(2), 75-89.
- Gibbs, J. L., & Kraemer, K. L. (2004). A cross-country investigation of the determinants of scope of e-commerce use: an institutional approach. *Electronic markets*, *14*(2), 124-137.
- Goscinski, A., & Brock, M. (2010). Toward dynamic and attribute based publication, discovery and selection for cloud computing. *Future generation computer systems*, *26*(7), 947-970.
- Gottschalk, P., & Solli-Sæther, H. (2005). Critical success factors from IT outsourcing theories: an empirical study. *Industrial Management & Data Systems*, *105*(6), 685-702.
- Grover, V. (1993). An empirically derived model for the adoption of customer-based interorganizational systems. *Decision sciences*, *24*(3), 603-640.
- Gutierrez, A., Boukrami, E., & 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.
- Hashizume, K., Rosado, D. G., Fernández-Medina, E., & Fernandez, E. B. (2013). An analysis of security issues for cloud computing. *Journal of internet services and applications*, *4*, 1-13.
- Hassan, H., Nasir, M. H. M., Khairudin, N., & Adon, I. (2017). Factors influencing cloud computing adoption in small medium enterprises. *Journal of Information and Communication Technology*, *16*(1), 21-41.
- Hsu, C. L., & Lin, J. C. C. (2016). Factors affecting the adoption of cloud services in enterprises. *Information Systems and e-Business Management*, *14*, 791-822.
- Hunter, G. K. (1999). *Sales technology, relationship-forging tasks, and sales performance in business markets* (Doctoral dissertation, University of North Carolina at Chapel Hill).
- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *MIS quarterly*, 465-485.
- Igbaria, M., Guimaraes, T., & Davis, G. B. (1995). Testing the determinants of microcomputer usage via a structural equation model. *Journal of management information systems*, *11*(4), 87-114.
- Javaid, M. A. (2014). Implementation of cloud computing for smes. *World Journal of Computer Application and Technology*, *2*(3), 66-72.
- Kasse, J. P., Nakawoya, F., Balunywa, W., & Nansubuga, A. K. (2015). Framework towards cloud computing adoption by SMEs in Uganda. *Asian Journal of Computer Science and Information Technology*, *5*(7), 42-46.
- Korongo, J. N., Samoei, D. K., & Gichoya, D. M. (2013, May). Cloud computing: An emerging trend for small and medium enterprises. In *2013 IST-Africa Conference & Exhibition* (pp. 1-7). IEEE.
- Kuan, K. K., & Chau, P. Y. (2001). A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework. *Information & management*, *38*(8), 507-521.
- Lacity, M. C., & Willcocks, L. P. (1998). An empirical investigation of information technology sourcing practices: Lessons from experience. *MIS quarterly*, 363-408.

- Lalev, A. (2017). Methods and instruments for enhancing cloud computing security in small and medium sized enterprises. Business Management / Biznes Upravlenie, 2, 38–53. Retrieved from http://bm.uni-svishtov.bg/?lang=en.
- Lee, J. (2004). Discriminant analysis of technology adoption behavior: a case of internet technologies in small businesses. *Journal of computer information systems*, *44*(4), 57-66.
- Lian, J. W., Yen, D. C., & Wang, 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.
- Lippert, S. K., & Forman, H. (2005). Utilization of information technology: Examining cognitive and experiential factors of post-adoption behavior. *IEEE Transactions on Engineering Management*, *52*(3), 363-381.
- Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial management & data systems*, *111*(7), 1006-1023.
- Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial management & data systems*, *111*(7), 1006-1023.
- Majumdar, S. K., & Venkataraman, S. (1993). New technology adoption in US telecommunications: The role of competitive pressures and firm-level inducements. *Research Policy*, *22*(5-6), 521-536.
- Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing—The business perspective. *Decision support systems*, *51*(1), 176-189.
- Miller, M. (2008). *Cloud computing: Web-based applications that change the way you work and collaborate online*. Que publishing.
- Moneer Jlelaty, Y. M. (2012). Factors in Cloud Computing Adoption, Thesis Lunds University.
- Municipality, K. (2016). International Journal of Managing Public Sector Information and Communication Technologies, 1-14.
- Nair, S. C. (2012). Cloud Computing: An Emerging Technology In The Sultanate of Oman. *International journal of advanced research in computer science and software engineering*, *2*(10), 376-380.
- National Institute of Standards and Technology, NIST, "The NIST Definition of Cloud Computing," http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145
- Neves, F. T., Marta, F. C., Correia, A. M. R., & Neto, M. D. C. (2011). The adoption of cloud computing by SMEs: identifying and coping with external factors.
- Nuamah-Gyambrah, K., OffeiOtu, M., & Agyeiwaa, F. (2016). Role of Information and Communication Technology (ICT) in the Survival of Small and Medium Scale Enterprises (SME's) in Ghana: Evidence from selected Small and Medium Scale Enterprises in New Juaben Municipality, Koforidua. *International Journal of Managing Public Sector Information and Communication Technologies*, *7*(1), 1-14.
- Oliveira, T., & Martins, M. F. (2011). Literature review of information technology adoption models at firm level. *Electronic journal of information systems evaluation*, *14*(1), pp110-121.
- 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.
- Pauly, M. (2011). T-Systems Cloud-Based Solutions for Business Applications. Cloud Computing: Principles and Paradigms. John Wiley & Sons, Inc., Hoboken.
- Precedence research (2022), Cloud Services Market, https://www.precedenceresearch.com/cloud-services-market, logged on 13th January 2024
- Premkumar, G. K. W. R., & King, W. R. (1994). Organizational characteristics and information systems planning: An empirical study. *Information systems research*, *5*(2), 75-109.
- Premkumar, G., & Potter, M. (1995). Adoption of computer aided software engineering (CASE) technology: an innovation adoption perspective. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, *26*(2-3), 105-124.
- Premkumar, G., & Roberts, M. (1999). Adoption of new information technologies in rural small businesses. *Omega*, *27*(4), 467-484.
- Quinn, J. B. (1985). Managing innovation: controlled chaos. *Harvard business review, 63*(3), 73-84.
- Ramdani, B., & Kawalek, P. (2007). SMEs & IS innovations adoption: a review & assessment of previous research. *Academia. Revista Latinoamericana de Administración*, (39), 47-70.
- Rath, A., Kumar, S., Mohapatra, S., & Thakurta, R. (2012, December). Decision points for adoption cloud computing in small, medium enterprises (SMEs). In *2012 International Conference for Internet Technology and Secured Transactions* (pp. 688-691). IEEE.
- Raza, M. H., Adenola, A. F., Nafarieh, A., & Robertson, W. (2015). The slow adoption of cloud computing and IT workforce. *Procedia Computer Science*, *52*, 1114-1119.
- Rui, G. (2007). *Information Systems Innovation Adoption among Organizations a Match-Based Framework and Empirical Studies*, National University of Singapore, Singapore.
- Salmeron, J. L., & Herrero, I. (2005). An AHP-based methodology to rank critical success factors

of executive information systems. *Computer Standards & Interfaces*, *28*(1), 1-12.

- Thong, J. Y. (1999). An integrated model of information systems adoption in small businesses. *Journal of management information systems*, *15*(4), 187-214.
- Thong, J. Y., Yap, C. S., & Raman, K. S. (1994). Engagement of external expertise in information systems implementation. *Journal of Management Information Systems*, *11*(2), 209-231.
- Tornatzky, L. G., & Fleischer, M. (1990). "The processes of technological innovation", Lexington Books.
- Trigueros-Preciado, S., Pérez-González, D., & Solana-González, P. (2013). Cloud computing in industrial SMEs: Identification of the barriers to its adoption and effects of its application. *Electronic Markets*, *23*, 105-114.
- Tripathi, S., & Jigeesh, N. (2013). A review of factors that affect cloud computing adoption. *IUP Journal of Computer Sciences, 11*(4).
- Weible, R., & Wallace, J. (1998). Cyber research: the impact of the Internet on data collection, *Market Research, 10*(3), 19-31.
- 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.