International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol.6, No. 9, 351-366, 2024
https://asianscholarsnetwork.com/asnet-journals

Why Small Businesses Move to Cloud Computing Solutions? A Conceptual Explanation

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Received: 7 August 2024 | Accepted: 15 November 2024 | Published: 31 December 2024

DOI: https://doi.org/10.55057/ijbtm.2024.6.9.31

Abstract: *The purpose of this paper is to conceptualize the predictors of cloud computing solutions adoption among small and medium-sized businesses (SMEs). This paper explores the theoretical review of cloud computing solutions on SMEs by looking at literature review from Scoups and Google Scholar Databases. Previous literature on cloud computing uses various theoretical lens such as Resource-Based View (RBV), Technology Acceptance Model (TAM), Technology-Organizational-Environment (TOE) Framework and Diffusion of Innovation (DOI) Theory. But this paper formulates the framework by integrating DOI and TOE which are frequently used to understand how cloud computing solutions and technologies spread within industry and organizations. Both theories, had provided a structured approach to understanding the reason why SMEs migrate from traditional IT solutions towards cloud computing. This paper explains how DOI theory and TOE framework allow a structured examination of the dynamics influencing factors of cloud computing solutions adoption in SMEs by considering nine factors such as relative advantage, complexity, testability, observability, compatibility, technology readiness, organizational capabilities to absorb new technology, competitive pressure and regulatory advantage. In short, this paper has critically discussed the influencing factors to help strengthen the body of knowledge on cloud computing in SMEs studies. Findings on this review shed some light on the other potential factors of cloud computing solutions adoption that might not been included in past research on this subject.*

Keywords: SMEs, Cloud Computing Solutions, Diffusion of Innovation, Technology-Organizational-Environment Framework

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1. Introduction

Adopting cloud computing solutions has enabled small and medium-sized enterprises (SMEs) to remain competitive (Tırpan & Bakırtaş, 2024). These solutions reduce costs, streamline operations, and accelerate decision-making by offering flexibility and providing competitive intelligence that is difficult to obtain with traditional IT systems (Martin, 2010; Sener et al., 2017). For example, traditional methods of competitive analysis, such as customer surveys, often yield delayed results (Norfarah et al., 2024; Norfarah et al., 2020; Alijani et al., 2014). In contrast, the integration of big data analytics from social media with cloud computing has become a widely adopted practice among large corporation, and some literature also reported SMEs in China, Germany, Portugal, and Saudi Arabia are adopting cloud computing (Xie et

al., 2024; Deilr & Brune, 2017; Ferro, 2019; Alghamdi et al., 2019). By analyzing real-time customer feedback and trends from social media platforms, SMEs can gain valuable insights that help them make faster, more informed decisions. Business Intelligence (BI) cloud computing provides SMEs with powerful tools for data analytics (Ferro, 2019), especially in the context of small hotel businesses, where social media data is increasingly used to drive data-driven decision-making (Siti Nabiha et al., 2021).

This rising popularity on cloud computing adoption however, mostly adopted either one of this two theories Technological-Organizational-Environment (TOE) Framework and Diffusion of Innovation (DOI) theory. TOE and DOI both presents a useful analysis of new technologies such as cloud computing adoption (Xie et al., 2024). However, current research frameworks produced findings which has limited utility to be implement in contemporary digital era suggesting more studies are needed to study how, why, and when, SMEs need to consider adoption and investing on new technology for business performance improvement, profitability and growth (Amini & Bakri, 2015; Alkhalil et al., 2017). Therefore, it is important to identify a revised framework that listing exhaustive, nevertheless parsimonious determinants of cloud computing technologies adoption. In this context, this paper aims to review the antecedents of cloud computing solutions adoption and its relations to SMEs growth and performance based on current literature review.

The aim of this paper is to identify how managers and decision makers in SMEs decide on adoption of cloud computing solutions and later proceed to what are the influencing factors of cloud computing solutions adoptions. Our main objective is to propose a theoretical framework that will help explain this phenomenon. Based on our aims, we pose the following research question:

RQ1: What are the core building blocks that should be taken into account when considering cloud computing solutions?
RQ2: What is the underlying theory to support adoption of cloud computing?

The rest of the paper is organized as follows. In the next section we present a literature review on the area of cloud computing in the business context. In section 3 a theoretical discussion is presented introducing the two main perspectives employed. Section 4 describes the proposed research framework and how theories are contextualized for cloud computing adoption. Finally, section 5 concludes the paper with suggestions for future work.

2. Literature Review

Cloud computing has become increasingly prevalent among businesses of all sizes around the world because of its flexibility compared to traditional computing (Odukoya, 2024). Traditional computing involves the use of physical data centers to store digital assets and maintain a network infrastructure for day-to-day operations. In this setup, users' access to data, applications, or storage is typically limited to the device or office network they are connected to. In other words, users can only access data on the specific machine where it is stored, restricting flexibility and remote access (Choudhary et al., 2022). Therefore, companies migrate to cloud computing to enhance productivity and maintain a competitive edge, primarily due to its economic advantages, such as the pay-per-use model and on-demand availability (Modisane & Jokonya, 2021).

In business research, cloud enterprise resource planning (ERP) systems, cloud customer relationship management (CRM), and cloud business intelligence (BI) are frequently studied. A key distinction between cloud services and traditional IT infrastructure is crucial to understand the dynamics of cloud computing. This section clarifies the concept based on Weinman (2012). outlines There are five essential characteristics of cloud computing: commonality, location independence, online accessibility, utility, and on-demand resource availability (Weinman, 2012).

Another distinction is cloud computing service are classified into three major types or layers. They are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Moreover, various as-a-service models, such as Data as a Service (DaaS), Compute as a Service, Integration as a Service, and Business Process as a Service (BPaaS) are considered offshoots or components of IaaS, PaaS, and SaaS (Bradley & Cooper, 2014).

In the context of small businesses, cloud service models offer tailored solutions that address different operational needs. For instance, Infrastructure as a Service (IaaS) is ideal for small business owners or operations personnel who need to manage IT infrastructure without the cost and complexity of maintaining physical servers. Platform as a Service (PaaS) is targeted at small business developers who want to build custom applications or integrate existing ones without worrying about underlying infrastructure. Meanwhile, Software as a Service (SaaS) is designed for end-users such as employees who interact directly with software applications, like cloud-based accounting or customer relationship management (CRM) tools. These three service models have revolutionized how small businesses access and leverage technology, enabling them to streamline operations, reduce costs, and enhance productivity with scalable, on-demand solutions (Bradley & Cooper, 2014).

In particular, Cloud ERP (categorized under SaaS) represents a cloud-based solution for enterprise resource planning that integrates business processes and operations, accessible via the internet. This shift to cloud-based ERP allows organizations to streamline operations, enhance decision-making, and respond swiftly to customer and employee demands (Jayeola et al., 2022). Popular examples of cloud ERP systems include Oracle ERP Cloud, SAP Business One, Microsoft Dynamics 365 Business Central, and Sage UBS (Moyer & Nikolopoulos, 2023). The growing popularity of cloud ERP systems is largely due to their cost-effectiveness, speed, and ability to improve access to accurate, real-time data, fostering competitive advantage (Martin, 2010; Mahmood, 2014).

Cloud SaaS solutions, like ERP systems, are particularly beneficial for small and medium-sized enterprises (SMEs), offering lower subscription costs compared to traditional on-premise software (Bradley & Cooper, 2014). However, despite these advantages, many SMEs remain hesitant to adopt cloud-based ERP systems. The Malaysia Digital Economy Blueprint highlights that only 44% of SMEs have embraced digital technologies (Nordin et al., 2023), and while many use cloud storage services like Dropbox and Google Drive, fewer are utilizing cloud SaaS for business applications such as big data analytics and competitive intelligence. Indeed, only 35% of SMEs have adopted business applications like Salesforce or marketing tools (MSME Admin, 2021), with just 2 out of 15 SMEs in Malaysia implementing cloud-based ERP systems.

Several studies have cited resource limitations, such as lack of funding, skilled employees, and expertise in control systems, as barriers to adopting cloud ERP systems (SME Corp & Huawei, 2018). A Pilot BDAI Survey found that 60% of SMEs were not utilizing cloud services, with

97% of microenterprises and 81% of small companies refraining from cloud adoption (SME Corp & Huawei, 2018). While the overall business culture is supportive of cloud adoption, these statistics reflect a slow uptake, particularly among SMEs.

Numerous studies have investigated the adoption and utilization of cloud computing systems across different countries. For example, studies by Al-Shboul (2018) and Ahn & Ahn (2020) focused on SMEs in the Middle East and South Korea, respectively. However, the applicability of these findings to other regions is limited by the unique socio-economic and cultural contexts of each country. In contrast, studies on cloud adoption in Malaysia remain limited, such as the research by Qian et al. (2016), which focused only on SMEs in Penang. This suggests a need for broader, more generalized studies that reflect the situation across all of Malaysia.

Further research is necessary to explore the disposition of SMEs towards cloud computing adoption, particularly in the manufacturing sector. The manufacturing industry is the third-largest sector among Malaysian SMEs, representing 5.8% of the total 1,226,494 SMEs, and is the second-highest contributor to Malaysia's GDP. The value added by SMEs in the manufacturing sector rebounded in 2021, recording an impressive growth rate of 8.5%, compared to a negative growth of 2.9% in 2020 (SME Corp & Huawei, 2018).

A recent framework proposed by Schwaeke et al. (2024) aims to guide researchers in studying artificial intelligence (AI) adoption in SMEs. The framework uses the Technology-Organization-Environment (TOE) model to examine AI adoption. While insightful, a more comprehensive framework could integrate additional theoretical lenses such as the Technology Acceptance Model (TAM), Resource-Based View (RBV), and Diffusion of Innovation (DOI) to better understand how cloud technologies (SaaS, PaaS, and IaaS) spread within organizations and influence business decisions. By incorporating market dynamics and competitive forces from the Environmental factor of TOE model, a more robust framework could provide a clearer understanding of business strategy and decision-making in adopting cloud-based technologies.

3. Theoretical Discussion

The increasing interest in cloud computing necessitates a focused exploration on which theoretical frameworks can best illuminate its critical factors and business value. The fields of information technology (IT) management and information systems (IS) have employed various theoretical perspectives to investigate the adoption of cloud computing, often seeking to integrate multiple theories (Jayeola et al., 2022). A predominant approach has been the Technology Acceptance Model (TAM) of the users, which posits that cloud computing are adopted because of ‘usefulness’ and ‘ease of use’ key elements that contribute to acceptance. While TAM effectively identifies the essential predictors needed for migration to clouds, it falls short in explaining how the organizations factor, and environmental factors influence cloud computing technologies adoption. This limitation has prompted scholars to consider additional theoretical perspectives that could fill this gap and enhance our understanding of cloud computing's impact. The subsequent sub sections discussed selected theoretical perspectives before the proposed model is presented.

3.1 Technology Acceptance Model

A growing body of research highlights the significance of the Technology Acceptance Model (TAM) in explaining the adoption of cloud computing (Tırpan & Bakırtaş, 2024; Gangwar et al., 2015; Yadegaridehkordi et al., 2015). The TAM posits that users' acceptance of technology

is primarily influenced by two key factors: perceived usefulness and perceived ease of use. Gangwar et al. (2015) research has conceptualized TAM and TOE together. In TAM, predictors of cloud computing adoption are perceived-usefulness and ease-of-use. They refer to the degree to which a user believes that using a particular technology will enhance their job performance or overall productivity. In the context of cloud computing, if users perceive that cloud solutions can improve efficiency or effectiveness in their tasks, they are more likely to adopt these technologies. The perceived ease of use factor pertains to how easy and user-friendly a technology is perceived to be. If potential users find cloud computing applications intuitive and straightforward to use, they are more inclined to embrace them (Yadegaridehkordi et al., 2015).

Together, these dimensions influence users' attitudes toward technology, ultimately affecting their intention to adopt cloud computing. By leveraging the TAM, researchers can gain insights into the psychological and contextual factors that drive cloud adoption, helping organizations to tailor their strategies for greater acceptance and integration of cloud technologies (Tırpan & Bakırtaş, 2024. But TAM is not suitable for technology adoption studied at firm level. However, TAM has seen a maturing in terms of its theoretical grounding for technology adoption research, specifically perceived usefulness, and ease of use was routinely incorporated into some other technological adoption at firm level such as TOE framework (Gangwar et al., 2015). However, the current model is unable to provide a comprehensive explanation on how cloud computing technologies spread within SMEs. One major drawback is that the model hinders knowledge on nuances of progressive spread across members through certain routes in innovation.

3.2 Diffusion of Innovation Theory

The Diffusion of Innovation Theory (DOI) is particularly relevant in the context of cloud computing technology, especially for small and medium-sized enterprises (SMEs). Alkhalil et al. (2017) applied the DOI framework to explore the complexities SMEs face when migrating to cloud computing. The DOI theory illustrates how new technologies, like cloud computing, gradually diffuse through societies as organizations and individuals adopt these innovations into their operational routines (Morgan et al., 2021). According to Rogers (2003), the terms "technology" and "innovation" are often interchangeable, particularly in studies focused on technological advancements. In the context of cloud computing, technology serves as a crucial tool that reduces uncertainty for SMEs, enabling them to achieve desired business outcomes. Rogers defines "diffusion" as the process through which innovations, such as cloud services, spread among system members through various channels (Rogers, 2003).

The key elements of this diffusion process include innovation, time, communication channels, and the social system (Sahin, 2013). The DOI theory can be applied at both organizational and individual levels, offering a framework to understand cloud adoption on a broader scale (Amini & Bakri, 2015; Abaee et al., 2024). Rogers, however, emphasizes that the diffusion of innovation is fundamentally about reducing uncertainty, a critical factor for SMEs considering cloud adoption. To facilitate this process, Rogers identified five characteristics of innovations—observability, compatibility, relative advantage, complexity, and trialability—that influence how quickly and effectively cloud computing can be adopted by SMEs. These attributes will be crucial in developing hypotheses regarding the factors that drive cloud adoption within this sector.

3.3 Technology-Organization-Environment (TOE) framework

The Technology-Organization-Environment (TOE) framework is a theoretical model used to explain the adoption of cloud solutions, particularly in small and medium-sized enterprises

(SMEs). This framework emphasizes organizational-level analysis, focusing on broader attributes such as technological, organizational, and environmental contexts, rather than the specific behaviors of individuals within the organization. The adoption of cloud-based solutions in SMEs is influenced by several factors, including managerial support, technological readiness, regulatory environment, and perceived advantages. The TOE model provides a structured approach to understanding how these elements interact and impact the decision-making process regarding cloud adoption. Despite its widespread use, the TOE framework has seen limited theoretical development since its inception. Zhu and Kraemer (2006) suggest that this stagnation stems from the framework's "generic" nature, which allows for considerable variation in factors and measures, reducing the incentive to modify the theory itself. Additionally, Mackay et al. 2012, notes that the TOE framework aligns "too well" with other technology adoption theories, offering little unique explanatory power. As a result, there has been minimal motivation to refine or adapt the framework further.

While TOE and DOI build on different ideas to support adoption of new technologies, there is a growing body in literature which identifies their complementarities (Amini & Bakri, 2015). Despite DOI being more appropriate in explaining how new technologies spread within organizations, it is noted in literature that DOI would reinforce the theoretical link between TOE and DOI for the adoption of cloud-based solutions in SMEs. However, research integrating TOE and DOI was dated more than five years ago (Alkhalil et al., 2017; Amini & Bakri, 2015), and with many new complementary technologies such as Artificial Intelligence, there is a need to relook into the framework of cloud computing adoption in SMEs.

4. Research Framework Development

The theoretical discussion in the previous section lays the groundwork for understanding how companies decide to adopt cloud-based solutions for business purposes and serves as the foundation for developing a research framework for future reference. The proposed research framework aims to help avoid common pitfalls in IT management research by providing a structured approach to studying cloud adoption.

This section begins with discussion by explaining the dimensions of the Technology-Organization-Environment (TOE) framework and the Diffusion of Innovations (DOI) theory, highlighting their relevance to the adoption of cloud-based solutions within the context of SMEs. By identifying the key relationships between these dimensions and cloud adoption, the framework offers valuable insights for researchers and practitioners seeking to enhance their understanding of this critical area.

4.1.1 Relative advantage and adoption of cloud computing solutions

Relative advantage is the extent to which innovations are regarded to be more beneficial than the current practices it replaces (Rogers, 2003). Accordingly relative advantage is one of the most extensively studied innovation predictors in the context of IT and IS management at the firm level (Tornatzky & Klein, 1982). From a review of the literature on cloud system adoption among SMEs, it is clear that relative advantage is an important predictor of cloud system adoption (Lutfi, 2022; Ahn & Ahn, 2020; Das & Dayal, 2016). Past literature has found a positive correlation between relative adoption and migration to cloud computing systems. Any organization would expect advantages and benefits from adopting cloud systems, because change from non-cloud and on-premises systems requires significant efforts, and cost.

In past research, the expected benefits include cost savings, real-time insights, improved accessibility, efficient coordination and collaboration (Lutfi, 2022; Ahn & Ahn, 2020; Das & Dayal, 2016). Cloud services either IaaS, PaaS, or SaaS can lead to margin expansion. Some argue that the costs of processing, storage, and networking are headed to zero by adopting cloud system (Martin, 2010). Some argue that this is an overstatement, but there is no question that costs are falling with the of relative advantage of cloud computing solutions. Therefore, the following proposition is postulated:

Proposition 1 Relative advantage is positively related to adoption of cloud computing solutions.

4.1.2 Complexity and adoption of cloud computing solutions

Complexity refers to the degree to which a technology is perceived as difficult to use and understand (Rogers, 2003). The complexity of cloud systems is a common issue highlighted in cloud migration literature (Alkhalil et al., 2017; O'Leary, 2000), and it is often cited as a primary reason for rejecting the adoption of new technologies (Premkumar & Ramamurthy, 1995). This is particularly relevant for SMEs, as complexity can prolong the learning curve and adaptation process, which is unfavourable.

However, Ahn and Ahn (2020) found that complexity does not have a direct impact on the desire to adopt cloud systems. Conversely, studies by Oliveira et al. (2014) and AlBar and Hoque (2017) found that complexity is negatively associated with the willingness of SMEs to adopt cloud ERP systems. In other words, SMEs are often hesitant to implement cloud solutions when the process is perceived as challenging or complicated. Contradictory literature suggests that, after considerable effort and investment, organizations can realize significant cost advantages up to 20% of total IT spending by transitioning to cloud solutions, particularly with hybrid deployments, which can yield 25% savings when fully implemented (Martin, 2010, Bughin et al., 2010).

To effectively evaluate the complexity of adopting cloud solutions compared to traditional IT systems, it is crucial to ensure that both options are being compared on a like-for-like basis and within the broader context of overall value. Moreover, cloud computing can help reduce the complexity of business processes that SMEs face with traditional IT systems. Under all of these circumstances, where either the cloud costs less or the same, the cloud is often a better option and making the business process easier. Based on this literature, we propose the following.

Proposition 2 Complexity is negatively related to the intention of Malaysian SMEs to adopt cloud ERP systems.

4.1.3 Testability and adoption of cloud computing solutions

Testability refers to the extent to which new technology or innovations can be tried out for a short period of time before they are adopted (Rogers, 2003). New technology or innovation that can be tested before being completely implemented are more widely embraced since new innovations require an investment of time, effort, and resources (Scott et al., 2019). Trialability is an essential element to support innovation implementation (Elbeltagi et al., 2013). Numerous studies have demonstrated that one of the most significant elements of the process of implementing innovation is the ability to pilot innovation.

A study conducted in Korea showed that testability was positively associated to cloud ERP system adoption (Ahn & Ahn, 2020). This is because cloud ERP system is a comparatively

new, so it is necessary to justify how it fits into an organization and ensure that requirements are reflected before actual adoption in order to minimize trial and error.

Furthermore, Das & Dayal (2016) also revealed that trialability associated with cloud systems has a favourable influence on the decision to select and deploy the system. Usually, research reported that a company would refuse cloud service providers if the cloud provider did not offer a free trial of the application. Therefore, trialability has a positive correlation with the adoption. Hence, the following hypothesis is proposed in this study:

Proposition 3 Testability has a direct positive relationship with adoption of cloud computing solutions

4.1.4 Observability and adoption of cloud computing solutions

Observability refers to the degree to which the consequences or outcomes of adoption of new technology are visible to others (Rogers, 2003). When potential adopters cannot see the new innovation in action or are unaware of its existence, they are less likely to implement it. While observability is generally not considered a strong predictor of the intention to adopt new technology or being innovative compared to factors such as compatibility, relative advantage, and complexity (Lin & Chen, 2012), it has still been widely utilized in studies examining the adoption and acceptance of new technologies.

A review of the literature on cloud system adoption among SMEs reveals a consistent finding, observability is positively correlated with the adoption of cloud technologies (Jeyaraj et al., 2006; AlBar & Hoque, 2017; Das & Dayal, 2016). One notable advantage of cloud computing is its pricing model, which typically charges based on the actual number of subscribers rather than projected use. Often, initial projections for a new application can fall short because users may not fully engage with the system due to factors such as busy schedules, inadequate training, or implementation challenges related to access, security, or compatibility with various devices and operating systems. But, upon witnessing successful case studies of cloud system implementations can inspire other organizations to adopt similar solutions, showcasing the observable tangible benefits of the technology. Based on this literature, we propose the following proposition.

Proposition 4 Observability has a direct positive relationship with adoption of cloud computing solutions

4.1.5 Compatibility and adoption of cloud computing solutions

According to Rogers (2003), compatibility refers to the degree to which an innovation aligns with the existing values, experiences, and objectives of potential users. It is one of the most critical factors influencing the adoption of information system innovations (Premkumar, 2003). Research by Jeyaraj et al. (2006) found that incompatibility between computer software and hardware systems is a primary barrier preventing many companies from fully realizing the potential of information system technology. Additionally, Al-Shboul (2018) highlighted compatibility as a significant factor positively affecting the intention to adopt cloud systems in developing economies.

One area where standardization exists is in application programming interfaces (APIs). For instance, Marten Mickos, CEO of Eucalyptus, has developed an open-source version of software that is compatible with Amazon Web Services APIs, enabling companies to build private clouds with similar functionalities. However, compatibility can also pose challenges; if

an organization's existing systems and prior experiences do not align with the new cloud infrastructure, adoption may be hindered. Furthermore, commonality in systems is essential for efficient resource allocation; it would be difficult to dynamically allocate resources if each user's setup were uniquely custom-built. A common infrastructure facilitates on-demand resource provisioning and utility, driving benefits such as business agility, revenue growth, market share expansion, and cost reduction (Martin, 2010). Based on the above findings, we propose the following.

Proposition 5 Compatibility has a direct positive relationship with adoption of cloud computing solutions

4.1.6 Organizational technological readiness and adoption of cloud computing solutions

Technological readiness refers to the extent to which an organization possesses the necessary infrastructure, tools, and skills to effectively adopt and utilize new technologies, such as cloud computing. This concept encompasses several critical components, including adequate hardware and software capabilities, reliable internet connectivity, and sufficient data storage. Additionally, employees must have the relevant technical skills and knowledge to implement and manage cloud solutions, supported by a culture that embraces innovation and continuous learning. Access to technical support and resources is essential for a smooth transition, and the organization's overall strategy should align with technological advancements to prioritize cloud adoption. Ultimately, technological readiness is crucial for organizations aiming to leverage the full benefits of cloud technology.

A robust technological infrastructure is vital for the deployment and functioning of technology within an organization. This infrastructure includes hardware such as servers, networking equipment, and devices, as well as software applications that facilitate operations. Reliable connectivity, efficient data management, and seamless integration of various systems are all supported by a strong technological foundation. Key elements of this infrastructure encompass data centres, cloud services, cybersecurity measures, and the interoperability of different technologies. A well-established infrastructure not only supports new technologies but also enhances operational efficiency and enables scalability as organizations grow. Moreover, it allows organizations to quickly adapt to technological advancements and meet evolving business needs, ultimately driving competitive advantage.

The benefits associated with Software as a Service (SaaS) include flexible pay-per-use pricing, which is advantageous for variable usage; on-demand provisioning for unpredictable demand; efficient multitenancy enabled by common infrastructure; and location independence facilitated by a distributed infrastructure, ensuring a responsive user experience.
Based on this understanding, we propose the following.

Proposition 6 Technological readiness has a direct positive relationship with adoption of cloud computing solutions

4.1.7 Organizational Absorptive Capacity and adoption of cloud computing solutions

Organizational absorptive capacity refers to a company's ability to recognize the value of new information, assimilate it, and apply it to commercial ends. As we transition from the internet era into the age of artificial intelligence, businesses must prepare for a surge of rapid technological advancements, including the integration of cloud computing and other emerging technologies into their strategic planning and operations. By fostering a culture of continuous learning, innovation, and adaptability, organizations can effectively navigate the challenges

posed by cloud computing and secure their position in an increasingly dynamic, technology-driven landscape.

Transitioning to cloud solutions can be particularly daunting for industries with established processes. Experts can play a crucial role in facilitating change management by providing tailored guidance and training that addresses the specific needs of each industry. Additionally, organizations must consider the prohibitive costs associated with migrating legacy applications to the cloud. Complicating this transition are factors such as the ability of cloud providers to maintain economies of scale, the cyclical nature of data movement into the cloud, and the sensitivity of certain applications to latency. If hybrid solutions emerge as the most effective option, organizations may retain baseline resources within their data centers while shifting variable workloads and associated resources to the cloud.

Cloud services can significantly enhance employee autonomy and the perception of control, empowering individuals to be creative and solve problems. Whether it involves simple tasks like searching for information or utilizing a cloud-based platform to develop or extend solutions, the flexibility offered by cloud technology fosters a more innovative work environment. Based on this understanding, we propose the following.

Proposition 7 Absorptive capacity has a direct positive relationship with adoption of cloud computing solutions

4.1.8 Competitive Pressure and adoption of cloud computing solutions

Competitive pressure refers to the influence that rivals exert on organizations to improve performance, innovate, and adopt new technologies to remain viable in the market (Simons et al., 2000). SMEs in certain industry or sector are facing highly competitive pressure are often compelled to seek out advancements that can enhance efficiency and drive innovation, making cloud solutions particularly appealing.

It is no longer a secret that SMEs with access to industry-specific cloud solutions can effectively leverage advanced technologies such as AI and big data, driving innovation and maintaining a competitive edge. Many empirical research findings show the cloud truly offers dramatic economies of scale, resulting in the lowest possible unit costs, it stands to reason that organizations will save money—especially when considering the total cost per unit of computation or storage, after accounting for search costs, switching costs, and worker retraining.

Moreover, it is possible to save money even if the unit cost of cloud computing is higher, provided there is sufficient variability in resource demand. The total value proposition of the cloud lies not just in paying for a specific set of resources but in the ability to avoid costs when those resources are not in use. Thus, whether utilized individually or in a hybrid model, the cloud inherently reduces the average cost of IT for companies (Martin, 2010), making these features particularly beneficial in highly competitive and fiercely rivalrous industries. Therefore, the following proposition is posited.

Proposition 8 Competitive pressure has a direct positive relationship with adoption of cloud computing solutions

4.1.9 Regulatory Advantage and adoption of cloud computing solutions

Regulatory advantage refers to the benefits that organizations gain by successfully navigating and complying with industry-specific regulations, especially when adopting cloud computing technologies. By ensuring regulatory compliance, organizations can mitigate risks such as legal penalties and reputational damage. This not only facilitates smoother operations but also builds trust among customers, investors, and other stakeholders. Furthermore, compliance with regulations can enable organizations to access new markets that have specific legal requirements, giving them a competitive edge. Ultimately, organizations that prioritize regulatory adherence can optimize internal processes, improve operational efficiency, and boost customer confidence, as clients are more likely to trust companies that demonstrate strong data security and ethical practices.

Cloud providers often have vertical expertise, meaning they are well-versed in the regulatory requirements specific to industries like healthcare, finance, and retail. These providers often have dedicated compliance teams that ensure their cloud services meet stringent industry standards, such as HIPAA (for healthcare), GDPR (for data privacy), and PCI-DSS (for payment processing). This specialized knowledge helps businesses in regulated industries adopt cloud solutions more effectively, knowing that they meet the required legal and compliance standards.

Moreover, cloud services typically come with built-in security features—such as encryption and access controls—which help organizations meet data protection regulations without needing significant investment in on-premises security infrastructure. The scalability and flexibility of cloud solutions also make it easier for businesses to adjust resources as regulatory demands evolve. Cloud platforms often include tools that help with audit preparation, track compliance status, and simplify the process of meeting international regulatory requirements. This reduces the complexity of compliance efforts and enhances overall operational efficiency, making cloud computing an essential strategic asset for business growth.

In terms of cloud solutions, there are domain-specific competencies and horizontal competencies. Domain-specific competencies refer to cloud-based solutions that are tailored to the needs of specific industries, such as a Software-as-a-Service (SaaS) platform designed to help businesses manage tax deductions for offshore investments or optimize sales funnel management. Horizontal competencies, on the other hand, apply across multiple industries, such as managing data centers, securing infrastructure, and automating provisioning processes.

Proposition 9 Regulatory advantage has a direct positive relationship with the adoption of cloud computing solutions.

4.2 The Proposed Framework

Building on these nine propositions, and predictors derived from both Technology-Organization-Environment (TOE) framework and Diffusion of Innovations (DOI) theory, Figure 1 illustrates the proposed framework for cloud computing adoption. This section outlines the nine key concepts and ideas underpinning the research framework, highlighting the main relational arguments that can guide future studies on how decision-makers adopt cloud computing solutions. By integrating the dimensions of Diffusion of Innovations into the Technological Factors of the TOE framework, we create a more holistic approach that incorporates both organizational and environmental factors.

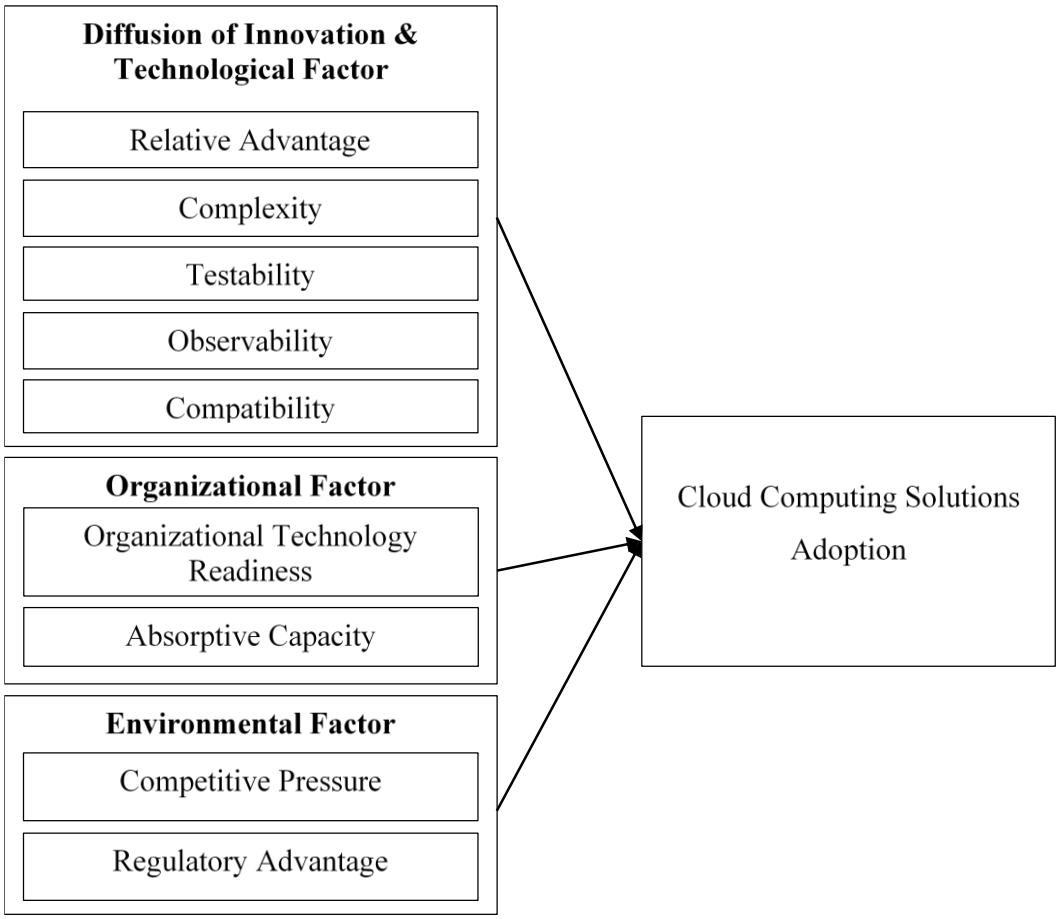

Figure 1: The Proposed Research Framework for Cloud Computing Solutions Adoption

5. Discussion and Conclusion

SMEs digital adoption still confined to basic cloud computing services, and adoption gaps increase as cloud computing technologies become more sophisticated (SME Corp & Huawei, 2018). The cloud computing adoption gaps compared to large firms increase as digital technologies become more sophisticated. Although the majority of businesses are connected to the Internet, information technologies (ITs) are still primarily seen as a communication tool. For SMEs to gain competitive advantage in the market and differentiate from their competitors it is important to leverage on cloud computing technology (Modisane & Jokonya, 2021). This work identifies nine predictors of cloud computing adoptions.

This study proposes a conceptual framework that is based on the concepts and predictors from TOE framework and DOI theory. Based on the theoretical discussion developed in Information Technology, Information System management and entrepreneurship literature this paper proposed a framework of cloud computing solutions adoption in the context of SMEs. The framework is hoped to provide a sound basis for the wider implementation of cloud computing migration in SMEs.

For future research, the framework may be considered in specific industry, or sectors. The vast majority of literature in cloud computing adoption now focuses on big data analytics, and Industry 4.0, but limited conceptual frameworks on what factors influence SMEs' manager decisions is not available to cover the aforementioned gaps. It is more important for managers

to understand why, how, and when cloud computing solutions are best to be adopted and aligning with their business competitive intelligence and strategy.

Furthermore, this study argues that the main factors of adoption will stem from technological aspects (T) of business process, and how diffusion of innovation theory help explain that the spread of technology need to consider technological testability, observability, ease of use (uncomplex), compatible, and the advantage and benefit of adoption exceeds the cost of subscription and compensate the challenges to move from traditional practice. This focus on Technological aspects (T) do not lessen the impact of Organizational (O) and Environmental (E) aspects of TOE Framework, since organizational readiness in terms of infrastructure and human resources are equally important. Tension to balance TOE aspects reinforces the dynamic of business.

This paper offers a theoretical framework on how, why, and when SMEs adopt cloud computing solutions. Future studies should empirically test and evaluate this framework by using survey, interview, focus group and case studies with the industry, using both quantitative and qualitative research design.

Acknowledgements
The authors would like to express their gratitude and appreciation to the Universiti Sains Malaysia for the funding of this research through the External Agency (Industry) Grant Scheme with Project Code: 304.PPAMC. 6501212

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