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Reaching for the “Cloud”: The Case of an SME in a Developing Economy

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ABSTRACT

Cloud computing adoption and utilization is gaining prominence in most developing countries. Its adoption is influenced by several factors, which can constitute a limitation rather than an advantage for firms. This research, therefore, explored the issues surrounding the adoption of cloud computing by small and medium-sized enterprises (SMEs) in a developing economy. An SME operating in Ghana for over five years was purposively selected as the case for the study. Technology-organization-environment (TOE) framework served as a guiding lens. Interviews were held with selected staff of the case firm. Data were analyzed using the Miles and Huberman’s transcendental realism technique. It was discovered that the motivation for cloud computing adoption is the possibility of getting a state-of-the-art IT infrastructure at the lowest cost possible. The study presents the factors that influenced cloud computing adoption in the SME. The study contributes to improving the present understanding of cloud computing as an SME’s strategic tool for operating within a developing economy.

KEYWORDS

Cloud Computing, Developing Economy, Small and Medium-Sized Enterprises, Sustainable Development, Technology Adoption, TOE Framework

INTRODUCTION

Cloud computing, often referred to as simply “the cloud,” is the delivery of on-demand computing resources – everything from applications to data centres over the internet on a pay-for-use basis (Al-Hujran et al., 2018). In essence, cloud computing is the new form of data storage in the 21st century – used mostly by businesses from all sectors of which Small and Medium-sized Enterprises (SMEs) are of no exception (Jayeola et al., 2022). For instance, SMEs are a critical component of the Ghanaian economy, providing about 80 percent of employment opportunities and contributing

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about 70 percent to the country's Gross Domestic Product (GDP). Furthermore, SMEs account for approximately 92 percent of all businesses in Ghana (Quartey et al., 2017; Sasu, 2022).

In Ghana, businesses are increasingly relying on mobile cloud applications to serve their customers and clients (Edu, 2022). Additionally, governments and non-governmental organizations are recognizing the potential of cloud-based technologies to facilitate economic and social transformation, particularly in areas such as education, public health, and environmental sustainability (Abubakar, 2016; Liu et al., 2022). To remain competitive, enterprises must embrace and adopt innovative technologies and practices that enable them to deliver advanced products and services that meet the evolving demands of the market. Cloud services are particularly advantageous for Small and Medium-sized Enterprises (SMEs), as they enable these businesses to take advantage of the opportunities presented in a rapidly evolving and dynamic information and communication technology (ICT) environment (Assante et al., 2016; Al-Hujran et al., 2018).

Paradoxically, SMEs have little to no competitive advantage as compared to large-scale businesses due to the scarcity of resources and the inability or difficulty to acquire an expensive Information Communication Technology (ICT) infrastructure (Abor & Quartey, 2010; Khayer et al., 2021). For this reason, SMEs are unable to fully compete on an acceptable level with large scale businesses. Cloud computing, a new technological paradigm, is therefore regarded as a panacea to assuaging this challenge (Easmon et al., 2019; Jayeola et al., 2022). Cloud computing provides simple, scalable as well as readily available technological solutions. Again, it grants SMEs access to similar technologies utilized by large businesses devoid of high costs and risks (Yeboah-Boateng & Essandoh, 2014; Khayer et al., 2021).

Previous cloud computing studies tend to focus on developed economies where there is a seeming formalized digital economic structure. This assertion is highlighted in the meta-analysis of cloud computing research in information systems by Senyo et al. (2018) where majority of the studies were conducted in developed economies. This gap is particularly apparent in sub-Saharan Africa and most developing economies. According to Yeboah-Boateng and Essandoh (2014) and Khayer et al. (2021), this is mainly attributable to cloud computing being in its early stages in developing economies. Extant studies (e.g., Abubakar, 2016; Al-Hujran et al., 2018; Khayer et al., 2021) also suggests for further research in cloud computing adoption by SMEs in emerging economies. Such a study is envisaged to provide insights from the developing economy perspective on how cloud computing is growing and how practitioners in SMEs and future entrepreneurs take advantage of the cloud and gain a more competitive advantage from it.

In addition, calls have been made for technology adoption to be examined from a multidimensional approach at the organisational level (Al-Hujran et al., 2018; Ansong & Boateng, 2018; Bose & Luo, 2011). Ansong and Boateng (2018), for instance, examined telecommuting adoption using a comprehensive framework that viewed adoption from the Technological, Organisational and the Environmental perspectives. This multidimensional approach provides a comprehensive perspective on the factors that influence technology adoption at the organisational level (Amini & Javid, 2023; Mohammad et al., 2022; Nkhoma & Dang, 2013; Oliveira & Martins, 2011; Tornatzky & Fleischer, 1990).

The above discussions in extant literature call for a study on cloud computing adoption by SMEs in a developing economy from a multidimensional perspective – technological, organisational and environmental. This will be relevant in the current discourse of technology adoption, especially from a developing economy perspective where SMEs are entreated to play significant roles in helping with economic development as Adjabeng and Osei (2022) intimated. Specifically, this research was guided by the following questions;

1. What is the nature of usage of cloud computing by SMEs in Ghana?
2. What are the factors that influence the adoption of cloud computing by SMEs in Ghana?

This study is one of the handfuls of studies on cloud computing in a developing country that focuses on the SME industry. This adds to the knowledge of cloud computing from a developing economy perspective and serves as a reference for further studies on the subject matter. The remainder of the paper is structured into five sections. The second section reviews the literature on cloud computing. The third section discusses the methodology, while the fourth section presents the analysis and discussion of findings. The study concludes in the fifth section with a summary and recommendations.

BACKGROUND

The Small and Medium-Sized Enterprise (SME) Landscape in Ghana

The significant contributions of SMEs to the economic growth and development of national economies, particularly in developing countries, have been emphasized by a number of empirical studies (e.g., Abor & Quartey, 2010; Adjabeng & Osei, 2022; Quartey et al., 2017). SMEs make up over 90 percent of businesses in the world and account for 50–60 percent of employment (Fafunwa & Odufuwa, 2023). In developing countries, formal SMEs contribute up to 60 percent of total employment and up to 40 percent of Gross Domestic Products (GDP) (World Bank, 2019). Furthermore, SMEs account for 98 percent of enterprises, 50–80 percent of industrial employment, and 50 percent of manufacturing output in developing countries (Fafunwa & Odufuwa, 2023).

Abor and Quartey (2010) argue that data is not readily available on the exact number of SMEs in Ghana. Still, statistics from the Registrar General's Department shows that about 90 per cent of registered companies in Ghana are SMEs. The statistics on SMEs are inadequate for a number of reasons: lack of a uniform definition, high cost of conducting an industrial census, and the fact that many SMEs do not register and remain outside the formal economy (Sasu, 2022).

SMEs in Ghana contribute significantly to the development of the economy. It is asserted in extant research (e.g., Abor & Quartey, 2010; Quartey et al., 2017; Sasu, 2022) that SMEs account for about 92 percent of all formal businesses and offers 80 percent employment in addition to contributing to about 70 percent of Ghana's Gross Domestic Products (GDP).

Generally, SMEs in Ghana are mostly owned and managed by a single person, who is in charge of all major decisions. Furthermore, SMEs in Ghana are known to mainly serve the local market. On the other hand, only a handful of these SMEs have the capability and resources to serve international markets. This is mostly due to the huge capital requirements for engaging in export trade, as well as the owner's lack of education, training, and awareness of opportunities. Most of these SMEs are labour-intensive and often operate with low technological know-how and innovation (Al-Hujran et al., 2018; Donkor et al., 2018; Khayer et al., 2021).

In spite of the challenges, the significant role of SMEs in the economy of Ghana cannot be overemphasized (Easmon et al., 2019). It is, therefore, prudent to explore ways to improve their performance to become competitive both locally and internationally using digital innovations. This is because existing research (Evans, 2019; Jayeola et al., 2022) corroborates the assertion that digital innovations, such as cloud computing, have significant positive effects on the development of enterprises.

Impacts of Cloud Computing on the Operations of SMEs

SMEs benefit from cloud computing in several ways. First, cloud computing provides scalable resources (Abubakar, 2016). In cloud computing, SMEs can use as many resources as they require and these resources can be integrated smoothly in their operations. Second, the resources can be purchased with operational funds rather than as a capital expenditure (Dincă, Dima & Rozsa, 2019). The process for capital building usually takes a longer time, and many SMEs may face some difficulties in getting this type of fund. Another cloud computing advantage is the ability for multiple users to

collaborate on projects or documents in the cloud. It can bring together the key players in business. This could be in the form of helping teams, customers and suppliers to meet and share ideas as well as conducting business transactions effectively and without delay (Al-Hujran et al., 2018).

Through the use of cloud computing infrastructure, SMEs will not be required to invest in purchasing and maintaining ICT equipment for business operations. The SMEs, thus, are not required to invest in hardware, software, utilities as well as constructing data centres to manage the business. In addition, the SME do not need large IT teams to manage their operations as the firm may enjoy the expertise of their cloud service provider's staff. These benefits therefore allow the SMEs to spend their time and money on their core business operations (Dincă et al., 2019; Jayeola et al., 2022).

Another major contribution of cloud computing in the operations of SMEs is Data security. Data security is a major concern for every firm irrespective of its size, age or industry of operation. Abubakar (2016) assert that cybercrimes and data breaches have a devastating effect on the revenues of businesses including customer loyalty and brand positioning. Through cloud computing, SMEs are guaranteed of secured data storage. Thus, cloud computing service providers implement advanced data protection features for their platforms (Dincă et al., 2019; Al-Hujran, et al., 2018).

Theoretical Foundation to Innovation Adoption

In recent times, SMEs are increasingly using and adopting ICT due to the advent of Personal Computers, cost-effectiveness and cheaper ICT products such as cloud computing (Al-Hujran et al., 2018). Jayeola et al. (2022) assert that the adoption of innovations including cloud computing provides numerous opportunities for SMEs to compete equally with the large corporations.

Dominant frameworks used in Information Systems research on innovation adoption include Technology Acceptance Model (TAM), Task-Technology Fit (TTF), Technology Organization Environment (TOE) framework, information system (IS) success model, Diffusion of Innovation (DoI), Delone and McLean model (D&M model). Nevertheless, the Technology Organization Environment (TOE) framework has been used extensively in Information Systems research to investigate a number of technology innovations (Dincă et al., 2019; Oliveira et al., 2014). The TOE framework is about the only framework that combines the three major determining factors that influence the adoption of technology; Environment, Technology and Organisation (Ansong & Boateng, 2018; Gangwar et al., 2015). This therefore justifies the adoption of the TOE framework as the guiding lens in the conduct of this study on cloud computing adoption in SME.

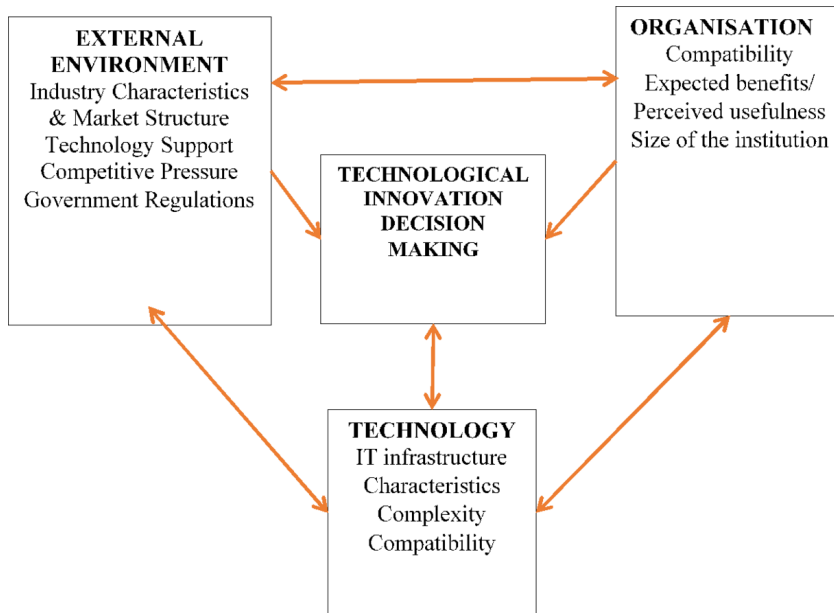
The Technology-Organization-Environment (TOE) Framework

Tornatzky and Fleischer (1990) developed the Technological-Organizational-Environmental (TOE) framework based on the Contingency theory. The Contingency theory proposes that for an organization to be effective, there should be a structure that is in line with the needs of the environment. Therefore, the organization's ability to adopt innovations depends on its suitability for factors such as organizational size, environment, and strategy (Donaldson, 2001).

The TOE framework identifies three major contexts that influence the process through which organizations adopt and implement technological innovations: technological context, organizational context, and environmental context. Figure 1 outlines the framework as proposed by Tornatzky and Fleischer (1990).

The Technological context consists of all the technical issues which can be internal or external that influence the firm's adoption of Technology. These technological factors consist of internal equipment and the current practices associated with technology. Some technological factors that influence the adoption of cloud computing in organisations include: compatibility (Chiu et al., 2017; Oliveira et al., 2014), security (Lian, 2015; Abdollahzadegan et al., 2013; Baker, 2011), relative advantage (Chiu et al., 2017; Oliveira et al., 2014), technological trend (Pateli et al., 2020) and trialability (Dincă et al., 2019; Yeboah-Boateng & Essandoh, 2014).

Figure 1.
The TOE framework (Tornatzky & Fleischer, 1990)



The Organizational context denotes issues about the organisation and its human ware that influence the adoption of Technology. Some organisational factors that influence the adoption of innovation within the organisation include the firm size, top management support, organization structure, organization culture, and the availability of human and slack resources (Pateli et al., 2020; Ansong & Boateng, 2018; Chiu et al., 2017; Oliveira et al., 2014).

The Environmental context is also the market space where the organisation conducts its business activities which influence the adoption of technological innovations. The environmental factors may include competitive pressure, the industry of the firm, venders and business partners as well as relationships with governmental agencies (Pateli et al., 2020; Ansong & Boateng, 2018; Chiu et al., 2017; Lian, 2015; Oliveira et al., 2014). It is asserted that for an organization to adopt either existing or latest technology, such environmental factors play important roles.

Managers of organizations are therefore to consider the environmental, organizational and technological issues before making innovation adoption decisions. The TOE framework combines the technological, organizational and environmental factors of adoption, which other information adoption theories seem to be deficient in (Gangwar et al., 2015). The factors constituting the three contexts (Technological, Environmental and Organisational) were utilized in examining the factors that contributed to the adoption of cloud computing.

METHODOLOGY

Literature on cloud computing adoption was discussed in the previous section. This led to the development of the conceptual model guided by the TOE framework. The methodology for the study is presented in this section.

Critical realism was the guiding paradigm for the conduct of this study. Critical realism allows information systems researchers to get beneath the surface to understand and explain why things are

as they are, and the mechanisms that shape such observable events (Mingers, 2004). This therefore justified its selection as the guiding lens in the conduct of this study.

The approach for this study, based on the critical realism paradigm, was the qualitative method as it seeks to understand issues or situations by investigating the perspectives and behaviour of the people in cases and context within which they act (Kaplan & Maxwell, 2005). The qualitative method therefore best serve the purpose of the study on exploring the nature of usage and the adoption factors of cloud computing by SMEs in Ghana.

The focus of a case study is on the in-depth understanding of the phenomenon and its context (Cavaye, 1996). With this as the backbone, a case study was deemed the best strategy to carry out this research (Alshamaila et al., 2013). In this regard, an SME which has been operating within the service sector of Ghana since 2014 was selected as the case for the study. It is worth noting that this firm has adopted cloud computing, and it has been embracing technological innovations over the years. This firm currently has five employees who are full-time staff. Based on these characteristics, the SME was deemed fit to be purposively selected as the case for this study.

According to Benbasat et al. (1987), a case study should employ two or more sources of data collection to converge to support the research findings. Furthermore, case studies' evidence can stem from six sources, namely: documents, archival records, interviews, direct observation, participant-observation, and physical artefacts (Yin, 2009). This research utilized almost all the listed sources of data collection. The primary data collection was however through interviews with personnel of the case SME while the other sources were utilized to verify or confirm information obtained from the interviews. Interviews were conducted with four personnel including the business owner who is also the Chief Executive Officer – directs the operations of the firm. This was done to solicit how they viewed cloud computing from their angles of operations in the firm. All interviews were carried out within the premises of the case SME. This allowed for the direct observation of activities within the case SME. Table 1 presents the demographic characteristics of the list of interviewees.

Boateng (2019) asserts that during the interview, the researcher should take notes and read through them to sort out and categorize the data concerning its relevance to the different respondents and to the research questions to be addressed. With this as a backbone, all data collected for this research from the field were organized, interviews were transcribed, field notes well-arranged to make logical sense. Therefore, the transcribed interviews were read repeatedly to gain the most out of the information generated to facilitate the analysis. The data collection took place between 21st and 30th June 2019.

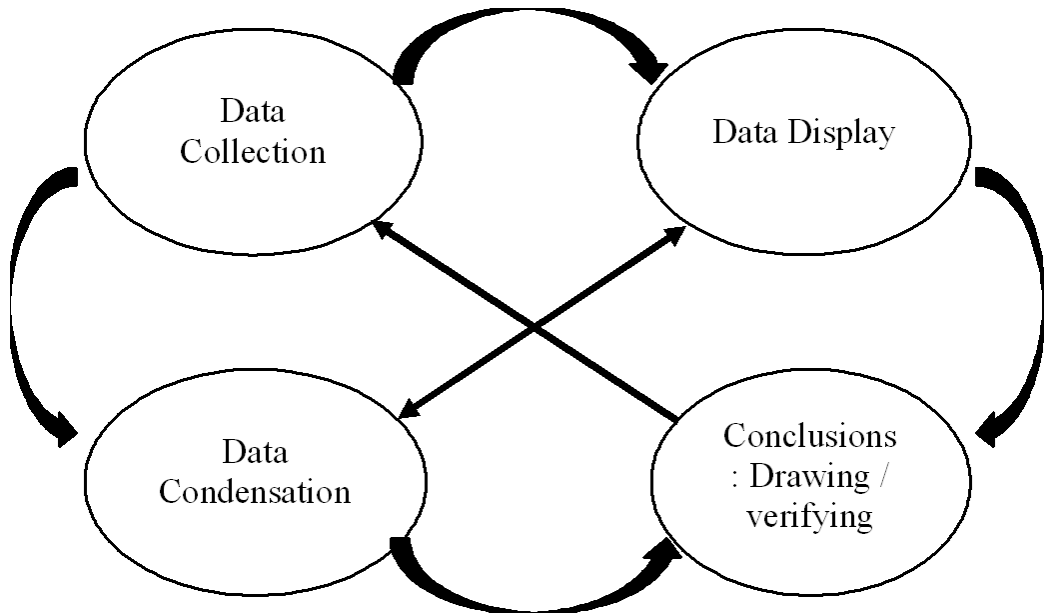
ANALYSIS OF DATA

The analysis was done by drawing themes from the tape-recorded interviews, which were transcribed verbatim without paraphrasing. The analysis thus followed the Miles and Huberman's (1994) transcendental realism technique (Figure 2) which highlights three main components for analysis; data reduction, data display and drawing and verifying conclusions.

Table 1.
Demographic characteristics of Interviewees

ID	Interviewee's position	Highest level of education	Gender	Years spent in current role	Duration of Interview
1	Service Delivery Officer	Bachelor's degree	Female	2 years	30 minutes
2	Software Developer	Professional degree	Male	3 years	45 minutes
3	Helpdesk System Analyst	Bachelor's degree	Female	4 years	45 minutes
4	Chief Executive Officer	Bachelor's degree	Male	5 years	30 minutes

Figure 2.
Miles and Huberman's (1994) transcendental Data Analysis Approach



In data reduction, the raw data is transformed into a more manageable and meaningful form, while preserving its essential meaning and integrity. Miles and Huberman (1994) suggest several techniques for data reduction, including coding, categorizing, and summarizing. This is applied and presented in this study in Figures 3, 4 and 5 as First-order codes.

The second component of the analysis technique is the data display which involves visual representation of data and the patterns and themes that have emerged from the data analysis. Miles and Huberman (1994) suggest that data display should be used to highlight patterns and relationships in the data, and to provide a visual representation of the findings that is accessible and understandable to others. The themes and patterns are also drawn and displayed in Figures 3, 4, and 5 as Second order constructs.

The final stage of the data analysis is where conclusions are drawn. These conclusions are presented as Aggregate Theoretical dimensions in Figures 3, 4 and 5 of this study.

Nature of Cloud Computing in the Case Firm

The firm chosen for this case has adopted cloud computing. This was the main criteria used in selecting the SME as the case for this study. This SME was established as a private limited liability company in 2014. This firm specializes in the development of on-demand IT solutions for clients. At the time of data collection, the firm had five full-time employees which included the owner. This information was consistent with data found in the documents and archival records of the SME.

The respondents were asked to define cloud computing in their own words. This was very helpful in throwing some lights on how cloud computing is perceived in the case firm. Hence, the Service Delivery officer stated that:

Cloud computing means having your office on the go, in your pocket. As I have always understood it, it means being able to perform your role remotely, not necessarily within your organization.

Additionally, a respondent who is a Helpdesk System Analyst refers to cloud computing as:

Having access to suites of IT services just utilizing the internet.

Another respondent also views cloud computing as:

On-demand, IT services via the Internet, or an IT infrastructure hosted and managed by a third party.

Furthermore, it is essential to mention that cloud computing has gained company-wide acceptance. As such, all respondents stated that at least one or all parts of their daily tasks at work were carried out using cloud-based services, be it Software as a Service (SaaS), Platform as a Service (PaaS), or Infrastructure as a Service (IaaS) model. This was confirmed by both the Chief Executive Officer and the Helpdesk Specialist. The latter asserted that:

As a digital company and an IT services provider, we must have a state-of-the-art infrastructure which is cost-effective. Hence, all our applications are cloud-based.

The respondents were asked to indicate the kinds of cloud services they were currently using and how it supports their operations. The Software developer stated that;

We are now using the Microsoft Azure platform, which includes Office 365. We use it for our interactions such as chats, calls, emails, video conferencing, among others. We also have an ERP system for our personnel management, invoicing, and some financing. In terms of system security, we use GravityZone Bitdefender, which is a cloud-based software.

Another respondent (the Service Delivery Officer) corroborated this assertion by indicating that;

We use Office 365 for collaboration, Bitdefender gravity zone for Security. We use an Odoo ERP that is customized and sold to our clients based on their needs. We use the Altaro VM backup for our automated backups.

Furthermore, the Helpdesk System Analyst asserted that:

Cloud computing has come at the right time for us. Internally, all of our applications are hosted by our third-party infrastructure provider, which is Microsoft. Therefore, we do not have any apps running within our local network. About 90 percent of our applications are hosted in the cloud. This allows us, as employees, to work from anywhere with only internet access and a system. Additionally, it allows one agent to assist two to three clients from the office without necessarily going to the clients' company.

Cloud Computing Adoption Factors

Several factors influence the adoption of cloud computing like any other technology. These factors can either be internal or external. In this section, these factors are analyzed based on the constructs of the TOE framework.

Technological Factors

Technological factors are adoption factors related to the presence and usage of innovation in a way that the existing technology supports the adoption process. As such, these factors have enabled the staff of the case firm to embrace cloud computing. The firm attributes the adoption of cloud computing

to the availability of fibre-optic broadband, MiFi devices, and a variety of electronic devices such as laptops, phones, or tablets. In addition, the availability of electricity and solar energy as a backup has contributed to the adoption of cloud computing. The Service Delivery Officer asserted that:

Today, the availability of fibre Internet in the country made us bold to believe in cloud services as we all know without internet there is no cloud.

Again, another respondent (Software Developer) confirmed this assertion by attributing the adoption of cloud computing to the availability of mobile devices. He asserted that:

The spread of electronic devices of all sorts that suit any budget has made technology more accessible than in previous years, where we had to think twice before purchasing a system. Additionally, for cloud software, you just need any available device to log in. For instance, all agents have been assigned a laptop, a MiFi, and a mobile phone, so we can work from anywhere unless the client's issue is due to hardware faults.

Furthermore, the technical service manager considers that:

The access to high-speed internet without restrictions and sophisticated mobile devices are the things that make cloud computing more attractive...they are the basis. If we can have access to more sophisticated IT services just through the internet at lower costs and with less staff, why shouldn't we go for it? The subscription to cloud services is a bit of a relief for us technicians. We don't have to crack our brains in order to do some configurations or type command lines; everything is handled by the service provider.

Organisational Factors

The Organizational context denotes issues about the organisation and its human ware that influence the adoption of Technology. These organisational factors consist of the management structure of the organisation, the scope and size of the organisation as well as the financial resources available to the organisation (Oliveira & Martins, 2011). Therefore, the respondents were asked to indicate the nature of support the management of the firm provides for cloud computing usage. The Helpdesk System Analyst responded that;

Our managerial structure is more of hierarchical because at some point we have hierarchies we report to, and crucial decisions always come from the top for us to execute. When I joined this firm, they had already joined the cloud computing train, and since then, we have subscribed to more services. Our leaders have been very supportive in this regard.

Furthermore, another respondent (the Chief Executive Officer) also stated that:

By using cloud-based services, the organisation is much more efficient – by reducing the number of agents employed, which consequently helps in reducing cost – and cost minimization is essential for Management.

Environmental Factors

The Environmental context includes the market space where business activities are conducted by the organisation which influence the adoption of technological innovations. In order to understand the environmental factors, the respondents were asked a series of questions. The responses pointed to the support

from the government in ensuring effective internet connectivity and the ability of the firm to embrace new technologies and use it to their advantage. For instance, the Helpdesk System Analyst stated that:

The government has made it easier because now we are using the 4G network everywhere. The government has engaged Internet Service providers to provide internet which is the backbone of cloud computing. I would say the government has played a key role in our ability to use cloud services.

The Chief Executive officer of the SME also attributed their usage of the cloud technologies to some government policies which tend to provide support to firms who patronise digital technologies.

The government has introduced policies and enacted legislations to protect firms who want to use digital tools. This support has made it safer to adopt cloud computing in our operations.

Another respondent attributed cloud computing adoption to competitive pressure. It was discovered that most competing firms within the industry had already embraced new technologies. The Service Delivery Officer indicated that;

The other IT firms, who are our competitors, are already using cloud technologies, so we have no other option but to adopt such technologies as well.

DISCUSSION OF FINDINGS

The previous section outlined the analysis of the findings pertaining to the research questions. In order to address the research questions, this section provides an interpretation and discussion of the analysis of the findings relative to the literature reviewed.

The Nature of Usage of Cloud Computing

The first research question was aimed at determining the extent the case firm uses cloud-based services. The analysis of the findings shows that cloud computing is widely used in the SME. The SME has been able to take advantage of cloud-based services to compete in its industry. The analysis of the data indicated that all employees within the firm use cloud-based services. Furthermore, the analysis showed that the SME subscribed to all the three types of cloud-based services – SaaS, PaaS and IaaS. This finding is corroborated in extant Information Systems research (e.g. Amini & Javid, 2023; Dincă et al., 2019; Evans, 2019) where it is asserted that SMEs mostly with low budgets and human resources are one of the major groups that tend to adopt cloud computing to remain competitive. This leads to the first finding of this study.

Finding 1: *SME with low budgets and human resources depends on cloud computing technologies to compete in the industry.*

The study also explored the types of cloud computing services utilized by the SME. It was discovered that the SME subscribed to a range of cloud computing services offered by Microsoft which contains an exchange hosted server, SharePoint for collaboration and data storage; Teams for communication and telecommuting, as well as word processing, spreadsheet and project management. The SME, thus, utilized the Platform as a Service (PaaS) model which offers an environment for developers to create and deploy applications. According to Abubakar (2016), the PaaS model has the capability to provide an affordable environment for consumer-created applications using programming languages, libraries, services, and tools supported by the provider.

Cloud Computing Adoption Factors

The second research objective was to identify the key Technological Organisational and Environmental factors that influence the adoption of cloud computing in the case study. A conceptual framework was therefore developed based on the TOE framework. This was used in analysing the data. The findings in this regard are discussed in this section.

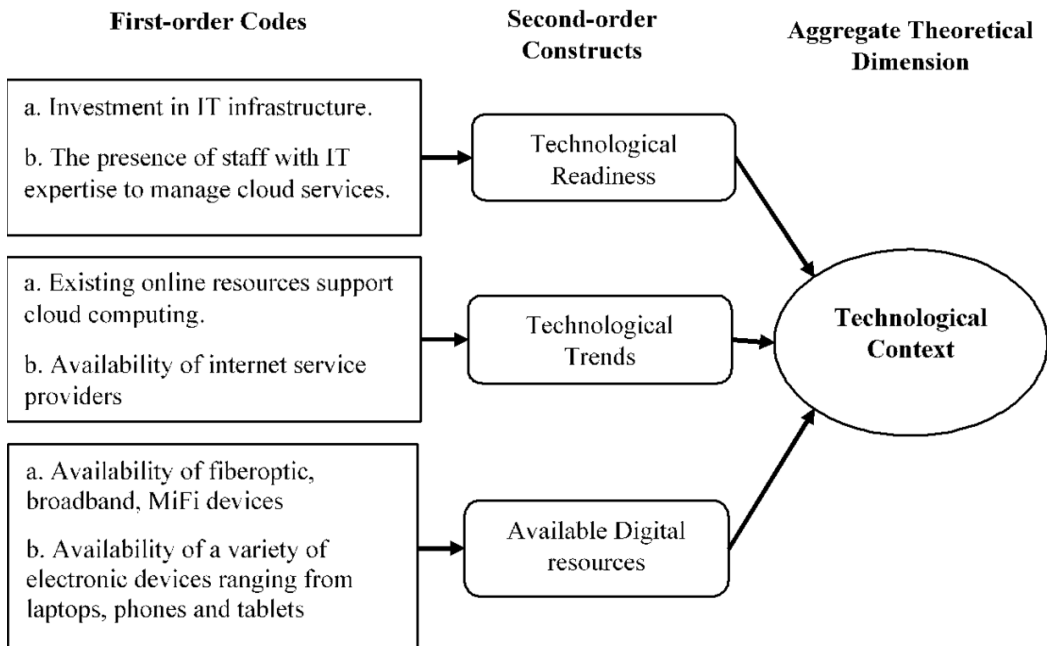
Technological Factors

Technological Factors that influence cloud computing adoption include technological trends and technical tools and infrastructure, such as the internet and other electronic devices. This finding is in line with extant studies (e.g., Amini & Javid, 2023; Abdollahzadegan et al., 2013; Oliveira et al., 2014), which have asserted that the technology readiness of organizations - including their technology infrastructure and IT resources - constitutes a critical factor for cloud adoption. The summarized and analyzed data related to the technological context are presented in Figure 3.

Existing literature on cloud computing proposes that the trialability of cloud services and learning capability of employees influence cloud adoption (Dincă et al., 2019; Khayer et al., 2021; Yeboah-Boateng & Essandoh, 2014). Therefore, cloud computing adoption will tend to increase when high-quality technological devices and other tools are available as discovered in this study. Consistently, the technological trend and the availability of technologies which constitute the basis of a cloud environment influenced its adoption in the case SME. This leads to the second finding of this study.

Finding 2: *Technology readiness, technological trends, and available digital resources influence cloud computing adoption.*

Figure 3.
Structure of data related to the Technological context



Organisational Factors

The analysis of the findings shows that the operations of the SME involve the use of electronic devices. The firm is in the IT sector, and management fully supports the use of digital tools, which serves as an enabler for the adoption of cloud computing. Additionally, management sees cloud computing as a cost-effective tool for serving clients with scarce resources. The summarized analyzed data related to the organizational context are presented in Figure 4.

A review of literature on cloud computing adoption asserted that the role of top management support and involvement in the adoption and use of innovative technologies is crucial (Khayer et al., 2021; Yeboah-Boateng & Essandoh, 2014). Furthermore, the size of the organisation was found to be an essential parameter for the adoption of digital innovations. Small and Medium-sized firms can be more innovative; they are flexible enough to adapt their actions to the quick changes in their environment (Assante et al., 2016; Abdollahzadegan et al., 2013). As such, the literature review indicated that the adoption process of cloud computing involves some organisational adjustments. These adjustments include the need to identify the way of thinking of the organisational elements (i.e., staff, and management) regarding culture (Amini & Javid, 2023; Dincă et al., 2019; El-Gazzar, 2014). It was therefore discovered that the support from the management and organisational characteristics influenced the adoption of cloud computing in the case SME. Finding 3 of the study is developed.

Finding 3: *Both organisational characteristics and managerial support influence cloud computing adoption.*

Environmental Factors

The environmental context includes competitors, vendors and business partners as well as relationships with governmental agencies (Tornatzky & Fleischer, 1990). The environmental context consists of the structure of the industry, the presence or absence of technology service providers and the regulatory agencies (Baker, 2011). The summarized analysed data related to the environmental context is presented in Figure 5.

The government was identified as one of the first enablers of cloud adoption by facilitating a partnership with foreign companies to provide more extensive internet coverage, which constitutes

Figure 4.
Structure of data related to the Organisational context

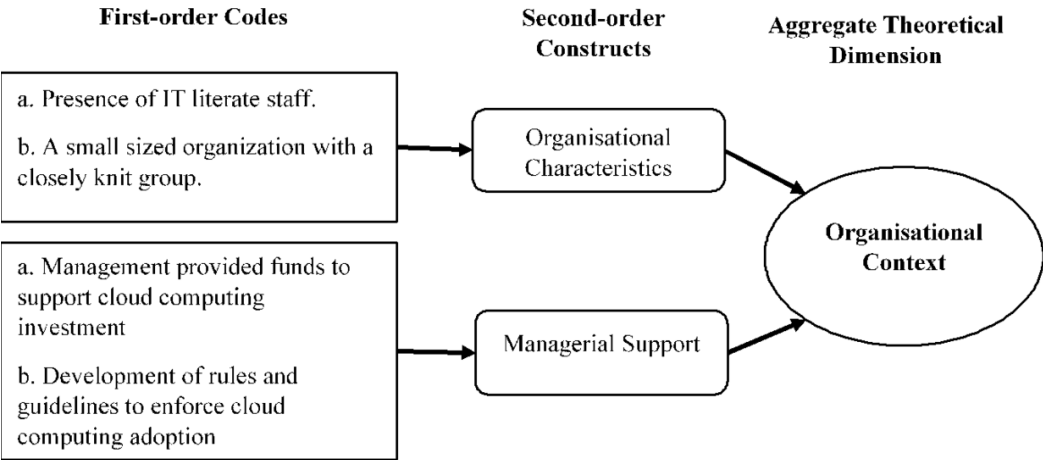
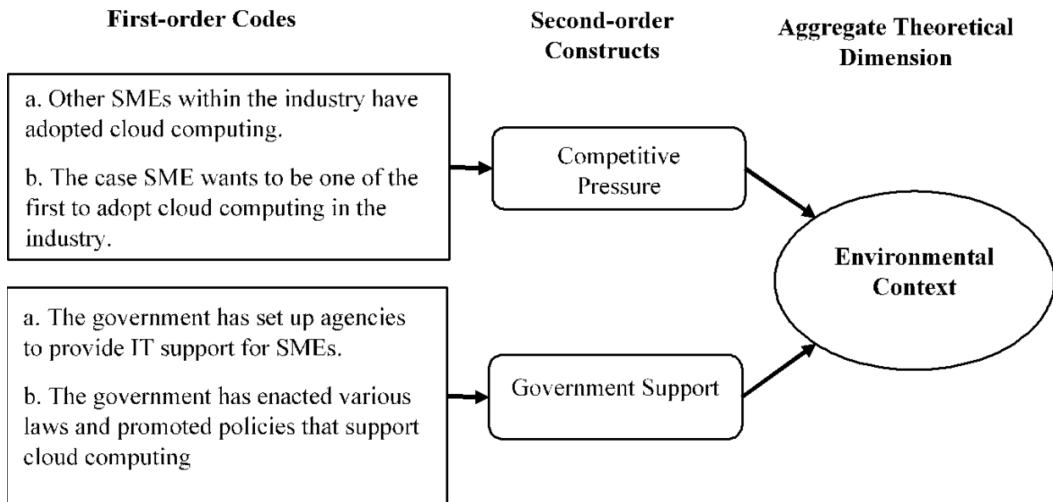


Figure 5.
Structure of data related to the Environmental context



the basis for a cloud environment. Furthermore, the case SME wanted to be among the first movers in the industry to adopt cloud-based services in the software development industry in Ghana. The existence of competitive pressure and government regulatory agencies tends to influence cloud computing adoption (Amini & Javid, 2023; Ansong & Boateng, 2018; Chiu et al., 2017; Dincă et al., 2019; Lian, 2015; Oliveira et al., 2014). For instance, through the Ministry of Communications, the Government of Ghana has built a national data center that serves as a cloud service provider for both public and private enterprises. In addition, the Government of Ghana has enacted various laws and promoted policies that support and facilitate the establishment of different service levels for cloud data transmission and storage. These regulations include the Data Protection Act, ICT4AD Policy, the National Telecom Policy, the Electronic Transaction Act, the Electronic Communications Act, among others (Omane-Boamah, 2014). This leads to Finding 4 of the study.

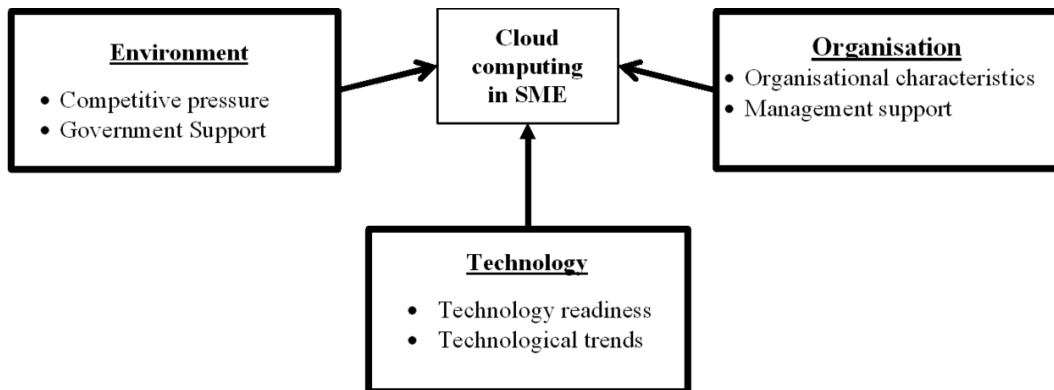
Finding 4: *Competitive pressure and Government support influence cloud computing adoption.*

CONCLUSION AND RECOMMENDATIONS

The purpose of this study was to assess the current stage of cloud computing usage by SMEs and investigate the factors influencing its adoption in Ghana using a digital firm as a case study.

An extensive literature review was carried out to identify pertinent issues related to SMEs and cloud computing adoption in research. The Technology-Organisation-Environment (TOE) framework was selected as a guiding lens in order to conduct this research. The TOE framework was the best fit for this study because of its extensive use in information systems research to investigate a number of technology innovations (Oliveira & Martins, 2011). In addition, it is about the only framework that combines the three major determining factors that influence the adoption of a technology (Oliveira & Martins, 2011). A conceptual research model was developed using the TOE framework. This was in response to answering the second research objective which was to determine the factors that influence the adoption of cloud computing by SMEs in Ghana. The research model developed after the analysis and discussion of the findings is shown in Figure 6.

Figure 6.
SMEs Cloud Computing Adoption Model



In response to the first research objective, it was discovered that the SME subscribed to a range of cloud computing services offered by Microsoft which contains an exchange hosted server, SharePoint for collaboration and data storage; Teams for communication and telecommuting, as well as word processing, spreadsheet and project management.

Implications of the Study

This study adds to the knowledge of cloud computing from a developing economy perspective and could serve as a basis for further studies in SMEs and cloud computing. The initial review of cloud computing literature revealed a limited number of studies conducted at the organisational level. In addition, most of the studies largely focused on the operational and technical issues involved in cloud computing adoption as intimated by Schneider and Sunyaev (2016). This study therefore fills this gap in literature from a developing country perspective.

In practice, this study provides more understanding of how cloud computing is growing in Ghana and how managers in SMEs and potential entrepreneurs can get the most out of the cloud and gain an edge over competitors. The study highlights the multidimensional factors which are critical for SMEs in the adoption of cloud computing within the Ghanaian economy. The case SME presents a success story of how cloud computing is being implemented which invariably can serve as a good learning point for other SMEs operating within a similar context.

In terms of significance to policy, this research provides more insight for policymakers with regards to the policy discourse on cloud computing adoption. Issues for policy discourse could include the cost of data by service providers, and guidelines to ensure there are laws governing the provision of cloud services in Ghana.

Limitations and Future Research

Cloud computing is a digital innovation which is still evolving; hence findings from this study could be limited to the peculiarities of an SME in Ghana. Future studies may expand this study into other sectors of the Ghanaian economy.

Again, an SME involved in software development was purposively selected for this study. The nature of the case SME may have an impact on the findings of this study. Hence future studies may consider other non-IT related SMEs to test and validate the findings from this study.

Future research may also include collecting quantitative data via surveys to test and validate the research model in Figure 6.

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