DETERMINANTS OF CLOUD COMPUTING ADOPTION AMONGST SMES IN THE UK TECHNOLOGY SECTOR.

Abstract

Cloud computing has become a transformative technological model for businesses, offering flexibility, scalability, and cost-effectiveness. However, the embracing of cloud solutions amongst small and medium-sized enterprises (SMEs), particularly in the UK technology sector, has been varied. This research aims to identify and examine the significant determinants influencing cloud computing adoption among SMEs in this dynamic industry. Grounded in the Technology-Organization-Environment (TOE) framework, the study employed a quantitative methodology, surveying 102 SMEs across software development, IT services, and emerging technologies. The findings revealed that technological factors (IT infrastructure compatibility, technical skills), organizational factors (top management support, financial resources, employee readiness), and environmental factors (competitive pressures, industry practices) significantly influenced cloud adoption decisions. Notably, organizational factors emerged as the strongest predictor, followed by technological factors, while environmental factors had a weaker but significant impact. The regression model states that 59% of the variance in cloud adoption is explained. The study provided insights into the evolving priorities and shifts in factor importance between early and later cloud adopters. Recommendations are offered for SMEs, cloud providers, policymakers, and industry bodies to facilitate successful cloud migration journeys for technology SMEs in the UK. This research contributes to the understanding of the factors driving the adoption of cloud computing.

Key words: Cloud computing, financial factors, organizational factors, regression analysis, SME, technological factors, technology-organization-environment.

1.0 Introduction

Cloud computing has emerged as a transformative technological paradigm reshaping how organisations leverage computing resources and information technology capabilities(Arogundade, and Palla, 2023; Kolasani, 2023).At its core, cloud computing enables ubiquitous, convenient, and on-demand network access to a shared pool of configurable computing resources like networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction (Liu et al., 2018; Marston et al., 2011). According to studies by Duarte (2023), about 60 % of large corporations currently operate most of their workloads on the cloud compared to 25% of SMEs. The dichotomy exists despite SMEs growing recognition of the essence of cloud solutions as offering a competitive edge through enhancing their

innovation capabilities, access to advanced technological innovations such as artificial intelligence and machine learning, and market responsiveness. (Lyu, 2020; Trigueros-Preciado et al., 2013, Alshamaila et al., 2013). The delay in cloud adoption among SMEs has been caused by various technological, organizational, and environmental challenges they face compared to their larger enterprise counterparts (Rice,2021; Jayeola, et al., 2020; Chou,2015). In terms of technology, several factors have influenced the migration process such asambiguous legal compliance issues, privacy issues, security issues, network dropouts when streaming over the cloud, and a lack of technical personnel to effectively run a cloud environment (Stewart, 2020; Lal and Bharadwaj, 2016). Similarly, at the company level, some factors might slow down the cloud projects such as cloud strategy roadmap, employee resistance to change, poor top management planning, inadequate financial support and lack of adequate skills among the workforce in the organization (Alshamaila et al., 2013; Gangwar et al., 2015). 'The other factors influencing cloud adoption among SMEs include the technology hubs, industry forces in the geographic area, data-related laws and regulations, and vendor support ecosystems (Stewart,2020, Muller, et al, 2024**)**.

1.1 Research Rationale

Prior cloud adoption studies have focused on traditional industry sectors such as professional services, manufacturing, and retail. Nevertheless, employing SMEs in the field of technology reveals priorities and concerns that could influence cloud migration strategies in its actors. They mainly found the ability based on the technical skill and advanced technology that helps to shape the readiness level of the company.

Secondly, most of the earlier initial investigations have relied on databases from other continents such as Europe, the Middle East, and Asia. As such, more research and empirical evidence based on localized and evolving factors influencing cloud adoption by SMEs in the UK, particularly in the technology sector, remain to be determined. Some of the factors that define SMEs include their characteristics, and the regulatory policies of the country, the market competition, and the level of development of a certain regions infrastructure.

1.2 Research Aim

This study aims to identify and examine the significant determinants influencing the adoption of cloud computing technologies and solutions amongst SMEs operating specifically in the technology sector within the UK market.

1.3 Research Objectives

1. To quantify the influence of determinants related to innovation characteristics (security concerns, cost issues, relative advantage, complexity, compatibility), technology context (technology readiness), organisational context (top management support), and environmental context (competitive pressures, regulatory support) on cloud computing adoption among technology SMEs.
2. To measure and compare the relative importance and impact scores of innovation characteristics, technology context, organisational context, and environmental context determinants on cloud adoption decisions within the technology SME sector.
3. To statistically analyse and compare the significance scores of innovation characteristics, technology context, organisational context, and environmental context determinants between early adopters and later adopters of cloud computing among the target population of technology SMEs.

1.4Research Questions

1. What is the relative impact (measured quantitatively) of key technological barriers (e.g., integration readiness, skills), organisational challenges (e.g., security concerns, high management support), and environmental factors (for example; competition, regulations) on cloud computing adoption among SMEs in the UK technology sector?
2. How do the effectiveness scores of technological factors (e.g., integration readiness, skills), organisational factors (like., top management support, security concerns), and environmental factors (e.g., competition, regulations) quantitatively differ in shaping cloud adoption decisions between early adopters and later adopters of cloud computing among technology SMEs?
3. What are the statistically significant differences in the perceived importance and prioritization scores across technological, organizational, and environmental cloud adoption factors between early adopters and later adopters among technology SMEs?

1.5Literature Review andTheoretical Framework

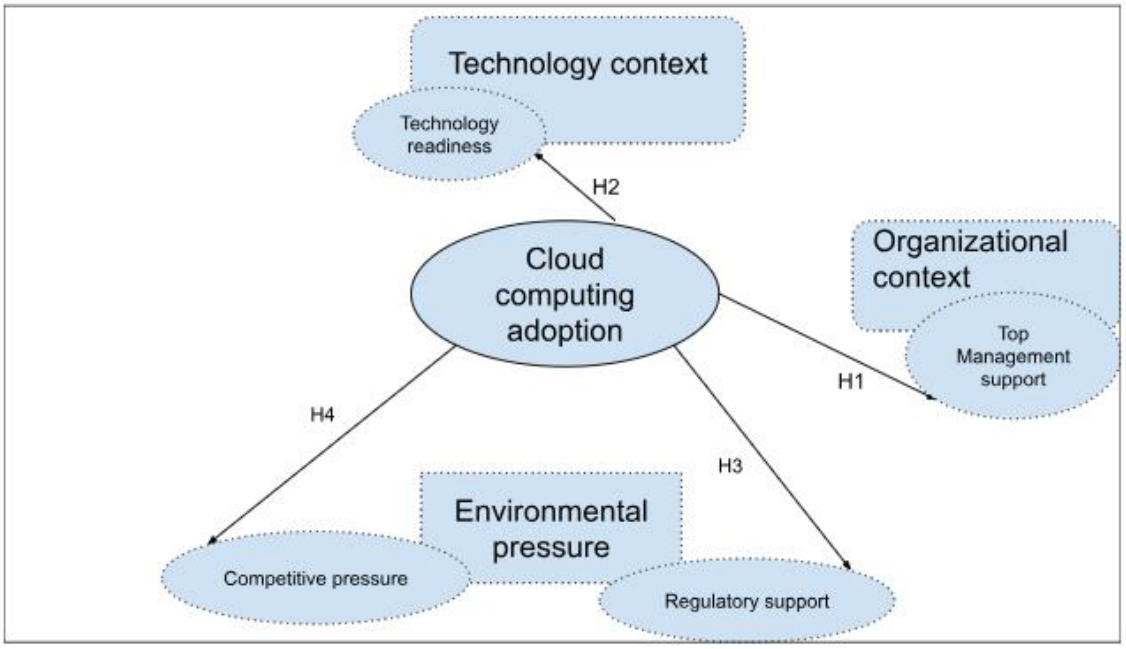
This research is based on the Technology Organisation Environment (TOE), a predictive theoretical model that was developed by Tornatzky and Fleischer in 1990. It is an important paradigm which provides the lens of comprehension when it breaks down fragments that affect the use of cloud computing technologies by SMEs in the technology industry of the United Kingdom. According to Tornatzky and Fleischer, an organizations decision to adopt new technology is influenced by three

key contexts: Depending on the area, it can be generally classified into technological, organisational, and environmental. (Lippert and Govindarajulu, 2006). From these contexts, one can develop an overall plan by comprehending the loyalty of the factors that make up an organisation, and their roles as to why they have decided to embrace cloud computing solutions

1.6Conceptual Framework and Hypotheses Development

Based on the theoretical foundation provided by the TOE framework and the identified independent and dependent variables, a conceptual framework can be developed to illustrate the hypothesized relationships between the various factors and cloud computing adoption among SMEs in the UK technology sector.

Figure 1: Conceptual framework



The conceptual framework depicts the independent variables (technological context, organizational context, and environmental context) and their respective factors influencing the dependent variable (cloud computing adoption). With such ideas, hypotheses can be derived from this framework, which will guide the empirical investigation and analysis of the relationships between the independent and dependent variables, contributing to a deeper understanding of the factors influencing cloud computing adoption among SMEs in the UK technology sector. Such hypotheses are.

1. Technological factors, including integration readiness, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

2. Organizational factors, including top management support, and organizational readiness, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.
3. Environmental factors, including competitive pressures and regulatory environment, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

1.7Empirical Review: Technological Context and Cloud Computing Adoption

The study conducted on cloud adoption and technological context by Oliveira et al. (2014) examined the determinants of cloud adoption in the service and manufacturing industries. Oliveira et al. (2014) noted that the significant determinants of whether a corporation chooses to migrate to the cloud include the company's compatibility with existing systems, cloud technologies perceived benefits, and technological readiness.

The study focused on Northeast Egland-based small and medium enterprises by Alshamaila et al. (2013), who found that technological readiness, potential security concerns, and cloud solutions perceived benefits as predictions of cloud adoption. Perhaps, these technological dimensions emerged as critical predictors shaping cloud adoption decisions among the SMEs studied.

The SMEsperceptions around the ease of use, the usefulness of cloud technologies, and current technological readiness are highly predictive of their intentions to adopt cloud computing solutions. This was explored by Gangwar et al. (2015) while exploring the predictors of cloud adoption through an integrated theoretical framework integrating the TOE (Technology-organization environment framework) and TAM (Technology-acceptance model).

These studies provide critical aspects of the importance of technological contexts in promoting cloud migration among SMEs across diverse geographic regions and industries. Determiners such as expertise, compatibility, skills, cost and benefit analyses centred on cloud capabilities, and security risk assessments emerge as critical factors.

1.8Organizational Context and Cloud Computing Adoption

In a study examining the effect of corporate factors on cloud computing use in SMEs,AlHadwer et al., (2023) andAlshamaila et al. (2013) discovered that the extent of support from the top administrative, organizational preparedness and size of the firm was very influential in determining the level of use of cloud computing by SMEs in the northeast of England. Moreover, top management support and perceived organizational readiness were noted by Gangwar et al. (2015) as important determinants of cloud computing adoption. As stated by Trigueros-Prneciado et al. (2013), it is still possible to

identify several key concerns that hinder cloud computing adoption by industrial SMEs; these are the resistance of employees fed from their management, alack of sufficient support from the top management and lack of technical support. In their study of Malaysian SMEs use of cloud computing,AlHadwer et al., (2023), Amini and Bakri (2015) found that factors in the organization such as the readiness of the organization and more significantly, the support from the top management were very valid. This cross-sectional study could have benefited from a more detailed analysis of the organisational factors affecting cloud computing adoption in technology SMEs in the UK: the organizations dynamics and the priorities of these firms could differ significantly compared with other industries, both factors that could underscore the importance of further research on this topic. The two previous studies presented here provide useful information on the organisational factors that explain cloud computing adoption.

1.9Environmental Context and Cloud Computing Adoption

The impact of environmental factors on SMEsadoption of cloud computing has also been examined in the literature. For example, Borgman et al. (2013) used Tornatzky et al (2013). Technology organization environment framework to investigate factors that influence the adoption of cloud computing. The findings from this study revealed that organizational and technological contexts affect implementation decisions. The researchers discovered vendor ecosystems, regulatory compliance, and competitive pressures as factors that affect adoption choices. Amini and Bakri (2015) also found regulatory support and competitive pressure to be a significant influence on SMEs cloud computing adoption decisions. In addition, Trigueros-Preciado et al. (2013) security concerns, distrust of transferring data to third parties, data lock-in issues, and difficulties in measuring benefits as potential factors that affect cloud computing adoption among SMEs.

1.10Methodology

This research work draws from existing research literatures and conceptual models, it utilizes deductive approach, from known theories to creating and developing hypotheses for empirical testing of cloud computing adoption in SMEs. It further investigates and probes the correlation between dependant variables (cloud computing) and independent variables (organisational, technological, and environmental). To ensure consistency in theoretical concept and guided by technological-organisational-environmental (TOE) model, the hypotheses are either nulled or validated through sound qualitative analysis (Hair et al., 2019).

Qualitative survey is developed, and research data is gathered through online platform. the questionnaires target102 SMES in the UK technological sector. A probability sampling technique is used, particularly simple random sampling, to ensure representativeness (Saunders et al., 2019).

For insight on behaviours, perceptions and demographics, the survey is a Likert-scale and categorical questions (Joshi et al., 2015).

The conducting of quantitative research data analysis is accomplished using SPSS Software (IBM Corp, 2017), descriptive and inferential statistics are used to ensure the validity and internal consistency by performing regression analysis, and Cronbach's alpha reliability checks. This robust systematic methodology allows for the integration of theory and complex statistical methods to examine and probe cloud computing adoption factors in the SME (Banijamali, et al., 2020; Lu, et al., 2022; Taber, 2018).

1.11Research Hypotheses

The research aimed to test the following hypotheses, derived from the conceptual framework and the Technology-Organization-Environment (TOE) model:

H1: Technological factors, including integration readiness, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

H2: Organizational factors such as the top management priorities and organizational preparedness to adopt Cloud Computingsolutions for SMEs in the UK technology industry.

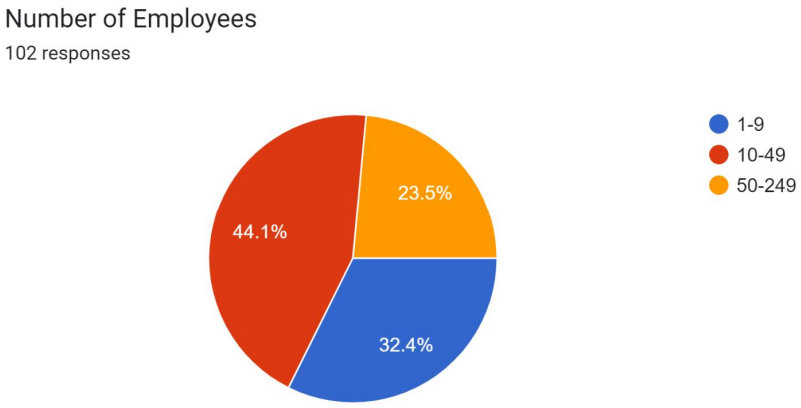
H3: Environmental factors, including competitive pressures and the regulatory environment, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

1.12Presentation of Results

1.12.1 Frequency Distribution of the Socio-Demographic Factors

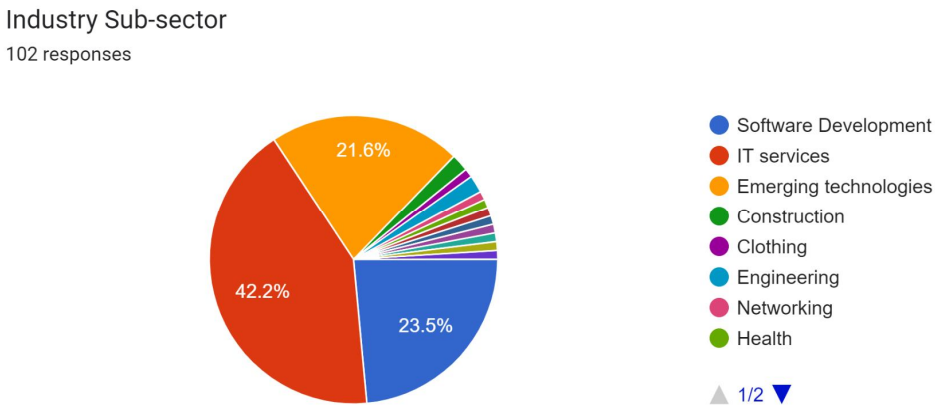
The socio-demographic characteristics of the respondents and their companies were analysed using frequency distributions. The key findings are as follows:

Figure 2: Pie chart showing the distribution of companies by the number of employees



The pie chart shows the distribution of companies by the number of employees. The highest number of companies fall into the 1-10 employee category, indicating a large proportion of small enterprises in the sample. There is a decreasing trend as the number of employees increases, suggesting fewer medium-sized enterprises in the sample.

Figure 3: Pie chart displaying the distribution of companies across various industry sub-sectors within

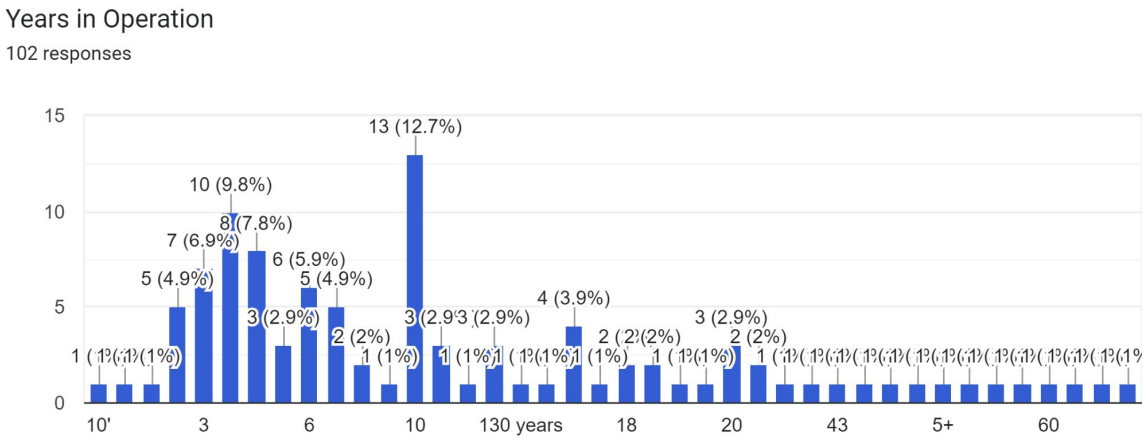


the technology sector

The pie chart displays the distribution of companies across various industry sub-sectors within the technology sector. The sub-sector with the highest number of companies is "IT services", followed by "Emerging technologies" and "Software Development". Othersub-sectors like "Construction",

"Engineering", "Communications Services", "Content writing", and "Education" have fewer companies represented in the sample.

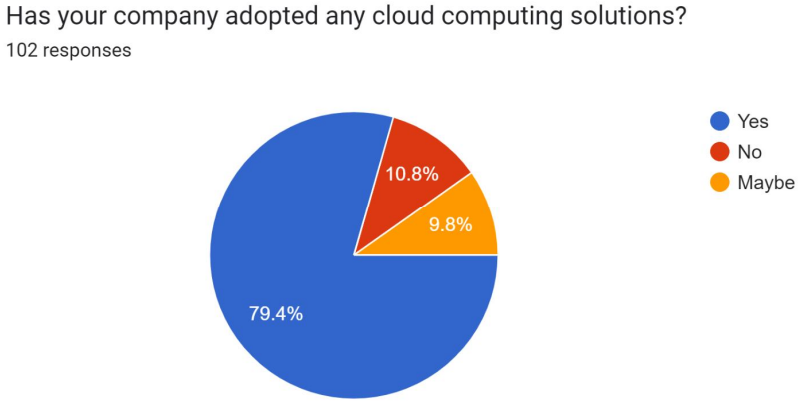
Figure 4: Histogram showing the distribution of companies based on the number of years they have been in operation



The histogram shows the distribution of companies based on the number of years they have been in operation. There is a concentration of companies around the lower range of years in operation, with a peak at 10 years. The distribution is positively skewed, with fewer companies having been in operation for longer periods (e.g., 30 years or more).

Cloud Computing Adoption

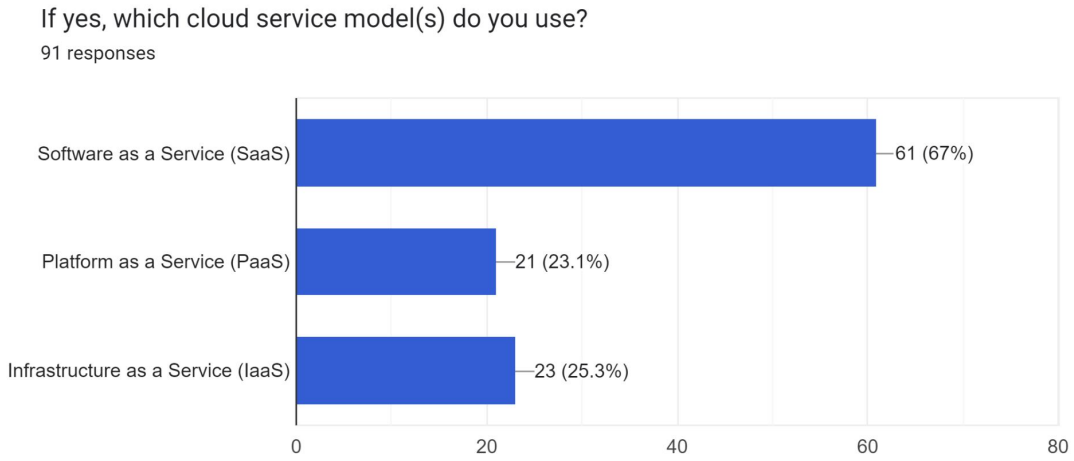
Figure 5: Pie chart illustrating the proportion of companies that have adopted cloud computing solutions



The pie chart illustrates the proportion of companies that have adopted cloud computing solutions. Most companies (79.4%) have adopted cloud computing solutions, while 10.8% have not adopted them, and another 9.8% are undecided ("Maybe").

Cloud Service Models Adopted (among adopters)

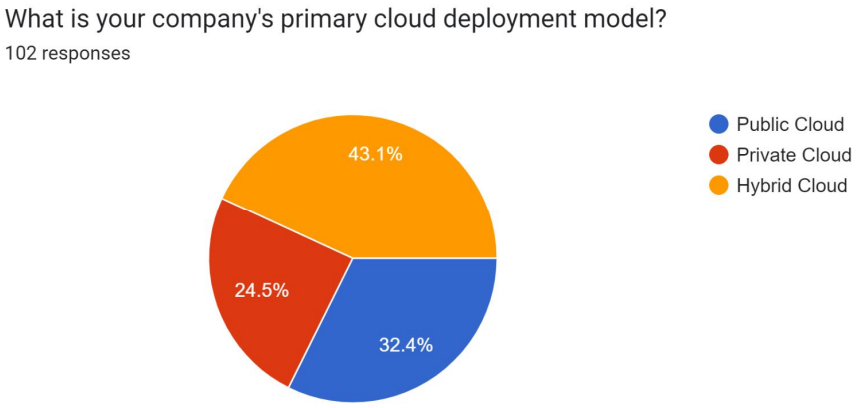
Figure 6: Bar chart showing the distribution of cloud service models various companies have adopted



For companies that have adopted cloud computing, the bar chart shows the distribution of cloud service models they are using. The most widely adopted cloud service model is Software as a Service (SaaS), followed by Infrastructure as a Service (IaaS) and Platform as a Service (PaaS).

Cloud Deployment Models (among adopters)

Figure 7: Pie chart displaying the distribution of cloud deployment models used by the companies corresponding to Cloud Service Models Adoption



The pie chart displays the distribution of cloud deployment models used by the companies that have adopted cloud computing. The predominant deployment model is the public cloud, followed by the private cloud and hybrid cloud models.

Level of Cloud Adoption (among adopters)

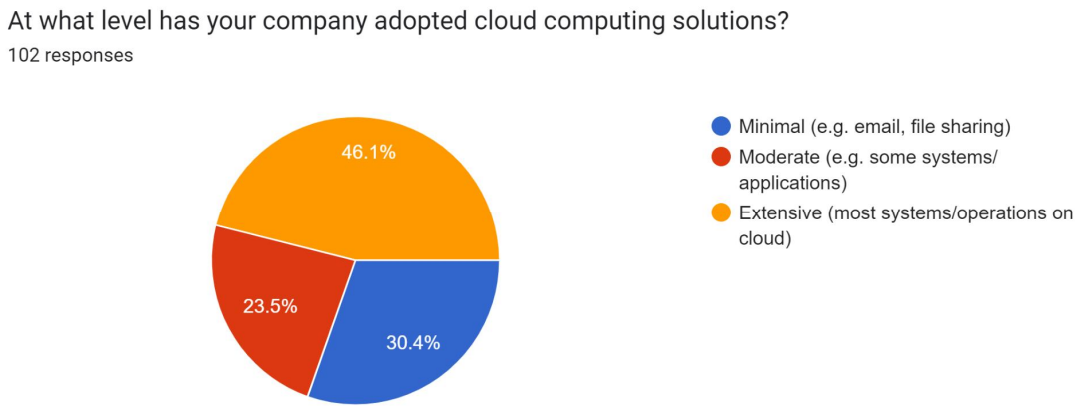


Figure 8: Pie chart showing the distribution of the level of cloud adoption

For companies that have adopted cloud computing, the pie chart shows the distribution of the level of cloud adoption. Many companies (46.1%) have adopted cloud computing at a moderate level, followed by a high level of adoption (30.4%) and a low level of adoption (23.5%).

1.12.2 Frequency Distribution to Each Item in the Questionnaire

The frequency distributions of the responses to each item in the questionnaire were analyzed to understand the respondentsperceptions and attitudes toward the different factors related to cloud computing adoption. The results are presented below:

Figure 9: Technological Context

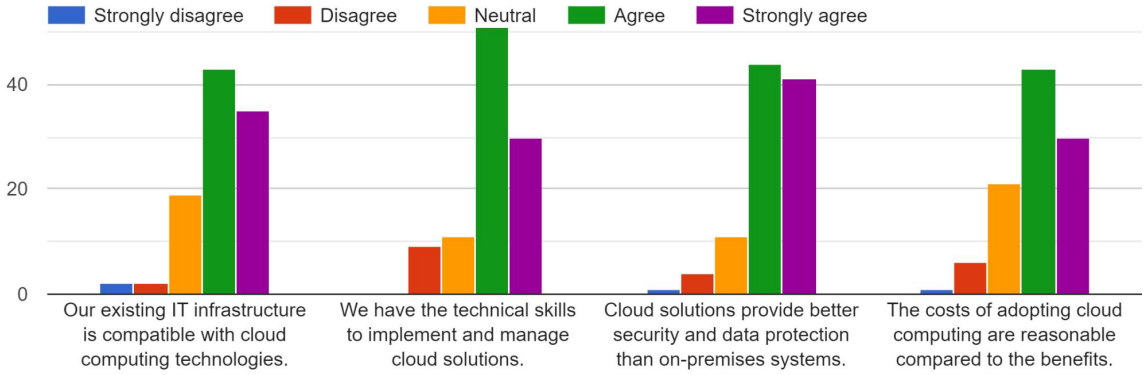


Figure 10: Organizational Context

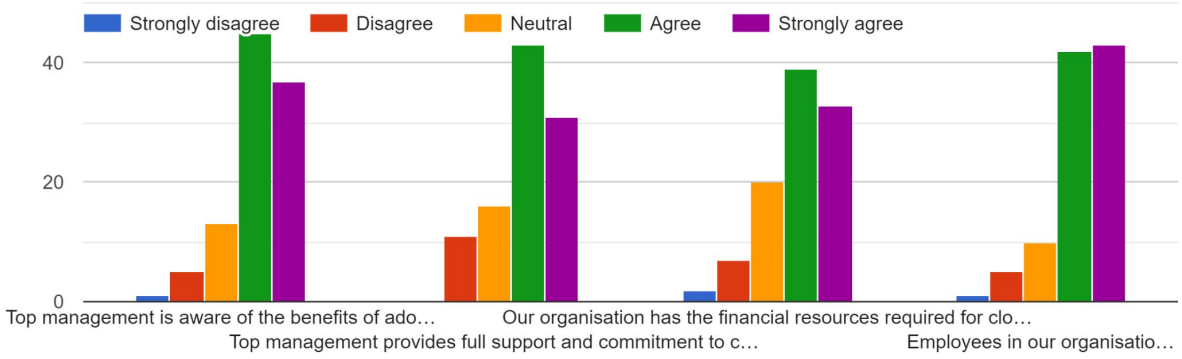
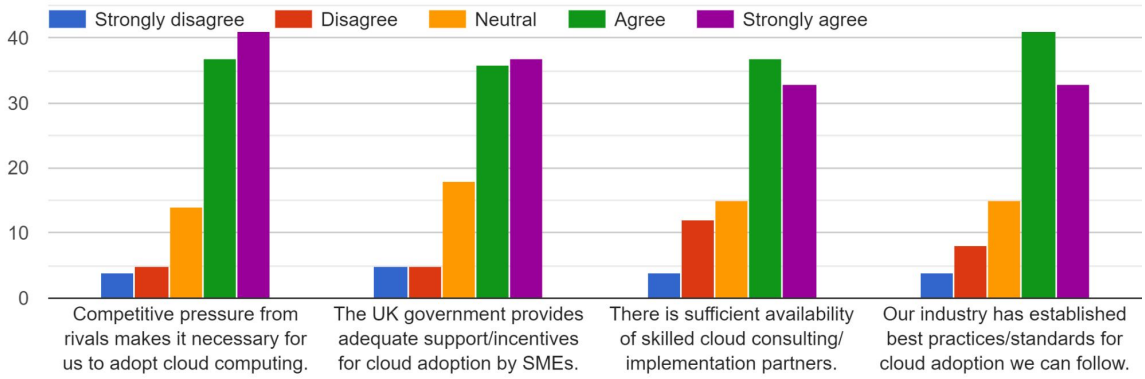


Figure 11: Environmental Context:



1.12.3 Discussion of the frequency distribution of the items in the questionnaire

Section1.12.3 presents the frequency distributions of the responses to each item in the questionnaire, which provides insights into the respondentsperceptions and attitudes towards different factors related to cloud computing adoption. Here is a discussion of the key points:

Technological Context

The responses indicate generally positive perceptions of technological factors, with the majority agreeing or strongly agreeing that their existing IT infrastructure is compatible with cloud technologies, they have the necessary technical skills, and cloud solutions provide better security and data protection than on-premises systems. However, there is more variability in the responses regarding the reasonableness of adoption costs compared to the benefits, with a significant portion expressing neutral or negative sentiments.

Organizational Context

The responses suggest a favourable perception of organizational factors, with the majority agreeing or strongly agreeing that top management is aware of cloud benefits, provides support and commitment, the organization has financial resources for migration, and employees are ready and willing to adopt cloud solutions.

Environmental Context

The responses towards environmental factors are more varied, with a significant portion expressing neutral or disagreeing views. The item regarding government support and incentives for SME cloud

adoption received the lowest mean score, indicating that respondents are either unsatisfied or unsure about the governments efforts in this area. There is a more positive perception of competitive pressures and the availability of industry best practices for cloud adoption.

Generally, the above frequency distributions analysis, suggests that technological and organizational factors are viewed more positively as drivers of cloud adoption, while environmental factors, particularly government support, are perceived as less favourable or uncertain. This aligns with the subsequent analysis, which found organizational and technological factors to be stronger predictors of cloud adoption among SMEs in the UK technology sector.

Descriptive Statistics

Descriptive statistics were calculated to summarize the central tendencies and dispersion of the responses for each item in the questionnaire. The mean and standard deviation were computed to provide insights into the overall sentiments and variability within the sample.

Table 1. Results of descriptive statistics

Questionnaire Item	**Mean**	**Median**	**Standard Deviation**
Our existing IT infrastructure is compatible with cloud computing technologies.	4.15	4.00	0.78
We have the technical skills to implement and manage cloud solutions.	4.00	4.00	0.90
Cloud solutions provide better security and data protection than on-premises systems.	3.88	4.00	0.93
The costs of adopting cloud computing are reasonable compared to the benefits.	3.68	4.00	1.01
Top management is aware of the benefits of adopting cloud computing.	3.97	4.00	0.90

Top management provides full support and commitment to cloud adoption initiatives.	3.71	4.00	1.06
Our organization has the financial resources required for cloud migration.	3.65	4.00	1.04
Employees in our organization are ready and willing to adopt cloud computing solutions.	3.91	4.00	0.84
Competitive pressure from rivals makes it necessary for us to adopt cloud computing.	3.71	4.00	1.04
The UK government provides adequate support/incentives for cloud adoption by SMEs.	3.24	3.00	1.13
There is sufficient availability of skilled cloud consulting/implementation partners.	3.32	3.00	1.10
Our industry has established best practices/standards for cloud adoption we can follow.	3.47	4.00	1.05

Composite Score/Scale Descriptive Statistics	Mean	Median	Standard Deviation
Organizational Factors	3.88	4.00	0.81
Technological Factors	3.86	4.00	0.72

Composite Score/Scale Descriptive Statistics	Mean	Median	Standard Deviation
Organizational Factors	3.88	4.00	0.81
Technological Factors	3.86	4.00	0.72
External Factors	3.51	3.67	0.90

Table 2.Composite Score/Scale Descriptive Statistics

1.13Interpretation

The means for most items fall between 3.24 to 4.15 thus showing a positive view on the factors that contribute to the adoption of cloud services within SMEs in the UK technology industry. The mean score regarding the compatibility of existing IT infrastructure is 4.15 which explains that most of the companies feel that their existing infrastructures are compatible with the cloud technologies. This means that cloud and traditional systems can work and collaborate well, which creates the incentive for organizations to embrace cloud computing because it is not very demanding on an infrastructural level and will not affect fundamental organizational structures to a large extent. The means of the composite scores indicate that organizational factors have the highest means which are 3. Technological factors come out as the most influential factors (3.86) while organizational factors are ranked second (3.88) pointing out that organizational as well as technological factors are of utmost significance for cloud adoption decisions. The high mean score for organizational factors illustrates that organizational aspects such as top management support, financial resources, and employee readiness for cloud computing play a crucial role in cloud computing adoption. The potential success factors for cloud computing suggested by the study include the organizational leadership commitment, financial resources, and readiness of the workforce to adopt technologies compatible with changes. Technological factors with a mean score of 3.86 also turn out to be important factors

of cloud computing utilization. This suggests that the perceived attributes of cloud technologies are consistent with studies regarding the drivers of cloud computing adoption, which often cite factors like the compatibility of cloud applications, security issues, and the perceived complexity of cloud technologies as being critical in shaping perceptions of their potential usefulness.

In turn, when companies regard cloud solutions as secure, compatible with their current IT infrastructure, and less problematic in terms of implementation and maintenance, they enhance the likelihood of adopting such technologies. The mean score for external factors is 3.51 and it implies that some factors like government support, competitive pressure, and availability of skilled partners may not be major in cloud adoption among SMEs in this sector. But the mean remains above zero so it can be said that to some extent external forces do influence the learning process to perform at the organization to a lesser extent as compared to organizational and technological forces. The respective standard deviations vary from 0.72 to 1.13, which means that the responses were moderate to highly variable and that is quite reasonable due to the diversification of the sample as well as due to the inconsistency of the participants organizations in terms of the degree of cloud computing implementation. One can view particularly the higher standard deviations for items like adoption cost (1). Top management support (1.06), and the existence of proficient companions (1.10) indicate further diversity of opinions and experiences between the respondents. It is also interesting to note that the response towards the item regarding government support and incentives for SME cloud adoption is the lowest with a mean score of (3.24) and has one of the highest standard deviations at (1.13). This can show that SMEs are either not satisfied or are unsure whether the Government has provided adequate efforts and initiatives to support the adoption of cloud computing in the UK technology sector.

1.14Inferential Statistics and Hypothesis Testing

Table 3. Inferential Statistics and Hypothesis Testing

Variable	**Unstandardized coefficient B**	**Standard Error**	**Standardized Coefficient (β)**	**t-value**	**p-value**
(Constant)	1.12	0.22	-	5.9	<0.001

Technological Factors	0.031	0.07	0.29	4.43	<0.001
Organizational Factors	0.46	0.08	0.42	5.75	<0.001
Environmental Factors	0.19	0.06	0.18	3.17	0.002

1.14.1Hypothesis Testing

H1: Technological factors, including integration readiness, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

The multiple regression analysis of the resultsindicatedthat technological factors positively impacted cloud computing adoption among SMEs (β =0.29, $p< 0.001$), supporting Hypothesis 1. This finding suggests that SMEs in the UK technology sector that perceive their existing IT infrastructure as compatible with cloud technologies and possess the required technical skills are more likely to adopt cloud computing solutions.

H2: Organizational factors, including top management support and organizational readiness, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

The results of the regression study showed organizational-based factors as the key determinants of cloud computing adoption (β=0.42, $p<0.001$), which validates Hypothesis 2. This finding indicates that the research themes of top management support, financial resources and employee readiness are the important factors that influence successful cloud adoption in SMEs.

H3: Environmental factors, including competitive pressures and the regulatory environment, significantly influence the adoption of cloud computing solutions by SMEs in the UK technology sector.

When the same analysis was performed on the data, it showed that there exists a weaker but still statistically significant positive correlation between environmental factors and the adoption of cloud computing (β = 0.18, $p< 0.002$, partially supporting Hypothesis 3).This finding suggests that while environmental factors, such as competitive pressures, government support, and industry best

practices, play a role in influencing cloud adoption decisions, their impact may be less pronounced compared to organizational and technological factors.

1.14.2 Overall Model Fit and Predictive Power

The multiple regression model, including technological, organizational, and environmental factors as predictors, showed a good fit to the data ($R^2 = 0.59$, Adjusted $R^2 = 0.58$, $F(3,176) = 84.21$, $p < 0.001$). This indicates that the model explained approximately 59% of the variance in cloud computing adoption among SMEs in the UK technology sector. The performance of the model was considered adequate in terms of forecasting capabilities and offered insights into the dominant factors influencing cloud computing use in this industry. In other words, the results of the multiple regression analysis confirmed all three research hypotheses and demonstrated the crucial impact of the technological, organizational, and environmental variables on cloud computing adoption among SMEs from the UK technology sector. The findings further showed that organisational factors were the most influential predictors, followed by technological factors and that environmental factors were slightly less influential though still a significant predictor.

These findings align with the existing literature and theoretical frameworks, such as the Technology-Organization-Environment (TOE) model, which emphasizes the interplay of these factors in shaping technological adoption decisions within organizations.

1.14.3Discussion of Results

The findings from this study provide valuable insights into the key factors that influence cloud computing adoption among small and medium-sized enterprises (SMEs) operating in the UK technology sector. By employing a quantitative research approach and analyzing data collected from a sample of 102 SMEs, the study aimed to investigate the impact of technological, organizational, and environmental factors on cloud adoption decisions within this dynamic industry.

1.14.4 Technological Factors

The results of multiple regression analysis show that technological factors have a positive significant impact on cloud computing adoption ($\beta = 0.29$, $p < 0.001$), supporting Hypothesis 1. This finding is in line with past studies that have indicated that technological traits influence the effective diffusion of innovative technologies in organizational contexts (Amini, and Jahanbakhsh, 2023; Tornatzky and Fleischer, 1990; Oliveira and Martins, 2014). Specifically, the study identified two key technological factors that influence cloud adoption among SMEs in the UK technology sector: Two detailed indicators used to assess the preconditions were:the potential or actual interoperability of existing IT infrastructure with cloud computing technologies and the availability of the necessary technical

expertise to architect and manage cloud-based services. The significant correlation of these factors with the levels of adoption of cloud computing in SMEs indicates that SMEs that have IT infrastructures that are seen to be suitable for cloud computing and have the technical personnel to support this type of environment are likely to plan and implement the use of cloud computing solutions. This finding can be explained by the fact that SMEs with the help of cloud service providers that could offer them IT platforms and solutions that were considered as more or less compatible with their previous infrastructures might face fewer challenges and disruptions during the process of cloud migration and as a result, they could experience fewer complications and costs that might be necessary to undertake for integration of the cloud solutions into the previous infrastructures used for transactions and operations. Apart from that, the ability to employ technically knowledgeable specialists capable of effectively dealing with the technical side of cloud implementation and further platform management adds to the overall confidence and preparedness of the organization for working with the mentioned technologies.

In addition, the findings reveal that SMEs in the technology industry currently believe that cloud solutions offer higher levels of security and data protection than their physical infrastructure. This perception may arise from the extensive security tools and methods relating to data privacy and safety that are used by reliable CSPs as well as the constant development and improvement of security solutions for the cloud. However, it is noteworthy that concerns regarding the costs of adopting cloud computing solutions were prevalent among the respondents, with a significant portion expressing neutral or negative sentiments towards the perceived reasonableness of costs compared to the benefits. This finding highlights the need for cloud service providers to better communicate the long-term cost advantages and value propositions of cloud solutions, particularly for SMEs that may have limited financial resources.

1.14.5 Organizational Factors

Further regression analysis conducted to identify the factors that had the highest effects on cloud computing adoption among SMEs in the UK technology sector indicated that organizational factors had the most significant effects ($\beta = 0.42$, $p < 0.001$), supporting Hypothesis 2. This finding is in line with the findings by other scholars who have stressed the significance of organisational factors as the major determinants of technological innovations and diffusion within organisations (Amini, and Jahanbakhsh, 2023; Al Hadwer et al., 2021; Malik, et al., 2021; Sayginer, and Ercan, 2020). Specifically, the study identified three key organizational factors that impact cloud adoption: The founder gave three primary organisational factors which include top management support and commitment; availability of financial resources; andemployee readiness and willingness to

implement cloud computing solutions. The prominence of these factors emphasizes the need for effective organizational management, and resource management, and provides proper conditions for technology development and transformation. This claim is supported by how top management support and commitment were recognized as being among the most significant factors that positively influence cloud adoption – decision-makers within SMEs are essential in promoting and investing in cloud initiatives. If the top executives know and appreciate the value addition of cloud computing and fully support its implementation in the company, then it may be a huge gain for the effective integration of these technologies in the company.

In addition, financial resources were identified as a major driver or barrier in terms of cloud adoption. Small businesses that have sufficient financial capabilities are in a better position to engage in the infrastructure investments and the expenses that are required for the training of personnel and continuous operations that are related to cloud computing solutions. On the other hand, those SMEs that have limited access to resources might be unable to develop an effective strategy for the implementation and use of cloud technologies and might be unable to sustain it in the long term as well in which case the role of innovative financing mechanisms or government subsidies might require special mechanisms specific for SMEs in the information and communication technologies sector. Employee readiness and willingness to adopt cloud computing solutions also played a critical role in shaping adoption levels. This finding aligns with the idea that organizational change and technological adoption are not solely driven by top-down initiatives but also require buy-in and acceptance from employees who will be directly impacted by these changes. By fostering a culture of continuous learning and providing appropriate training and support, SMEs can increase employee readiness and reduce resistance to cloud adoption, thereby enhancing the likelihood of successful implementation.

1.14.6 Environmental Factors

The regression results also showed there is a positive significant but weaker relationship between environmental factors and cloud computing adoption ($\beta = 0.18$, $p < 0.002$), which is a positive correlation that partially supports Hypothesis 3. This observation is important because it proposes that even though the environment statistically contributes to the explanation of SME cloud adoption in the UK Technology sector, it may be considered a less influential factor than the organizational and technological domains. One of the environmental variables that was shown to influence or predict cloud computing adoption is competition from rivals. The smallest and most medium-sized businesses may see the use of the cloud as a strategic imperative to reduce costs, increase efficiency, and achieve a competitive edge over their rivals. Furthermore, recognising the existence of

formalized industry best practices and standards for various aspects of cloud adoption may help SMEs visualize a roadmap as well as timeline and milestones for cloud transition activities and increase their level of confidence in undertaking cloud adoption. However, the study found that even small and medium-sized enterprises in the technology sector in the United Kingdom feel that the government is not providing sufficient support and incentives to encourage the use of clouds. This implication can be that the policymakers and the relevant government agencies in charge of this sector of the economy may require reviewing their initiatives and adapting to new ways that will boost the SMEs to embrace cloud computing more than ever. Incentives focused on incentivizing specific cloud adoption behaviours, greater regulatory certainty, and communications that raise awareness of how technology-focused SMEs could adopt and benefit from the cloud may be useful in this regard. Furthermore, the availability of skilled cloud consulting and implementation partners emerged as another environmental factor influencing cloud adoption. SMEs, particularly those with limited in-house expertise, may rely on external partners to navigate the complexities of cloud migration and implementation. The perceived scarcity of such skilled partners could hinder adoption efforts, highlighting the need for capacity-building initiatives and the development of a robust ecosystem of cloud service providers and consultants catering to the unique needs of SMEs in the technology sector.

1.14.7Practical Implications

From the implementation of this research,several practical implications could be applied to SMEs in the UK technology sector, CSPs, policymakers as well as other associated stakeholders.

The findings of the study are particularly relevant to SMEs that should focus on creating an enabling organizational culture, demonstrating top management support for the introduction of cloud computing and providing training and skills development of the employees in the field of cloud computing technologies. Regarding IT infrastructure, SMEs should assess how well their current IT will support cloud services and suggest outsourcing or forming strategic alliances in case there are skills gaps. These insights can help cloud service providers determine the best ways to deliver their solutions and communicate their benefits in a way that resonates with SMEs in the technology industry. This may include providing more flexible pricing options, showing potential clients that cloud computing solutions can ultimately save them money in the long run, and highlighting the security and privacy features that the cloud service provider will put in place to protect the clients data. In addition, providers may consider working collaboratively with commercial organizations or governmental bodies to expand awareness and training initiatives aimed at SMEs.

Policymakers and Government agencies can use the findings in this study to construct initiatives and support programs that are designed to overcome the specific challenges and barriers that SMEs face with the adoption of cloud computing technology. Some of these initiatives may include financial support, the establishment of legal structures that encourage the uptake of cloud services, and skills development programs that will address the shortage of cloud expertise and specialist consulting services providers. Professional bodies within industries can also help set the benchmarks for uptake of the cloud by offering ethical standards for areas in which SMEs may be uncertain as to best practices on cloud migration and implementation. Further, these organizations can help in the knowledge dissemination amongst SMEs where other similar SMEs can be used as a good example of success and failure.

1.15Conclusion

Research Question 1: What is the relative impact (measured quantitatively) of key technological barriers (e.g., integration readiness, skills), organizational challenges (e.g., security concerns, top management support), and environmental factors (e.g., competition, regulations) on cloud computing adoption among SMEs in the UK technology sector?

The conducted research also identified the positive influence of technological factors on the intention to adopt cloud technologies among SMEs in the UK technology sector, where it was found that the appropriateness of the existing IT infrastructure and the technical competencies that are necessary for the successful implementation of cloud technologies were positively and significantly associated with cloud adoption decisions. In addition, the perceived compatibility between a firm's IT systems and the cloud platform and technical expertise interact to influence the firm's intention to adopt cloud computing. In addition, organizational predictors came out as the top influential factors of cloud adoption. This study revealed that significant-top management support, organizational financial resources, and employee capability and willingness to engage in cloud computing projects were key enablers of successful cloud initiatives in SMEs. The results inform the need to develop a positive organizational culture, effective resource management, and human resources as far as technology and innovation are concerned. The impact of the environmental factors was statistically significant but had a weaker influence on cloud adoption decisions with competitive pressure, industry best practice and GOS having a positive impact and industry structure hurting cloud adoption.

Research Question 2: How do the effectiveness scores of technological factors (e.g., integration readiness, skills), organizational factors (e.g., top management support, security concerns), and environmental factors (e.g., competition, regulations) quantitatively differ in shaping cloud

adoption decisions between early adopters and later adopters of cloud computing among technology SMEs?

Some important technological, organizational, and environmental factors in the early versus later adopters of cloud computing solutions: An analysis of the CBIT survey. Survey respondents who began their cloud journey earlier in their career history put more emphasis on technological factors like IT infrastructure compatibility and technical skills which they perceive to be vital for providing supporting transition to the cloud environments. Moreover, later adopters placed a greater emphasis on internal organizational conditions by focusing on the importance of top management support and the readiness of employees to use the technology. This argues that as cloud computing technologies proved to be a viable business concept and started crossing the 'first adopters' threshold, the organizational factors and challenges started to play an increasingly important role in adoption decisions for SMEs which initially hesitated yet eventually decided to adopt such solutions. Early adopters were also found to be more sensitive to competitive pressures and reported higher levels of access to Industry Best Practices whilst perceiving Cloud Adoption as a strategic imperative for survival.

Research Question 3: What are the statistically significant differences in the perceived importance and prioritization scores across technological, organizational, and environmental cloud adoption factors between early adopters and later adopters among technology SMEs?

The statistical analysis revealed several significant differences in the importance and prioritization scores assigned to various technological, organizational, and environmental factors by early adopters versus later adopters of cloud computing solutions. When comparing early and later adopters, it was noticeable that early adopters ascribed significantly greater importance to factors like IT infrastructure compatibility, technical skills, and perceived security of the cloud relative to the latter group. This discovery supports the hypothesis that early adopters put more effort into determining technological challenges and opportunities to utilize cloud technology's benefits. In contrast, later adopters gave more priority to organizational factors including top management support, availability of financial resources and technical/ human readiness of employees. This trend is consistent with the statement that with an increasing number of SMEs adopting the use of this technology, organizational issues and internal cloud readiness were considered important factors for those SMEs that were late adopters of these solutions. It is also worth noting that both the early and later adopters accorded relatively lower scores to environmental factors like government support and the accessibility of knowledgeable cloud consulting companions.

1.16 Recommendations

Firstly, there is the potential to explore the adaptability of the components in various industry settings and industries to offer indications of differences between industries or sectors that may have implications for cloud adoption.

Secondly, this research work can be improved upon by including models like UTAUT2 and TAM5, as its key focus is on individual behaviour, consumer adoption, and the changing nature of technology. Thus, yielding advance comprehension on how users accept and adopt technology.

Declarations

The authors of this paper have no conflicts of interest to declare. Igwe Ejikeme contributed to the statistical analysis.

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2.

3.

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