Factors Influencing Cloud Computing Adoption in Small and Medium-Sized Enterprises: A Systematic Review

Nathalie Holler, Markus Westner*
E-mail: markus.westner@oth-regensburg.de
* Corresponding author

Faculty of Computer Science & Mathematics, OTH Regensburg Seybothstr. 2, 93053 Regensburg, Germany

Keywords: cloud computing adoption, small and medium-sized enterprises (SMEs), technology-organization-environment (TOE) framework, systematic literature review, digital transformation

Received: September 10, 2024

This paper investigates the factors influencing cloud computing adoption in small and medium-sized enterprises (SMEs) through a systematic literature review. The analysis identified twelve key factors influencing the adoption of cloud computing in SMEs. Based on the Technology-Organisation-Environment (TOE) model and the Technology Acceptance Model (TAM), a conceptual framework was developed for future research. The most important factors are cost, organisational readiness, compatibility, relative advantage and top management support. Other influential factors include security, perceived usefulness, firm size, government support, perceived ease of use, vendor support and competitive pressure. The majority of studies were conducted in Asian countries, including developing countries, limiting the generalisability of the findings to SMEs in more developed economies. This research highlights the need for cloud computing solutions that not only reduce costs and ensure high levels of security and privacy, but are also easy to use and integrate. Further research is recommended to explore these factors within SMEs in more developed economies.

Povzetek: Analizirani so dejavniki, ki vplivajo na sprejetje računalništva v oblaku v malih in srednje velikih podjetjih (MSP). S sistematičnim pregledom literature so avtorji identificirali dvanajst ključnih dejavnikov, vključno s stroški, organizacijsko pripravljenostjo, združljivostjo, relativno prednostjo in podporo vodstva. Na podlagi modela tehnologija-organizacija-okolje (TOE) in modela sprejemanja tehnologije (TAM) so razvili konceptualni okvir za prihodnje raziskave.

1 Introduction

The ongoing digital transformation is exerting increasing pressure on businesses to adapt to a rapidly changing environment. This necessitates enhanced digital connectivity and restructuring of internal business processes. Small and medium-sized enterprises (SMEs) are particularly affected by this shift, as they can enhance their growth by adopting new products, services, and business models [24]. A robust internal IT infrastructure is crucial for companies to remain competitive in this landscape [16].

Cloud computing, which refers to the on-demand provision of resources over the internet, is a technology that can facilitate this transformation. Its flexibility and scalability allow businesses to adapt more quickly to changes and needs, providing location-independent access to business processes [39, 47].

Notwithstanding the aforementioned advantages, SMEs lag behind larger enterprises in the adoption of cloud computing. This phenomenon can be attributed to the distinctive characteristics of SMEs, including owner-managed operations, informal organisational structures, and limited resources in comparison to larger corporations [36]. Consequently, a study by Taş et al. [2022] revealed that only 40% of German SMEs currently utilise cloud computing [42].

Previous research has examined the factors influencing cloud computing adoption in SMEs [15, 18, 29]. However, these reviews only include studies up to 2020, necessitating an updated investigation. This is particularly important in light of recent changes driven by digitalisation and the impact of the global pandemic.

The objective of this paper is to investigate the factors influencing the adoption of cloud computing in SMEs

Table 1: Overview of existing literature reviews

Author	Time period	Databases and # Of articles	Focus	Results
Hasan et al. [2015]	2010 – 2015	n/a; 12 articles	Factors influencing the introduction of cloud computing in SMEs.	28 factors; of importance are security, perceived usefulness, perceived ease of use, cost, compatibility, and top management support.
Jayeola et al. [2022]	2011 – 2020	ACM, Emerald Insight, IEEE, Google Scholar, ProQuest, ScienceDirect; 76 articles	Current status of data analysis techniques, analysed services, further research questions and the most important factors.	8 factors; security and privacy are the most analysed, the biggest factor is cost savings.
Nguyen and Liaw [2022]	2011 – 2020	Academia, Emerald Insight, ResearchGate, ScienceDirect, Springer Link; 30 articles	Investigation of influencing factors using the TOE framework.	28 factors; top management support, technological readiness, security concerns and relative advantage are influential.

through a systematic review of recent literature. This research aims to provide an up-to-date understanding of the key determinants of cloud computing adoption in SMEs, summarising them in a conceptual model for cloud computing adoption by SMEs. This model will inform both practitioners and researchers in the field.

The structure of this paper is as follows: Section 2 provides the conceptual background, defining key terms and models, and reviews the current state of research. Section 3 details the methodology used for the systematic review. Section 4 presents the results of the review. Section 5 discusses the findings, including the development of a conceptual model to explain cloud computing adoption by SMEs. Section 6 concludes the paper, outlining its contributions, mentioning limitations of our paper, and describing avenues for further research.

2 Background

2.1 Cloud computing and SMEs

Cloud computing refers to the on-demand provision of computing resources, including applications and infrastructure, that are flexibly and scalably delivered over a network [33, 39]. This technology enables organizations to access and utilize computing resources without the need for significant upfront investments or ongoing maintenance responsibilities.

Cloud computing offers several advantages to businesses. It allows for cost and effort reduction by outsourcing the provision and maintenance of IT infrastructures, platforms, and software to specialized providers [46]. This outsourcing enables companies to focus more on their core competencies and internal business processes [12]. Additionally, cloud computing improves resource availability, allowing access to business processes independent of location [12, 46].

Despite these benefits, some companies express reservations about integrating cloud computing into their operations. Primary concerns relate to performance, security, data protection, and reliability [41, 48]. Furthermore, the adoption of cloud computing often necessitates new competencies and tasks for technical staff, potentially requiring a restructuring of the IT department [33].

Cloud computing services are typically categorized into three main types: Infrastructure-as-a-Service (IaaS), which provides scalable IT infrastructure; Platform-as-a-Service (PaaS), offering development frameworks and

Table 2: Results of existing literature reviews

Author	Identified adoption factors
Hasan et al. [2015]	1. Security, Perceived usefulness, Perceived ease of use 2. Cost, Compatibility, Top management support 3. Attitude towards technology, innovation, Competitive pressure, Relative advantage, Complexity, Organizational competence
Jayeola et al. [2022]	1. Security and privacy 2. Cost savings 3. Relative advantage 4. Compatibility 5. Top management support 6. Competitive pressure 7. Government support 8. Awareness
Nguyen and Liaw [2022]	1. Top management support 2. Technological readiness 3. Security concerns 4. Relative advantage 5. Organizational readiness 6. Knowledge and training, Compatibility, Competitive pressure 7. Vendor support, Cost issues 8. Firm size

environments; and Software-as-a-Service (SaaS), providing software applications accessible over the internet [1, 14, 39].

Cloud computing can be deployed through various models: Private Cloud, used exclusively by a single organization; Public Cloud, available to the general public over the internet; and Hybrid Cloud, combining private and public cloud use. These models offer different levels of control, security, and flexibility to meet diverse organizational needs [8, 33, 39].

SMEs play a crucial role in many economies. In Germany, for example, SMEs account for about 99.4% of all enterprises, of which 82.4% are micro-enterprises, 14.5% are small enterprises and 2.4% are medium-sized enterprises [40]. According to the European Union definition (2003), SMEs can have up to 249 employees and an annual turnover of up to 50 million euros or a balance sheet total of up to 43 million euros [13]. Despite their numerical dominance, SMEs contribute only around 50% of GDP in developed countries [25] and, for example, only 28.7% of total turnover in Germany in 2021, although they employ a significant proportion of the workforce, with 54.8% of all employees in Germany working in SMEs [40].

The adoption of cloud computing presents both opportunities and challenges for SMEs. While cloud services offer SMEs access to advanced technologies without significant upfront investments, the adoption rate among SMEs lags behind that of larger enterprises. A recent study by Taş et al. [2022], for example, reported that 40% of German SMEs now use cloud services, indicating a growing recognition of cloud computing's potential benefits among SMEs [42]. However, this also highlights that a significant portion of SMEs have yet to adopt cloud technologies, underscoring the need for a deeper understanding of the factors influencing adoption decisions in this sector.

2.2 Theoretical background

The adoption of technological innovations like cloud computing in organizational contexts is typically examined through the lens of several theoretical models. Our paper primarily draws upon three widely recognized frameworks: the Technology-Organization-Environment (TOE) framework, the Technology Acceptance Model (TAM), and the Diffusion of Innovation (DOI) theory.

The TOE framework, proposed by Tornatzky and Fleischer [1990], posits that technological innovation adoption is influenced by three contextual elements [45]: technological, organizational, and environmental. The technological context encompasses both internal and external technologies relevant to the firm. The organizational context refers to descriptive measures such as scope, size, and managerial structure. The environmental context is the arena in which a firm conducts its business, including industry characteristics, market structure, and regulatory environment [7].

The TAM, developed by Davis [1989], focuses on individual-level technology acceptance [10]. It proposes that perceived usefulness and perceived ease of use are primary determinants of an individual's intention to use a technology. While the TAM has been widely applied in information systems (IS) research, its limited scope in addressing organizational-level factors has led researchers to often combine it with other models for a more comprehensive analysis [6].

The theory of diffusion of innovation (DOI) by Rogers [1995] describes from a sociological perspective the extent to which the introduction of an innovation can be predicted from the perception of users [34]. The contributing factors are relative advantage, compatibility, complexity, trialability and observability [34]. However, for a more holistic approach, the model should be combined with other theories and factors [17]. The characteristics of the DOI model match the technological and organisational context of the TOE model. The TOE model is additionally complemented by the environmental context and can therefore better illustrate the introduction of innovations at the firm level [30].

These models provide complementary perspectives on technology adoption. The TOE framework offers a broad organizational view, the TAM delves into individual user acceptance, and the DOI theory bridges individual and organizational adoption processes. By integrating these theoretical perspectives, researchers can develop a more nuanced understanding of the complex dynamics involved in cloud computing adoption by SMEs.

2.3 Related works

Previous systematic reviews have examined the factors influencing cloud computing adoption in SMEs, providing a foundation for our paper. This section critically analyzes these three reviews [15, 18, 29] to establish the current state of knowledge and identify gaps that we aim to address. Table 1 provides an overview of the reviews discussed.

Hasan et al. [2015] conducted a review of 12 articles from 2010 to 2015 [15]. Their analysis identified 28 factors influencing cloud adoption in SMEs. The most significant factors included perceived ease of use, perceived usefulness, security, compatibility, costs, and top management support. However, the review lacked a comprehensive description of the methodology, particularly regarding inclusion criteria and database selection, which limits the reproducibility of their findings [15].

A more recent review by Jayeola et al. [2022] examined literature from 2011 to 2020 [18]. This study provided a more robust methodological approach, clearly outlining search strategies and quality assessment procedures. Their analysis of 76 articles revealed eight key factors, with security and privacy being the most frequently studied, while cost savings demonstrated the highest statistical significance. This review also explored data analysis techniques and cloud services investigated in the primary studies, offering a broader perspective on cloud computing research in SMEs [18].

Nguyen and Liaw [2022] analyzed 30 articles published from 2011 to 2020, focusing on the application of the TOE framework [29]. Their review identified 28 factors, with top management support, technological readiness, security concerns, and relative advantage emerging

as the most influential. The organizational context within the TOE framework was found to have the highest impact on adoption decisions. However, this review lacked clear information on the time frame of the studies included and did not provide detailed quality assessment criteria for the selected studies [29].

These reviews collectively highlight several consistent factors influencing cloud adoption in SMEs, including security, cost, compatibility, top management support, and relative advantage. However, there are notable differences in how these factors are labelled, ranked and emphasised across the reviews, reflecting differences in the methodological approaches, timeframes and geographical focus of the primary studies included, as shown in Table 2.

It is important to note that these reviews primarily covered literature up to 2020 (Table 1). Given the rapid pace of technological advancement and the significant global changes since then, particularly the accelerated digital transformation driven by the COVID-19 pandemic, there is a clear need for an updated review. Our paper aims to bridge this gap by focusing on the most recent literature (2021-2024) to provide a current perspective on cloud computing adoption factors in SMEs.

Furthermore, the existing reviews predominantly included studies from Asian countries and developing economies. This geographical bias raises questions about the generalizability of findings to other contexts, particularly to countries with more advanced digital infrastructures. Our paper will pay particular attention to the geographical distribution of primary studies and discuss the implications for different economic contexts.

By building upon these previous works and addressing their limitations, this systematic review aims to provide a comprehensive, up-to-date analysis of the factors influencing cloud computing adoption in SMEs. This will not only contribute to the academic understanding of technology adoption in SMEs but also provide valuable insights for policymakers and cloud service providers seeking to facilitate wider adoption of cloud technologies in the SME sector.

3 Methodology

Our paper employs a systematic literature review to investigate the factors influencing cloud computing adoption in SMEs. The systematic review approach was selected for its rigor and capacity to synthesize existing research comprehensively and objectively [21]. The review process was guided by the recommendations of Templier and Paré [2015] and adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [28].

In order to ensure transparency and reproducibility, a predefined review protocol was devised, delineating the research questions, search strategy, inclusion and exclusion criteria, quality assessment criteria, and data extraction and synthesis methods. The search was conducted in March 2024 utilising four major academic databases: Emerald Insight, EBSCOhost, ScienceDirect, and Scopus. These databases were selected with the objective of ensuring comprehensive coverage of peer-reviewed publications in information systems and management fields.

The search string employed was as follows: *(Cloud AND Adoption AND (SME OR SMEs OR "Small and Medium Businesses" OR "Small and Medium Enterprises") AND (Factors OR Determinants))*. This string was adapted as necessary to align with the syntax requirements of each database. The search was limited to publications from 2021 to 2024 to focus on the most recent developments in the field.

The studies included in this review were selected based on the following criteria: The studies were required to have been (1) published between 2021 and 2024, to have (2) focused on the adoption of cloud computing in SMEs, to have been (3) empirical studies (either quantitative or qualitative), to have been (4) peer-reviewed journal articles or conference proceedings, and to have been (5) written in either English or German. Studies were excluded if they focused solely on large enterprises, were non-empirical, did not specifically address adoption factors, or were grey literature.

The preliminary search returned 155 studies that may have been pertinent to the review. Following the removal of duplicates and the screening of titles and abstracts, 42 articles were selected for a full-text assessment. Following

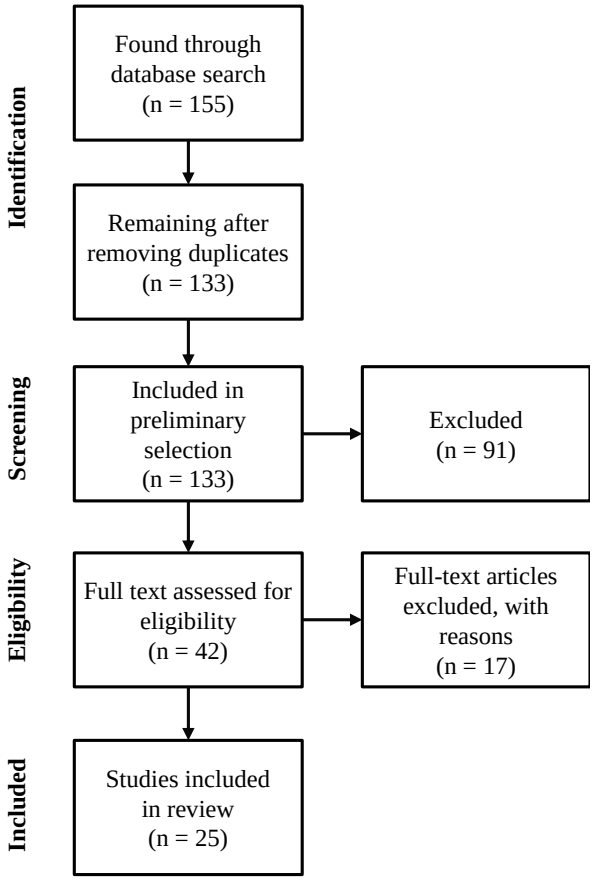


Figure 1: Selection process of the present systematic review in the form of a PRISMA flow chart (based on [28])

this assessment, 25 studies were ultimately included in the systematic review. Figure 1 presents a PRISMA flow diagram illustrating this selection process.

The quality of the included studies was evaluated using criteria adapted from Dybå and Dingsøyr [2008], which assessed aspects such as the clarity of the research aims, the appropriateness of the research design, and the adequacy of the data collection and analysis methods. A standardised data extraction form was used to collect relevant information from each study, including the study characteristics, the research methods, the context of cloud computing, the theoretical frameworks used, and the factors influencing cloud adoption.

The extracted data were synthesised using both quantitative and qualitative approaches. The quantitative synthesis involved calculating the frequency of factors across studies and their weighted importance based on reported significance, following the approach of Jeyaraj et al. [2006]. The qualitative synthesis involved thematic analysis to identify common themes and patterns across studies, interpreting findings in the context of existing theoretical frameworks (TOE, TAM, DOI) and identifying emerging themes or contradictions in the literature.

4 Results

4.1 Overview of included studies

Table 3 provides a comprehensive overview of all 25 studies included in this review. It details the authors, publication year, country, focus of the cloud service under investigation, research methodology, and theoretical models employed for each study.

The majority of studies (21 out of 25) were conducted in countries in Asia, with three in Africa and one in Europe. Fourteen studies examined cloud computing adoption in general, while eight focused specifically on cloud accounting, two on cloud Enterprise Resource Planning (ERP), and one on cloud Customer Relationship Management (CRM).

The quantitative data analysis methods employed were predominantly structural equation modelling (SEM), with some studies utilising multiple linear regression (MLR) or logistic regression. Qualitative research methods included semi-structured interviews and case studies. The most commonly used theoretical models were the TOE framework, the TAM, and the DOI theory.

4.2 Quantitative study results

The objective of the quantitative studies was to identify the positive, negative, or non-significant influences of various factors on the adoption of cloud computing in SMEs. A total of 171 factors (aka “independent variables”) were identified across all quantitative studies, comprising 104 for general cloud computing and 67 for specific cloud products. Following the categorisation process, 45 discrete factors were identified for further analysis (Tables 5 and 6 in the appendix).

Table 4 presents the factors that were the subject of the most extensive research, as evidenced by their appearance in at least five studies. This figure can be found in column A. Column B indicates the frequency with which

Table 3: Studies included in this literature review

Author	Country	Cloud service	Method	Model
Alasady et al. [2023]	Irak	Cloud Computing	PLS-SEM	DOI
Ali et al. [2023]	Somalia	Cloud Computing	SEM	TOE
Aligarh et al. [2023]	Indonesien	Cloud Computing	PLS-SEM	TOE
Al-Sharafi et al. [2023]	Malaysia	Cloud Computing	SEM-ANN	TOE
Ansong and Boateng [2023]	Ghana	Cloud Computing	Case study	TOE
Athambawa et al. [2023]	Sri Lanka	Cloud Computing	SEM	DOI, UTAUT2
Chen et al. [2023]	China	Cloud Computing	PLS-SEM, fsQCA	TOE
Forootani et al. [2022]	Iran	Cloud CRM	PLS-SEM	TAM, TOE
Homan and Beránek [2023]	Tschechien	Cloud Computing	Logistic regression	TOE
Kamal et al. [2023]	Malaysia	Cloud Accounting	PLS-SEM	TAM
Khayer et al. [2021]	Bangladesh	Cloud Computing	PLS-SEM	TOE, UTAUT
Lutfi [2021]	Jordanien	Cloud ERP	PLS-SEM	TAM
Lutfi [2022]	Jordanien	Cloud Accounting	PLS-SEM	TOE
Majengo and Mbise [2022]	Tansania	Cloud Computing	MLR, interviews	DOI, TOE
Matias and Hernandez [2021]	Philippinen	Cloud Computing	MLR, interviews	TOE
Mohammed et al. [2023]	Irak	Cloud ERP	PLS-SEM	DOI, TOE
Rawashdeh and Rawashdeh [2023]	Jordanien	Cloud Accounting	SEM	TOE
Rawashdeh et al. [2023]	Jordanien	Cloud Accounting	SEM	TOE
Saad et al. [2022]	Jordanien	Cloud Accounting	PLS-SEM	DOI, TOE
Sastararuji et al. [2022]	Thailand	Cloud Accounting	Interviews	TOEVO
Shetty and Panda [2023]	Indien	Cloud Computing	SEM	TAM, TCE, TOE
Sin et al. [2023]	Malaysia	Cloud Accounting	MLR	TAM
Syairudin and Nabila [2024]	Indonesien	Cloud Computing	PLS-SEM	TAM
Tawfik et al. [2023]	Oman	Cloud Accounting	SEM	TOE
Yaseen et al. [2023]	Jordanien	Cloud Computing	MLR	DOI, TOE

the factors were categorised as significant. The ratio of the frequency with which a factor was analysed and evaluated as significant is represented by the weighting from B/A in column C. Table 4 was finally sorted on the basis of this weighting. The minimum number of five occurrences (Table 5) was chosen in order to achieve a balanced and realistic weighting. Of these factors, those with a weighting of at least 0.5 (Table 6) were included in the further analysis, in accordance with the recommendations of Jeyaraj et al. [2006].

The most frequently examined factors were competitive pressure, relative advantage, top management support, compatibility, and security (Table 5). The factors with the highest weighted importance, exceeding 0.8, were cost, organisational readiness, compatibility, relative advantage, and top management support (Table 6).

A total of twelve factors were identified as being of significant importance in the context of cloud computing adoption by SMEs. These factors were selected based on a weighted importance threshold of 0.5, which was determined through a systematic review of the literature (Table 6). The twelve factors are as follows: cost, organisational readiness, compatibility, relative advantage, top management support, security, perceived usefulness, firm size, government support, perceived ease of use, vendor support, and competitive pressure.

4.3 Qualitative study results

Qualitative studies yielded a wealth of contextual insights into the factors influencing the adoption of cloud computing. Sastararuji et al. [2022] conducted semi-structured interviews with SME owners, cloud accounting service providers, and subject matter experts. The findings emphasised the crucial role of relative advantage, which was identified as a key factor leading to cost savings and increased efficiency. Complexity was identified as a negative influence, whereas compatibility was viewed in a positive light. Additionally, organisational characteristics, technological readiness, government support and competitive pressure were identified as influential factors.

Table 4: Most frequently analysed and found significant factors (aka “independent variables”) sorted by significance weight, C

Factor	A	B	C
Cost	7	6	0.86
Organizational readiness	6	5	0.83
Compatibility	11	9	0.82
Relative advantage	15	12	0.80
Top management support	15	12	0.80
Security	11	8	0.73
Perceived usefulness	6	4	0.67
Firm size	5	3	0.60
Government support	5	3	0.60
Perceived ease of use	5	3	0.60
Vendor support	7	4	0.57
Competitive pressure	17	9	0.53
Total	110	78	

In a case study presented by Ansong and Boateng [2023], a small enterprise that had adopted cloud computing was examined. The results, presented within the TOE model, identified technological readiness, technological trends, available digital resources, organisational characteristics, top management support, competitive pressure, and government support as the key influencing factors.

Matias and Hernandez [2021] found that while SMEs were aware of the benefits of cloud computing, these were not necessarily decisive factors in their decision to adopt cloud computing. Their study highlighted the importance of compatibility, cost effectiveness, and government measures in cloud computing adoption decisions.

5 Discussion

The following discussion section synthesises the findings, interprets their implications, and contextualises them within the broader landscape of cloud computing adoption research.

5.1 Synthesis and interpretation of findings

5.1.1 Geographical distribution and contextual considerations

A noteworthy finding from this review is the geographical concentration of studies. A significant bias is evident in the current research landscape, with 21 out of 25 studies (84%) conducted in Asian countries, many of which are developing economies such as Tanzania, Somalia, Indonesia, and Jordan. This concentration of studies gives rise to significant questions regarding the generalisability of findings to other contexts, particularly to more developed economies in Europe or North America.

The disparity in cloud computing adoption rates between countries serves to underscore this concern. For example, while studies indicate that cloud adoption in countries such as Jordan [2] and India [38] is progressing at a slow pace, research by Taş et al. [2022] suggests that 40% of German SMEs already utilise cloud services. This discrepancy underscores the necessity for caution when extrapolating findings from one economic context to another and highlights the importance of context-specific research in different regions.

5.1.2 Analysis of key adoption factors

Our analysis identified twelve significant factors that influence the adoption of cloud computing in SMEs. The most influential factors, based on their weighted importance, were cost, organisational readiness, compatibility, relative advantage, and top management support (Table 4).

Cost was identified as the most consistently significant factor, with a weighted importance of 0.86. This finding corroborates those of previous reviews (e.g., [18]) and highlights the pivotal role of financial considerations in the technology adoption decisions of SMEs. The high

significance of cost factors suggests that cloud service providers should focus on demonstrating clear cost benefits and return on investment in order to encourage the adoption of their services among SMEs.

The second most influential factor was organisational readiness (weighted importance of 0.83). This finding emphasises the significance of internal capabilities and resources in facilitating cloud adoption. SMEs with superior technical infrastructure, qualified personnel, and financial support are more likely to adopt cloud computing [32]. This indicates that efforts to enhance the overall technological capabilities of SMEs could indirectly promote cloud adoption.

Additionally, the results indicated that compatibility (0.82) and relative advantage (0.80) were also of significant importance. The importance of compatibility indicates that cloud solutions that align well with existing business processes and values are more likely to be adopted. The high significance of relative advantage indicates that SMEs are driven by the perceived advantages of cloud computing, including enhanced business processes, flexibility, and increased productivity [4, 35].

Top management support (0.80) was also identified as a significant factor, particularly in the context of SMEs where decision-making is often centralised. This finding suggests that educational and awareness programmes targeting SME owners and top management could prove effective in promoting cloud adoption [38].

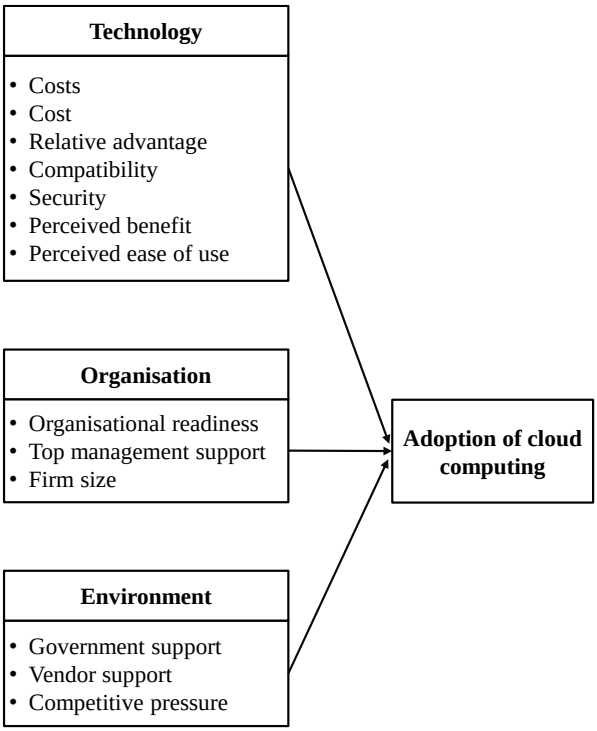
Notably, while security was frequently studied, the results were mixed (Table 5), with both positive and negative influences observed. This ambivalence may reflect the evolving perceptions of cloud security, where concerns about data protection are balanced against recognition of the robust security measures offered by cloud providers.

5.2 Comparison with previous research and theoretical implications

A comparison of our findings with those of previous systematic reviews reveals both continuities and shifts in the factors influencing cloud adoption in SMEs. The continued significance of factors such as cost, compatibility, and top management support across reviews spanning different time periods suggests that these are enduring concerns for SMEs considering cloud adoption.

However, our review also indicates some shifts in emphasis. For example, while Hasan et al. [2015] identified perceived ease of use and perceived usefulness as highly significant, our review suggests a relative decrease in the importance of these factors. This could indicate a growing familiarity with cloud technologies among SMEs, reducing usability concerns.

Figure 2: Tentative conceptual modul of cloud computing adoption factors in SMEs



The high significance of organisational readiness in our review, which was less prominent in earlier reviews, might reflect the maturing of cloud technologies and a shift in focus from technological to organisational factors in adoption decisions.

Our findings lend substantial support to the relevance of established theoretical frameworks, such as the TAM and the TOE, in understanding the adoption of cloud computing in SMEs. However, the complex interplay of factors revealed in our analysis suggests that an integrated theoretical approach combining elements from multiple frameworks may prove more effective in capturing the multifaceted nature of cloud adoption decisions in SMEs.

The prominence of cost and organisational factors in our results is consistent with the organisational context of the TOE framework. However, the significance of factors such as compatibility and relative advantage also highlights the continued relevance of the DOI theory in explaining cloud adoption. Based on our findings, we propose a tentative conceptual model (Figure 2) that combines elements from the TOE and TAM, incorporating the most significant factors identified in our review. This model provides a tentative framework for understanding cloud adoption in SMEs and can guide future research in this area.

This integrated model not only identifies the principal factors influencing the adoption of cloud computing, but also demonstrates the intricate interconnections between technological, organisational and environmental variables. It offers a more sophisticated comprehension of the adoption process, reflecting the complexities of decision-making in SMEs.

6 Conclusion

This systematic review was conducted with the objective of investigating the factors influencing the adoption of cloud computing in SMEs, with a particular focus on the most recent literature from 2021 to 2024. The analysis identified twelve key factors that significantly impact cloud adoption decisions in SMEs. The most influential factors were found to be cost, organisational readiness, compatibility, relative advantage, and top management support.

Our paper makes a number of contributions to the field. Firstly, we provide an up-to-date synthesis of the latest research on cloud adoption in SMEs, reflecting recent technological advancements and changing business environments. Secondly, the tentatively proposed conceptual model, combining elements from the TOE framework and the TAM, offers a framework for understanding the complex interplay of factors in cloud adoption decisions. This model can serve as a valuable tool for both researchers and practitioners in the field.

Our findings highlight the necessity for cloud computing solutions that not only provide cost savings and robust security measures but are also user-friendly and readily integrated into existing business processes. This indicates that cloud service providers should prioritise the development of flexible, cost-effective solutions that can be integrated seamlessly into the technological infrastructures of SMEs. For policymakers, our results indicate the potential influence of government assistance and regulatory frameworks on the adoption of cloud computing by SMEs.

It is important to acknowledge the limitations of our paper. The most significant limitation of the paper is the geographical bias in the reviewed literature. Given that 84% of the studies were conducted in Asian countries, many of which are developing economies, the generalisability of our findings to other contexts, particularly to more developed economies in Europe or North America, is limited. This geographical concentration gives rise to significant questions regarding the applicability of these findings to disparate economic and technological contexts. Furthermore, the accelerated pace of technological evolution in cloud computing may exceed the pace of academic publishing, potentially limiting the currency of some findings. The exclusion of non-English and non-German publications may also have resulted in the omission of pertinent studies from non-English-speaking regions.

These limitations indicate several potential avenues for future research. Firstly, there is a pressing need for further studies on the adoption of cloud computing in SMEs in developed economies, with a particular focus on Europe and North America. Such research would facilitate a more nuanced global perspective and enable comparative analyses across diverse economic contexts.

Secondly, future studies should investigate the temporal dynamics of factors influencing cloud adoption. Longitudinal studies could provide valuable insights into the evolution of the importance of different factors as SMEs progress through various stages of cloud adoption and as the technology itself matures.

Thirdly, the complexity of cloud adoption decisions revealed in our paper indicates a need for more in-depth qualitative research, such as case studies or ethnographic approaches, to provide a richer contextual understanding of how these factors interact in real-world settings.

Acknowledgements

Artificial intelligence (AI) tools, namely Claude 3.5 Sonnett and DeepL Write, were employed in the preparation of this paper. These AI tools were used to enhance the language, grammar, and overall readability of the manuscript. While the content, ideas, and research presented in this paper are the original work of the authors, it is important to acknowledge the use of these AI tools as a support in the writing process.

The authors have carefully reviewed and edited the AI-generated content to ensure the accuracy, integrity, and quality of the final paper. The use of AI tools was intended to improve the clarity and presentation of the research and does not diminish the academic contribution or originality of the work. The authors take full responsibility for the content and conclusions presented in this paper.

7 Appendix

A total of 104 adoption factors (aka “independent variables”) were identified through the analysis of all quantitative studies on cloud computing adoption by SMEs. In the case of specific cloud products, 67 were subjected to analysis. A total of 171 factors (“independent variables”) were thus identified. Following the categorisation process, a total of 45 factors were ultimately selected for analysis. In accordance with the methodology proposed by Jeyaraj et al. [2006], the data is presented in Table 5 and Table 6.

Table 5 provides an extended view of the number of factors (“independent variables”) that had a positive or negative effect, measured by positive or negative significance, on the cloud computing adoption by SMEs (“dependent variable”). The table was created based on Lacity et al. [2016] and Könning et al. [2019].

Table 6 presents the 45 aggregated factors and offers an analysis of the frequency with which a factor was identified as being significant for the decision to adopt cloud computing in an SME context. Column A indicates the frequency with which this factor was analysed in studies, while column B shows the proportion of studies in which the factor was categorised as significant. The ratio of factors analysed to those evaluated as significant is presented in column C, with a weighting derived from B/A.

For comparability, the sorting of both tables 5 and 6 is consistent with the frequency with which this factor was analysed in studies.

Relative advantage and top management support each have a predominantly positive effect on the adoption of cloud computing. Companies benefit from the use of cloud computing from improved business processes, flexibility, increased productivity and cost savings, among other things [4, 35]. Executives who are aware of the benefits are more likely to prepare the company for the introduction of cloud computing [31]. As SMEs often have flat hierarchies and are owner-managed, decisions can be made more quickly by the management level [38].

Compatibility is positive eight out of eleven times, but was weighted negatively once. A lack of compatibility can inhibit the decision due to a lack of technical knowledge and the time and cost required for implementation. A high level of compatibility between existing technical infrastructures and cloud services, on the other hand, can increase the likelihood of cloud computing being introduced. This means that new services can be implemented quickly and easily.

Competitive pressure (9 out of 17 times) and technology readiness (four out of nine times) were only categorised as significant in around half of the studies. Although competitive pressure was the most frequently investigated factor, there are some factors with a higher weighting, such as costs and organisational readiness. Technological readiness also has a low weighting in terms of frequency. Nowadays, many companies are usually already at an advanced technical level due to the digital transformation, which makes it possible to implement new technologies more quickly. These offer companies a strategic advantage in a competitive and constantly changing business environment [20]. As a result, these factors may have less influence on the decision, as the companies already benefit from the conditions.

Security was negatively significant five times, positive three times and three times no significance. According to the results, security and privacy are among the most important factors taken into account when adopting cloud computing. Companies have concerns about data security and worry about the protection of their data and that of their customers [43]. In order to protect companies, appropriate security and data protection measures must be taken by cloud providers [20]. This can increase companies' trust in cloud computing and improved security measures also lead to higher acceptance [49]. A high level of security therefore has a positive influence on implementation.

Complexity was significant once positively and once negatively, but five times without significance and has a weighting of 0.29. Due to insufficient knowledge of cloud technology, companies can perceive an introduction as too complex [9]. As the factor was predominantly confirmed as insignificant, it can be assumed that SMEs can cope with the use of innovative technologies such as cloud computing.

The cost factor proved to be relevant in the course of our analysis. In six out of seven studies, it was shown to have a positive effect on the introduction of cloud computing. By using cloud services, SMEs have low costs and save money by not having to have their software developed and maintained by external IT companies [26]. The high relevance attributed to costs can also be found in the studies analysed as an adoption factor with the highest or second-highest significance [3, 4, 26, 49].

Vendor support has a weighting of 0.57. The introduction of cloud services also depends on trust in the vendor, who can provide support in the absence of technical, human and financial resources and ensure the provision and maintenance of the services [35]. In three studies, vendor support was not significant. This may be due to the fact that companies are aware of the wide range of cloud services on offer [32] and have confidence in the vendors.

The organisational readiness also has a high weighting at 0.83. A company is more likely to decide in favour of an introduction if a good technical infrastructure, qualified personnel and financial support are available [32].

Other factors with a positive influence are perceived benefits with a value of 0.67 as well as government support, perceived ease of use and company size, each with a weighting of 0.6.

Table 5: Found significant adoption factors ("independent variables") sorted by analysis frequency

Factor	−1	N	+1	Total
Competitive pressure		8	9	17
Relative advantage		3	12	15
Top management support		3	12	15
Compatibility	1	2	8	11
Security	5	3	3	11
Technologial readiness		5	4	9
Complexity	1	5	1	7
Cost		1	6	7
Vendor support		3	4	7
Organisational readiness		1	5	6
Perceived usefulness		2	4	6
Firm size		2	3	5
Government support		2	3	5
Perceived ease of use		2	3	5
Industry		2	2	4
Suppliers		1	2	3
Self-efficacy			3	3
Awareness			2	2
Effort expectancy		1	1	2
Marketing		2		2
Performance expectancy		1	1	2
Risks		2		2
Social influence			2	2
Trust			2	2
Absorptive capacity			1	1
Selected characteristics		1		1
Sufficient resources		1		1
Decision maker's cloud knowledge			1	1
Pressure		1		1
Attitude towards technology		1		1
Employee experience			1	1
Hedonic motivation		1		1
Information intensity		1		1
Decision maker's innovative-ness			1	1
Internet infrastructure		1		1
Competitive advantage			1	1
Cost and benefit		1		1
Mimetic effect			1	1
Service quality			1	1
Computer anxiety		1		1
Trialibility			1	1
Training		1		1
Perceived uncertainty		1		1
Resistance to change				1
Reliability and availability			1	1
Total				171

Table 6: Ratio of found significant adoption factors related to their total analyses frequency sorted by analyses frequency

Factor	A	B	C
Competitive pressure	17	9	0.53
Relative advantage	15	12	0.80
Top management support	15	12	0.80
Compatibility	11	9	0.82
Security	11	8	0.73
Technologial readiness	9	4	0.44
Complexity	7	2	0.29
Cost	7	6	0.86
Vendor support	7	4	0.57
Organisational readiness	6	5	0.83
Perceived usefulness	6	4	0.67
Firm size	5	3	0.60
Government support	5	3	0.60
Perceived ease of use	5	3	0.60
Industry	4	2	0.50
Suppliers	3	2	0.67
Self-efficacy	3	3	1.00
Awareness	2	2	1.00
Effort expectancy	2	1	0.50
Marketing	2	0	0.00
Performance expectancy	2	1	0.50
Risks	2	0	0.00
Social influence	2	2	1.00
Trust	2	2	1.00
Absorptive capacity	1	1	1.00
Selected characteristics	1	0	0.00
Sufficient resources	1	0	0.00
Decision maker's cloud knowledge	1	1	1.00
Pressure	1	0	0.00
Attitude towards technology	1	0	0.00
Employee experience	1	1	1.00
Hedonic motivation	1	0	0.00
Information intensity	1	0	0.00
Decision maker's innovative-ness	1	1	1.00
Internet infrastructure	1	0	0.00
Competitive advantage	1	1	1.00
Cost and benefit	1	0	0.00
Mimetic effect	1	1	1.00
Service quality	1	1	1.00
Computer anxiety	1	0	0.00
Trialibility	1	1	1.00
Training	1	0	0.00
Perceived uncertainty	1	0	0.00
Resistance to change	1	1	1.00
Reliability and availability	1	1	1.00
Total	171	109	

References

[1] Ali S. Alasady, Hayder S. Hashim, and Wid A. Awadh. 2023. Nexus between Iraqi SMEs cloud computing adoption intention and firm performance: Moderating role of risk factors. *Indonesian Journal of Electrical Engineering and Computer Science* 31, 2, 1128–1135. DOI: https://doi.org/10.11591/ijeecs.v31.i2.pp1128-1135.

[2] Radwan M. Al-Dwairi, Nadia Al-Tweit, and Kholood Zyout. 2018. Factors influencing cloud-computing adoption in small and medium e-commerce enterprises in Jordan. In *Proceedings of the 2018 International Conference on Internet and e-Business*. ACM Other conferences. ACM, New York, NY, 73–78. DOI: https://doi.org/10.1145/3230348.3230370.

[3] Abdifatah F. Ali, Abdikarim A. Hassan, Husein O. Abdullahi, and Rusli H. Abdulah. 2023. Analyzing the factors influencing the adoption of cloud computing by SMEs using the SEM approach. *International Journal of Advanced and Applied Sciences* 10, 7, 66–79. DOI: https://doi.org/10.21833/ijaas.2023.07.009.

[4] Mohammed A. Al-Sharafi, Mohammad Iranmanesh, Mostafa Al-Emran, Ahmed I. Alzahrani, Fadi Herzallah, and Norziana Jamil. 2023. Determinants of cloud computing integration and its impact on sustainable performance in SMEs: An empirical investigation using the SEM-ANN approach. *Heliyon* 9, 5, e16299. DOI: https://doi.org/10.1016/j.heliyon.2023.e16299.

[5] Eric Ansong and Sheena L. Boateng. 2023. Reaching for the "cloud": The case of an SME in a developing economy. *International Journal of E-Business Research* 19, 1, 1–17. DOI: https://doi.org/10.4018/IJEBR.319324.

[6] Hart O. Awa, Ojiabo U. Ojiabo, and Bartholomew C. Emecheta. 2015. Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science & Technology Policy Management* 6, 1, 76–94. DOI: https://doi.org/10.1108/JSTPM-04-2014-0012.

[7] Jeff Baker. 2012. The technology–organization–environment framework. In *Information systems theory*. *Explaining and predicting our digital society*, Yogesh K. Dwivedi, Michael R. Wade and Scott L. Schneberger, Eds. Springer, New York, NY, 231–245. DOI: https://doi.org/10.1007/978-1-4419-6108-2_12.

[8] Jürgen Biebl. 2012. Wofür steht cloud computing eigentlich? *Wirtschaftsinformatik & Management* 4, 1, 22–29. DOI: https://doi.org/10.1365/s35764-012-0104-3.

[9] Mei Chen, Haiqing Wang, Yikai Liang, and Ge Zhang. 2023. Net and configurational effects of determinants on cloud computing adoption by SMEs under cloud promotion policy using PLS-SEM and fsQCA. *Journal of Innovation & Knowledge* 8, 3, 100388. DOI: https://doi.org/10.1016/j.jik.2023.100388.

[10] Fred D. Davis. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13, 3, 319–340. DOI: https://doi.org/10.2307/249008.

[11] Tore Dybå and Torgeir Dingsøyr. 2008. Empirical studies of agile software development: A systematic review. *Information and Software Technology* 50, 9-10, 833–859. DOI: https://doi.org/10.1016/j.infsof.2008.01.006.

[12] Mohamed A. A. Elmonem, Eman S. Nasr, and Mervat H. Geith. 2016. Benefits and challenges of cloud ERP systems: A systematic literature review. *Future Computing and Informatics Journal* 1, 1-2, 1–9. DOI: https://doi.org/10.1016/j.fcij.2017.03.003.

[13] Europäische Union. 2003. *Amtsblatt der Europäischen Union (2003/361/EG)*: *Empfehlung der Kommission vom 6. Mai 2003 betreffend die Definition der Kleinstunternehmen sowie der kleinen und mittleren Unternehmen*.

[14] Joel Gibson, Darren Eveleigh, Robin Rondeau, and Qing Tan. 2012. Benefits and challenges of three cloud computing service models. *Fourth International Conference on Computational Aspects of Social Networks*, 198–205. DOI: https://doi.org/10.1109/CASoN.2012.6412402.

[15] Lujain M. Hasan, Laith A. Zgair, Adoum A. Ngotoye, Hisham N. Hussain, and Chya Najmuldeen. 2015. A review of the factors that influence the adoption of cloud computing by small and medium enterprises. *Scholars Journal of Economics, Business and Management*, 842-848. DOI: https://doi.org/10.36347/sjebm.2015.v02i08.009.

[16] Raoul Hentschel, Christian Leyh, and Marc Egner. 2020. Motivationsfaktoren für oder gegen einen einsatz von cloud-lösungen in kleinstunternehmen. *HMD Praxis der Wirtschaftsinformatik* 57, 5, 961–975. DOI: https://doi.org/10.1365/s40702-020-00650-7.

[17] Erind Hoti. 2015. The technological, organizational and environmental framework of IS innovation adaption in small and medium enterprises: Evidence from research over the last 10 years. *International Journal of Business and Management* 3, 4, 1–14. DOI: https://doi.org/10.20472/BM.2015.3.4.001.

[18] Olakunle Jayeola, Shafie Sidek, Shouvik Sanyal, Syed I. Hasan, Nguyen B. An, Samuel-Soma Mofoluwa Ajibade, and Thi T. H. Phan. 2022. Government financial support and financial performance of SMEs: A dual sequential mediator approach. *Heliyon* 8, 11, e11351. DOI: https://doi.org/10.1016/j.heliyon.2022.e11351.

[19] Anand Jeyaraj, Joseph W. Rottman, and Mary C. Lacity. 2006. A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology* 21, 1, 1–23.

DOI: https://doi.org/10.1057/palgrave.jit.2000056.

[20] Abul Khayer, Nusrat Jahan, Md. N. Hossain, and Md. Y. Hossain. 2021. The adoption of cloud computing in small and medium enterprises: A developing country perspective. *VINE Journal of Information and Knowledge Management Systems* 51, 1, 64–91. DOI: https://doi.org/10.1108/VJIKMS-05-2019-0064.

[21] Barbara Kitchenham and Stuart M. Charters. 2007. *Guideliness for performing systematic literature reviews in software engineering*. EBSE Technical Report EBSE-2007-01. Keele Durham University, U.K.

[22] Michael Könning, Markus Westner, and Susanne Strahringer. 2019. A systematic review of recent developments in IT outsourcing research. *Information Systems Management* 36, 1, 78–96. DOI: https://doi.org/10.1080/10580530.2018.1553650.

[23] Mary C. Lacity, Shaji A. Khan, and Aihua Yan. 2016. Review of the empirical business services sourcing literature: An update and future directions. *Journal of Information Technology* 31, 3, 269–328. DOI: https://doi.org/10.1057/jit.2016.2.

[24] Christian Leyh and Katja Bley. 2016. Digitalisierung: Chance oder risiko für den deutschen mittelstand?: Eine studie ausgewählter unternehmen. *HMD Praxis der Wirtschaftsinformatik* 53, 1, 29–41. DOI: https://doi.org/10.1365/s40702-015-0197-2.

[25] Diaan-Yi Lin, Sruthi N. Rayavarapu, Karim Tadjeddine, and Rebecca Yeoh. 2022. *Beyond financials*: *Helping small and medium-size enterprises thrive* (2022). Retrieved from https://www.mckinsey.com/industries/public-sector/our-insights/beyond-financials-helping-small-and-medium-size-enterprises-thrive.

[26] Riziki M. Majengo and Mercy Mbise. 2022. Determinants of software-as a-service adoption by small and medium enterprises in Tanzania. *African Journal of Information Systems* 14, 1, 23–43.

[27] Junrie B. Matias and Alexander A. Hernandez. 2021. Cloud computing adoption intention by MSMEs in the Philippines. *Global Business Review* 22, 3, 612–633. DOI: https://doi.org/10.1177/0972150918818262.

[28] David Moher, Alessandro Liberati, Jennifer Tetzlaff, Douglas G. Altman, and The PRISMA Group. 2009. Preferred reporting items for systematic reviews and meta-analyses. *PLOS Medicine* 6, 7, 1–8. DOI: https://doi.org/10.1371/journal.pmed.1000097.

[29] Giang T. Nguyen and Shu-Yi Liaw. 2022. Understanding the factors affecting the small and medium enterprises adoption of cloud computing: A literature review. *International Journal of Business, Management and Economics* 3, 2, 149–162. DOI: https://doi.org/10.47747/ijbme.v3i2.635.

[30] Tiago Oliveira and Maria F. Martins. 2011. Literature review of information technology adoption models at firm level. *The Electronic Journal Information Systems Evaluation* 14, 1, 110–121.

[31] Tiago Oliveira, Manoj Thomas, and Mariana Espadanal. 2014. Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information & Management* 51, 5, 497–510. DOI: https://doi.org/10.1016/j.im.2014.03.006.

[32] Awni Rawashdeh and Badi S. Rawashdeh. 2023. The effect cloud accounting adoption on organizational performance in SMEs. *International Journal of Data and Network Science* 7, 1, 411–424. DOI: https://doi.org/10.5267/j.ijdns.2022.9.005.

[33] Jonas Repschläger, Danny Pannicke, and Rüdiger Zarnekow. 2010. Cloud computing: Definitionen, geschäftsmodelle und entwicklungspotenziale. *HMD Praxis der Wirtschaftsinformatik* 47, 5, 6–15. DOI: https://doi.org/10.1007/BF03340507.

[34] Everett M. Rogers. 1995. Diffusion of innovations. *New York: Free Press*.

[35] Mohamed Saad, Abdalwali Lutfi, Mohammed A. Almaiah, Ahmad F. Alshira'h, Malek H. Alshirah, Hamza Alqudah, Akif L. Alkhassawneh, Adi Alsyouf, Mahmaod Alrawad, and Osama Abdelmaksoud. 2022. Assessing the intention to adopt cloud accounting during COVID-19. *Electronics* 11, 24, 4092. DOI: https://doi.org/10.3390/electronics11244092.

[36] Noor A. Salleh, Husnayati Hussin, Mohd. A. Suhaimi, Asma M. Ali, and Asma Md Ali. 2018. A systematic literature review of cloud computing adoption and impacts among small medium enterprises (SMEs). *International Conference on Information and Communication Technology for the Muslim World*, 278–284. DOI: https://doi.org/10.1109/ICT4M.2018.00058.

[37] Dalinee Sastararuji, Danupol Hoonsopon, Pongsakorn Pitchayadol, and Pimsiri Chiwamit. 2022. Cloud accounting adoption in Thai SMEs amid the COVID-19 pandemic: An explanatory case study. *Journal of Innovation and Entrepreneurship* 11, 43. DOI: https://doi.org/10.1186/s13731-022-00234-3.

[38] Jayalaxmi P. Shetty and Rajesh Panda. 2023. Cloud adoption in Indian SMEs: An empirical analysis. *Benchmarking: An International Journal* 30, 4, 1345–1366. DOI: https://doi.org/10.1108/BIJ-08-2021-0468.

[39] Daniel Sonnleitner and Markus Westner. 2017. Quo vadis IT infrastructure: Decision support for cloud computing adoption from a business perspective. In *UK Academy for Information Systems Conference Proceedings 2017*.

[40] Statistisches Bundesamt. 2024. *55 % in kleinen und mittleren Unternehmen tätig* (May 2024). Retrieved June 3, 2024 from https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Unternehmen/Kleine-Unternehmen-Mittlere-Unternehmen/aktuell-beschaeftigte.html.

[41] Nabil Sultan. 2010. Cloud computing for education: A new dawn? *International Journal of*

Information Management 30, 2, 109–116. DOI: https://doi.org/10.1016/j.ijinfomgt.2009.09.004.

[42] Serpil Taş, Lukas Wiewiorra, and Claus Mayerböck. 2022. *Strategische bedeutung von clouddiensten für die digitale Souveränität von KMU. Teil 3 - Empirische erhebung KMU zu clouddiensten und digitaler souveränität* (2022). Retrieved May 29, 2024 from https://www.econstor.eu/bitstream/10419/268807/1/1833893360.pdf.

[43] Omar I. Tawfik, Omar Durrah, Khaled Hussainey, and Hamada E. Elmaasrawy. 2023. Factors influencing the implementation of cloud accounting: evidence from small and medium enterprises in Oman. *Journal of Science and Technology Policy Management* 14, 5, 859–884. DOI: https://doi.org/10.1108/JSTPM-08-2021-0114.

[44] Mathieu Templier and Guy Paré. 2015. A framework for guiding and evaluating literature reviews. *Communications of the Association for Information Systems* 37, 6, 112–137. DOI: https://doi.org/10.17705/1CAIS.03706.

[45] Louis G. Tornatzky and Mitchell Fleischer. 1990. *The processes of technological innovation*. D.C. Heath & Company, Lexington.

[46] Frederik Wulf, Tobias Lindner, Markus Westner, and Susanne Strahringer. 2021. IaaS, PaaS, or SaaS? The why of cloud computing delivery model selection: Vignettes on the post-adoption of cloud computing. In *Proceedings of the 54th Hawaii International Conference on System Sciences. DOI: https://doi.org/*10.24251/HICSS.2021.758.

[47] Frederik Wulf, Markus Westner, Maximilian Schön, Susanne Strahringer, and Claudia Loebbecke. 2019. Preparing for a digital future: Cloud strategy at Continental AG. In *ICIS 2019 Proceedings*.

[48] Frederik Wulf, Markus Westner, and Susanne Strahringer. 2021. Cloud computing adoption: A literature review on what is new and what still needs to be addressed. *Communications of the Association for Information Systems* 48, 1, 523–561. DOI: https://doi.org/10.17705/1CAIS.04843.

[49] Husam Yaseen, Ahmad S. Al-Adwan, Muhamud Nofal, Hazar Hmoud, and Radwan S. Abujassar. 2023. Factors influencing cloud computing adoption among SMEs: The Jordanian context. *Information Development* 39, 2, 317–332. DOI: https://doi.org/10.1177/02666669211047916.