

Mkhize, Ayaphila; Mokhothu, Katleho D.; Tshikhotho, Mukhoden; Thango, Bonginkosi A.

Article

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Businesses

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Suggested Citation: Mkhize, Ayaphila; Mokhothu, Katleho D.; Tshikhotho, Mukhoden; Thango, Bonginkosi A. (2025) : Evaluating the impact of cloud computing on SME performance: A systematic review, *Businesses*, ISSN 2673-7116, MDPI, Basel, Vol. 5, Iss. 2, pp. 1-56, <https://doi.org/10.3390/businesses5020023>

This Version is available at:

<https://hdl.handle.net/10419/338800>

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Evaluating the Impact of Cloud Computing on SME Performance: A Systematic Review

Ayaphila Mkhize, Katleho D. Mokhothu, Mukhodeneni Tshikhotho and Bonginkosi A. Thango * 

Department of Electrical & Electronic Engineering Technology, University of Johannesburg, Johannesburg 2092, South Africa; 222110213@student.uj.ac.za (A.M.); 221048828@student.uj.ac.za (K.D.M.); 219011874@student.uj.ac.za (M.T.)

* Correspondence: bonginkosit@uj.ac.za; Tel.: +27-(0)11-559-6939

Abstract: Small and medium-sized enterprises (SMEs) face substantial barriers in accessing reliable and cost-effective IT infrastructure, primarily due to economic constraints and limited technical resources. Hybrid cloud computing solutions, including infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS), offer potential to overcome these barriers by providing scalable, flexible IT services. This study systematically reviews the impact of cloud computing on SME performance, focusing on key performance metrics such as cost-efficiency, operational reliability, and competitive advantage. A systematic literature review was conducted using the PRISMA 2020 framework. Inclusion criteria included studies published in English from 2014 to 2024, focusing on cloud computing for SMEs and presenting clear analytical frameworks for evaluating performance. Out of an initial pool of 18,570 studies, 90 met the criteria for detailed analysis. Findings show that cloud computing adoption enhances SME performance, with approximately 82% of studies reporting improvements in operational efficiency and 76% noting cost savings. Competitive advantage was identified as a key benefit in 64% of studies, driven by cloud-enabled scalability and access to advanced technology. Key adoption drivers include management support (cited by 68% of studies), service quality (56%), and perceived risks (54%), while barriers such as initial cost concerns and data security risks were also prevalent, affecting 48% and 45% of SMEs, respectively. This review provides strategic insights for SMEs and policymakers, emphasizing the importance of tailored cloud strategies that align with specific operational needs and budget constraints. By addressing key predictors and challenges, this study offers a roadmap for SMEs to leverage cloud computing to improve performance, sustainability, and competitiveness.

Keywords: cloud computing; infrastructure as a service (IaaS); platform as a service (PaaS); software as a service (SaaS); SME performance; systematic review



Academic Editor: Shigeyuki Hamori

Received: 6 September 2024

Revised: 6 January 2025

Accepted: 15 May 2025

Published: 26 May 2025

Citation: Mkhize, A., Mokhothu, K. D., Tshikhotho, M., & Thango, B. A. (2025).

Evaluating the Impact of Cloud

Computing on SME Performance: A

Systematic Review. *Businesses*, 5(2), 23.

[https://doi.org/10.3390/](https://doi.org/10.3390/businesses5020023)

[businesses5020023](https://doi.org/10.3390/businesses5020023)

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1. Introduction

Cloud computing (CC) has become a transformative force in the digital age, revolutionizing the way businesses operate by offering scalable, cost-effective IT solutions that can be accessed over the internet on a pay-as-you-go basis (Khayer et al., 2020a; Vasiljeva et al., 2017; Rawashdeh & Rawashdeh, 2023). This flexibility and affordability make cloud computing particularly attractive to small and medium-sized enterprises (SMEs), which often grapple with limited financial and technical resources, as well as high infrastructure costs associated with traditional on-premises IT systems (Skafi et al., 2020; Shetty & Panda, 2021). Cloud computing solutions—such as infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS)—provide a range of

essential tools that can help SMEs improve efficiency, enhance agility, and maintain competitiveness, even in resource-constrained environments (Picoto et al., 2021; Odero, 2021).

Despite the clear advantages, the uptake of cloud computing by SMEs, especially in developing regions, has been slower than expected. This hesitation can be attributed to a mix of technological, organizational, and environmental challenges. Key obstacles include security and data privacy concerns, perceived complexity, insufficient top management support, and lack of prior experience with IT systems. Moreover, external factors, such as regulatory frameworks and infrastructural limitations, further complicate cloud adoption decisions in SMEs (Gamache et al., 2020; Qalati et al., 2021a; Nuskiya, 2017). The dynamics of cloud adoption are further shaped by factors such as relative advantage (the perceived improvement in performance due to cloud adoption), service quality (reliability and responsiveness of cloud providers), and perceived risks (including data security and vendor lock-in). Additionally, the influence of cloud service providers and server location significantly affect SMEs' trust and willingness to transition to cloud-based solutions (Thabit et al., 2021; Bhat, 2013).

Understanding these multidimensional factors is crucial for business leaders, cloud service providers, and policymakers who are looking to facilitate smoother transitions to cloud environments for SMEs. This systematic review aims to fill gaps in the literature by critically analyzing the impacts of cloud computing on SME performance, with a focus on elements such as cost-effectiveness, scalability, and competitive advantage. The study reviews literature published between 2014 and 2024, applying the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure a rigorous selection and evaluation process. Specifically, this review identifies the strategic drivers that encourage or discourage cloud adoption in SMEs and evaluates the operational and financial impacts of cloud-based models on SME growth and efficiency.

Our findings indicate that cloud computing adoption enhances SME performance by streamlining operations, reducing costs, and enabling greater scalability. Relative advantage, service quality, and top management support emerge as critical factors driving adoption, with evidence showing that SMEs with robust support systems and a clear understanding of cloud benefits are more likely to succeed in implementing these technologies (Ahmad et al., 2023; Tomás et al., 2017; Tan, 2022). Furthermore, the importance-performance map analysis (IPMA) conducted in this study highlights that addressing perceived risks and enhancing support from top management can maximize the positive outcomes of cloud adoption for SMEs. This research contributes to the body of knowledge by providing a comprehensive understanding of cloud computing adoption in SMEs, offering actionable insights for business leaders, policymakers, and cloud service providers. It emphasizes the need for strategic policies to mitigate barriers to adoption, such as enhanced regulatory frameworks and educational initiatives, that can guide SMEs in their cloud journeys. In doing so, the study supports the broader goal of promoting sustainable growth and competitiveness within the SME sector, particularly in emerging economies (Badie et al., 2015; Bajenaru, 2021; Bhat, 2013).

Table 1 offers a comparative analysis of existing reviews and the current systematic review, detailing the unique focus on cloud computing's impact on SME performance across different economic contexts and organizational conditions.

The reviewed literature in Table 1 reveals several significant research gaps in the study of cloud computing adoption among SMEs. Firstly, several studies have a restricted focus, primarily emphasizing risk factors without thoroughly exploring other crucial aspects such as cost, security, and organizational perspectives. This narrow scope restricts a holistic understanding of cloud adoption. Moreover, numerous studies are constrained by geographic limitations, concentrating on specific regions or countries, which hinders the

generalizability of their findings to a broader global context. Additionally, some research tends to focus closely on specific adoption factors, such as scalability, cost savings, or infrastructure, without integrating these with other essential considerations like ease of use and management support. The lack of practical validation in certain studies also poses a challenge, as proposed models or identified factors may not be fully applicable in real-world scenarios where SMEs face diverse challenges. Another notable gap is the insufficient attention given to post-adoption issues; while adoption challenges are often discussed, the long-term impacts and ongoing challenges faced by SMEs after implementing cloud solutions are frequently overlooked.

Table 1. Comparative analysis of the existing review works and proposed systematic review on the impact of cloud computing on SME performance.

Ref.	Cites	Contribution	Pros	Cons
Alkawsu et al. (2015)	35	Reviews cloud computing endorsement in SMEs, highlighting key risks and issues.	Exhaustive review concentrating on risk analysis.	Restricted research of non-risk factors of adoption of cloud computing on SMEs.
Hasan et al. (2015)	25	Evaluates cloud adoption in SMEs, emphasizing operational, technical, and organizational gaps.	Determines key endorsement factors; extensive literature review.	Limited by geography, scope, SME adoption model coverage and lacks institutional theory.
Salleh et al. (2018)	18	Provides a systematic review of cloud computing adoption in SMEs, focusing on risk analysis and proposing a future research agenda.	Offers a structured literature overview, emphasizes critical risk issues, and provides clear future research directions.	Limited to articles up to 2016, focuses primarily on risk analysis, and may introduce subjective bias and limited scope.
Priyadarshinee et al. (2016)	53	Reviews factors affecting cloud computing adoption and suggests a hypothetical model.	Specify key factors viz. management support, cost, ease of use, security, and usefulness.	Lacks practical validation with limited focus on technical aspects.
Rai et al. (2015)	20	Evaluates cloud computing adoption in SMEs, highlighting adoption issues and future research on post-adoption impacts.	Determines research gaps and proposes focusing on the performance of SMEs.	Restricted focus on post-adoption problems.
Alouane and El Bakkali (2015)	21	Risk assessment in cloud computing adoption.	Addresses crucial risk factors, improving decision making for the adoption of cloud computing.	Lacks organizational perspective; restricted to technical issues.
Setiyani et al. (2020)	91	Factors affecting SME processes in cloud computing.	Emphasizes scalability as a key factor, providing a foundation for future performance.	Focuses on cloud adoption without integrating other crucial adoption factors like cost and security.
Oriza and Maulidar (2024)	49	Review on C-KMS in processes of SME KM.	Demonstrates a detailed review of recent developments.	Focuses on databases and less on KM processes.
Hartono et al. (2020)	36	Privacy, trust, and security in cloud computing.	Extensive analysis of key concerns of cloud computing.	Focuses more on technical issues and less on a holistic approach to adoption factors.

Table 1. Cont.

Ref.	Cites	Contribution	Pros	Cons
Alrababah (2023)	3	Review of types of cloud computing supporting SMEs.	Furnishes a list of solutions of cloud for SMEs.	Restricted to 12 articles, specific focus.
Durao et al. (2014)	0	Examines adoption of cloud computing among SMEs.	Emphasizes benefits like scalability and efficiency.	Limited focus on integration and security.
Lawan et al. (2021)	7	Reviews factors affecting successful cloud computing in SMEs.	Emphasizes benefits like flexibility and efficiency.	Limited focus on precise difficulties.
M'rhaouarh et al. (2018)	1	Classifies barriers to cloud computing.	Insights review using PRISMA, several databases.	Limited infrastructure issues and awareness.
Hendri and Sudarmilah (2024)	230	Reviews challenges, gaps, and advances in cloud computing.	A thorough review of current developments.	Limited to security and privacy.
Salleh et al. (2018)	1	Examines HPC SME cloud contracts.	Furnishes guidelines and guidance for contract management and negotiation.	Narrow topic with restricted extensive applicability.
El-Gazzar (2014)	4	Reviews cloud computing in developing countries.	Determines key endorsement factors and specific advantages to developing countries.	Limited to developing countries.
Mikkonen and Khan (2016)	0	Carries out SLR and bibliometric review on IT adoption.	Highlights crucial improvement in publications.	May lack detailed IT implementation.
Tehrani and Shirazi (2014)	50	Offers a systematic literature review on cybersecurity risk management in SMEs.	Highlights major perspectives in cybersecurity risk management using NVivo software.	Limited to 15 out of 50 papers, may not capture all relevant studies.
Pathan et al. (2017)	17	Explains SMEs' benefits from cloud computing and key adoption factors.	Identifies cost-effectiveness, flexibility, and scalability as primary benefits of cloud computing for SMEs.	Relies on a small sample size of six SMEs.
Amini (2014)	36	Explores Indonesian SMEs' views on cloud computing benefits, challenges, and business impact.	Highlights cloud computing benefits for SMEs.	Points out concerns over security and limited infrastructure.
Kumar et al. (2017)	7	Examines Indonesian SMEs' views on cloud computing benefits.	Highlights cost savings and improved communication as key benefits of cloud computing for SMEs.	Limited to security and infrastructure.
Priyadarshinee et al. (2016)	108	Evaluates cloud computing suitability for Indian SMEs using a tested conceptual framework.	Highlights cost savings, scalability, and improved disaster recovery for SMEs.	Focuses on only 121 manufacturing SMEs, which may limit generalizability.

Table 1. Cont.

Ref.	Cites	Contribution	Pros	Cons
Salleh et al. (2018)	42	Identifies key factors in Pakistani SMEs' cloud adoption using the TEO framework.	Highlights six positive factors and validates them with robust statistical methods.	Relies on data from a limited sample of 103 SMEs.
Kumar et al. (2017)	162	Reviews cloud computing adoption issues, classifies key factors, and suggests a research agenda.	Identifies major adoption challenges and offers a future research agenda for cloud computing adoption.	May not cover all recent developments or emerging trends in cloud computing.
Proposed systematic review	-	Evaluates the impact of cloud computing on SME performance, highlighting key benefits such as cost savings, scalability, and enhanced operational efficiency. Examining factors influencing cloud adoption.	Offers a comprehensive understanding by identifying critical predictors of cloud adoption and assessing their impact. The review highlights research gaps and provides valuable guidance for researchers to enhance cloud adoption in SMEs.	-

1.1. Research Questions

Though numerous studies on the evaluation of cloud computing on SMEs have been conducted worldwide in the last decade, there are limited comparative studies on the impact of cloud computing on SMEs' performance in the literature. Therefore, this work proposes to review the available literature on the evaluation of these impacts. The goal is to provide a comprehensive analysis of the impact associated with cloud computing on SME performance. To attain the goal and objectives of this research, the authors considered the undermentioned research questions:

- Why should SMEs make use of cloud computing to perform their business functions?
- What potential and future expectations do cloud computing services present for SMEs?
- What is the impact of utilizing cloud computing services on the business performance of SMEs?
- What are the costs involved in using cloud computing technology and how does it affect a company's budget?
- What business operations are affected by the adaptation of cloud computing and what are the most impacted business operations?

1.2. Rationale

The existing literature presented insights on technical and organizational aspects of cloud computing adoption in SMEs. However, there is a lack of exhaustive review of how these technologies affect the performance of SMEs over the long term. Furthermore, depending on various sectors and regions the benefits of cloud computing may vary, which adds to the complexity of this issue. Cloud computing has advanced rapidly and is transforming the technology world and it offers advantages like scalability, flexibility, and cost-effectiveness which are very appealing to SMEs. Although the adoption of cloud computing is increasing in SMEs, there is still a lack of broad understanding concerning the impact of cloud computing on overall performance.

This systematic review aims to produce a set of knowledge on the existing impact of cloud computing on SME performance. This review will pinpoint the trends, opportunities, and challenges associated with the adoption of cloud computing among SMEs by significantly examining different existing studies. The results of this review will deliver valued insights to business managers and researchers.

1.3. Objectives

Cloud computing has developed as a changing technology for SMEs, offering several benefits such as scalability, cost efficiency, and advanced business processes. However, the degree to which SMEs are influenced by these advantages and limitations regarding their comprehensive performance remain a crucial area for exploration. This systematic review aims to explore the multifarious relationship between SMEs' operational performance and the adoption of cloud computing. By evaluating many dimensions like financial outcome, operational performance, efficiency, innovation capability, and long-term growth this research intends to furnish a thorough insight into how SMEs are influenced by cloud computing. Therefore, the precise objectives of this research are:

- Assessing the embracement rate of cloud computing among SMEs.
- Understanding how extensive cloud computing is among the SME sectors as well as the factors affecting adoption rate.
- Analyzing the influence of cloud computing on the operating performance of SMEs, examining how it impacts scalability, efficiency, and business processes.
- Determining financial performance advancements in SMEs due to the adoption of cloud computing.
- Evaluating cloud computing's role in improving innovation and competitive advantage of SMEs.
- Identifying barriers and difficulties faced by SMEs in implementing and adopting cloud computing solutions.
- Exploring the long-term impact of cloud computing among SMEs.

1.4. Research Contribution

This work introduces a detailed systematic survey of the impact of cloud computing on SMEs' performance. We spotlight various pending issues and research challenges in the adoption and deployment of cloud computing by SMEs. The research contributions made by the proposed work are as follows:

- We furnish a thorough analysis of cloud computing, centering on the integration of cloud services, data storage, and computing power. This analysis underscores the cost-effectiveness, reliability, and scalability benefits of cloud computing, offering crucial insights for informed decision making and promoting the adoption of these technologies among SMEs.
- We consolidate existing research on cloud computing and identify gaps in the literature, particularly regarding the successful adoption and integration of cloud services by various SMEs. By addressing these gaps, we highlight areas needing further research and innovation, thereby advancing the field of cloud computing and ensuring improved performance and competitiveness of SMEs.

1.5. Research Novelty

The proposed work has the following novelty. According to the best knowledge of the authors, there is no existing similar study in the literature that introduces a systematic evaluation of the impact of cloud computing on SMEs' performance, exclusively focusing on the integration of cloud services into small and medium enterprises. We provide a com-

prehensive evaluation of cloud computing's impact, focusing on data storage, computing power, service scalability, and their applications across diverse SMEs.

1.6. Manuscript Organization

The manuscript is organized into five key sections that comprehensively address the study's objectives. Section 1 introduces the significance of cloud computing for SMEs, setting up the study's focus on technological, organizational, and environmental factors. Section 2 outlines the systematic methodology using the PRISMA framework, ensuring rigorous data collection and analysis. Section 3 presents detailed findings that address each research question, highlighting critical insights and percentages of cloud adoption factors. Section 4 provides practical recommendations with step-by-step implementation frameworks tailored to SMEs in different industries. Finally, Section 5 discusses the broader implications, limitations, and future research directions, summarizing the positive impacts of cloud technology on SME performance and growth.

2. Materials and Methods

The systematic literature review (SLR) framework for this study, illustrated in Figure 1, offers a detailed, multistep approach to analyzing cloud computing's impact on SMEs' performance. This framework begins by establishing research questions that address cloud computing's relevance, future expectations, and operational impacts on SMEs. The Materials and Methods section follows, with clear eligibility criteria, information sources, and search strategies to ensure a rigorous selection of studies. The data collection and assessment processes then ensure that each selected study undergoes a bias evaluation and is systematically extracted for key data points.

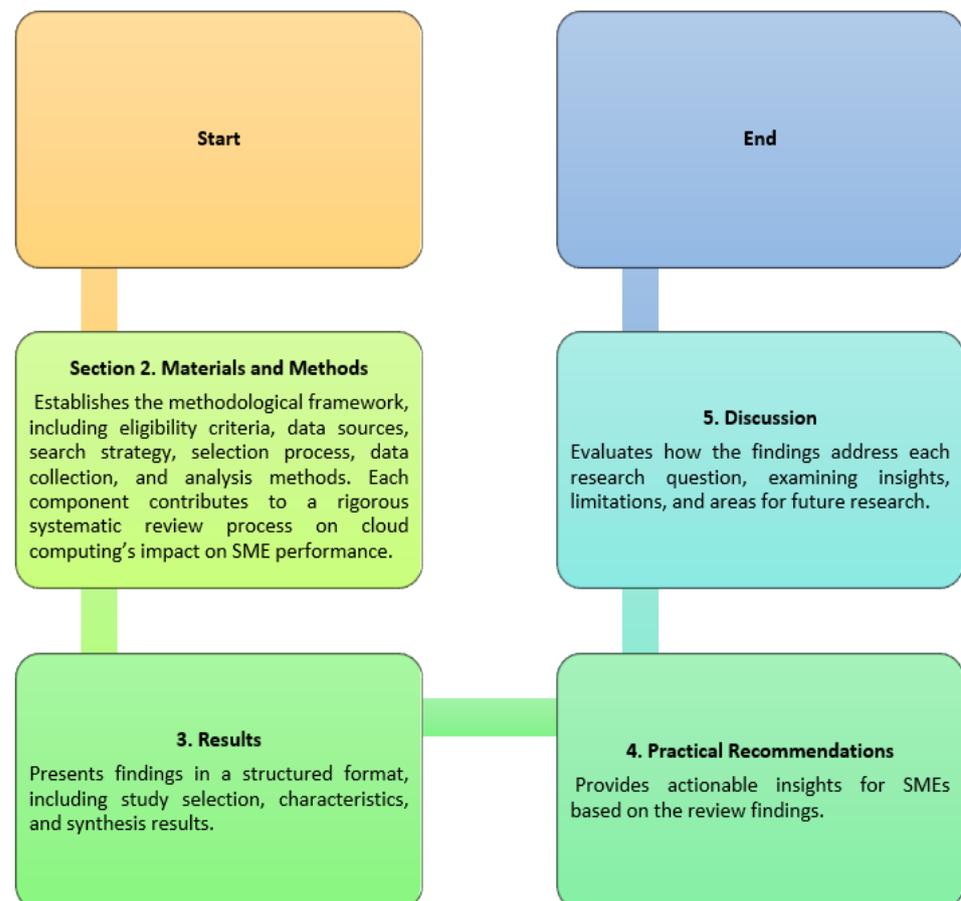


Figure 1. Proposed SLR framework for this study.

In the Results section, findings are categorized by study selection, characteristics, and results synthesis. This allows for a comprehensive view of patterns, biases, and confidence levels across the literature. The Practical Recommendations segment leverages these findings to provide actionable frameworks for business leaders, including strategic implications, decision-making frameworks, and key performance metrics tailored to the unique needs of SMEs. Finally, the Discussion and Conclusions sections interpret these insights in the context of the research questions, emphasizing the strategic importance of cloud adoption for enhancing SME performance and offering a roadmap with policy recommendations for sustained cloud integration in SMEs. This structured, evidence-based approach ensures that each stage of the review contributes meaningfully to a holistic understanding of cloud computing's role in transforming SME operations and competitiveness.

2.1. Eligibility Criteria

A systematic study of all peer-reviewed and published research works relevant to the evaluation of the impact of cloud computing on SMEs was conducted for examination. The research works published in the English language on the functions, strengths, weaknesses, and cost considerations of these technologies during the last decade from 2014 to 2024 were considered (Kanaan et al., 2024; Asad et al., 2024). A proper inclusion criterion was adopted to incorporate appropriate research papers and exclude those that did not focus on the comprehensive evaluation of cloud computing. Consequently, only peer-reviewed research works that fundamentally converge on the function, performance, benefits, and challenges of this technology were considered. The inclusion and exclusion criteria for this study are tabulated in Table 2 (Tsiu et al., 2024; Kgakatsi et al., 2024; Molete et al., 2024).

Table 2. Proposed Inclusion and Exclusion Criteria.

Criteria	Inclusion	Exclusion
Topic	Articles focusing on evaluating the impact of cloud computing on SMEs' performance.	Articles not related to evaluating the impact of cloud computing on SMEs' performance.
Research Framework	Articles must include a research framework or methodology for evaluating the impact of cloud computing on SMEs' performance.	Articles lacking a clear research framework related to evaluating the impact of cloud computing on SMEs' performance.
Language	Must be written in English.	Articles published in languages other than English.
Period	Articles between 2014 and 2024.	Articles outside 2014 to 2024.

2.2. Information Sources

The reviewed literature was collected from well-regarded academic databases, ensuring comprehensive coverage of relevant studies. Google Scholar, Scopus, and Web of Science were chosen for their breadth and accessibility across various disciplines, covering a wide range of publications, including journal articles, conference papers, dissertations, and book chapters (Mohlala et al., 2024; Chabalala et al., 2024; Ndzabukelwako et al., 2024; Maswanganyi et al., 2024). Google Scholar, in particular, aggregates content from multiple sources, including IEEE Xplore and ACM Digital Library, allowing us to access studies from specialized technology databases. By leveraging Google Scholar's extensive indexing capabilities, we ensured the inclusion of technical and domain-specific research relevant to cloud computing and SMEs without needing direct access to IEEE or ACM. Scopus and Web of Science complemented this approach by providing rigorous, peer-reviewed content, thus enhancing the reliability of the systematic review. This strategy allowed for

a robust dataset that is both broad and specific to the research objectives, ensuring the study's comprehensiveness without requiring additional specialized databases.

2.3. Search Strategy

To obtain the applicable and relevant literature, it is crucial to have a set of keywords related to the systematic review topic. The keyword search assists in reducing irrelevant literature while maximizing the results of studies related to evaluating the impact of cloud computing on SME performance. The synonyms developed for the term "cloud computing" included "cloud technology", "cloud services", "cloud adoption", and "cloud-based solutions". For the term "SMEs" the following synonyms were adopted: "small and medium enterprises", "small businesses", "medium enterprises", and "SMBs". The alternate terms for "performance" that were employed for the keyword search included "business performance", "operational performance", "financial performance", "efficiency", "productivity", and "growth". The search strategy also made use of the logic operators "AND" and "OR" to pinpoint relevant studies. The keyword search utilized for this research is ("Cloud Computing" OR "Cloud Technology" OR "Cloud Services" OR "Cloud Adoption" OR "Cloud-Based Solutions") AND ("SMEs" OR "Small and Medium Enterprises" OR "Small Businesses" OR "Medium Enterprises" OR "SMBs") AND ("Performance" OR "Business Performance" OR "Operational Performance" OR "Financial Performance" OR "Efficiency" OR "Productivity" OR "Growth"). This keyword search yielded a total of 18,570 papers from all the online repositories after customizing the range from 2014 to 2024 as mentioned in the inclusion and exclusion criteria. The list of online repositories that were employed as well as the total number of results attained before screening is tabulated in Table 3 (Ngcobo et al., 2024; Mohlala et al., 2024; Chabalala et al., 2024).

Table 3. Results obtained from Literature Search.

No.	Online Repository	Number of Results
1	Google Scholar	18,100
2	Web of Science	165
3	Scopus	305
Total		18,570

2.4. Selection Process

This section outlines the procedure utilized for screening and evaluating research papers incorporated in this study as presented in Figure 2. It describes the systematic process utilized to ensure consistent and thorough assessment, including the roles of individual researchers and the procedures for resolving disputes. Exhaustive steps are presented on how titles, abstracts, and full-text articles were reviewed and to reach consensus and address challenges. This approach aimed to sustain high standards of objectivity throughout the selection process (Myataza et al., 2024; Mudau et al., 2024).

Four researchers (AM, KDM, MT, BAT) individually evaluated titles and abstracts of the first 90 papers and discussed contradictions up until consensus was achieved. Then, in pairs, the researchers individually screened titles and abstracts of all articles extracted. In case of disputes, consensus on which articles to screen for full text was achieved by discussion. If required, the 4th researcher was consulted to make the final decision. Then, three researchers (AM, KDM, MT) individually screened full-text articles for inclusion. Moreover, consensus was achieved on exclusion or inclusion by discussion and, if required, the fourth researcher (BAT) was consulted in case of disagreements.

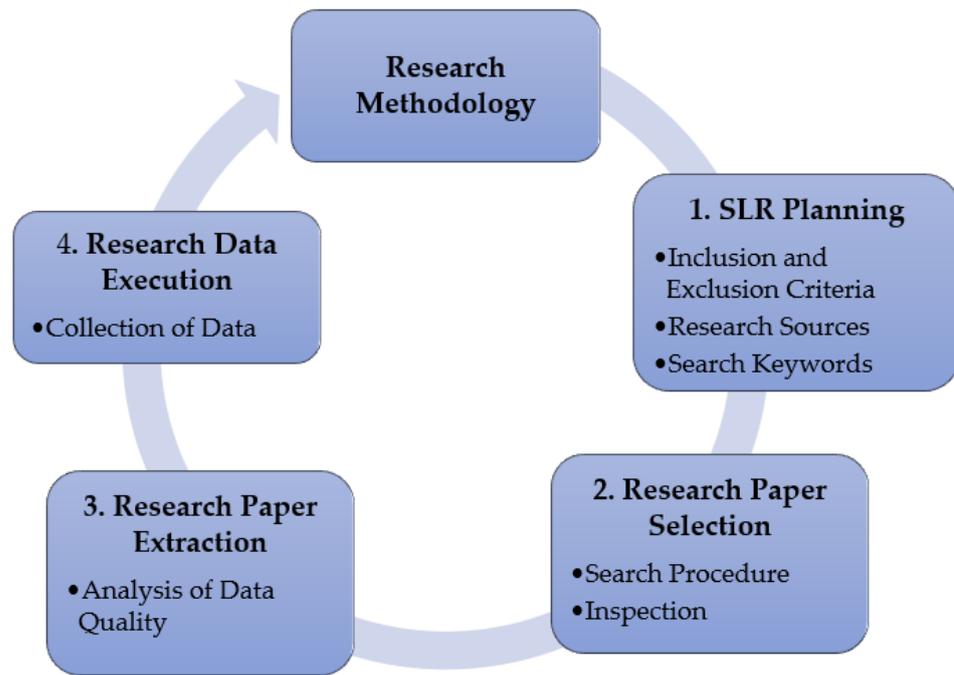


Figure 2. Procedures and Stages of the Review.

2.5. Data Collection Process

This section outlines the methods used for collecting data from the included reports, detailing the roles of the reviewers, the procedures for independent data extraction, and any techniques used to verify and confirm the accuracy of the data as presented in Figure 3 (Myataza et al., 2024; Mudau et al., 2024).

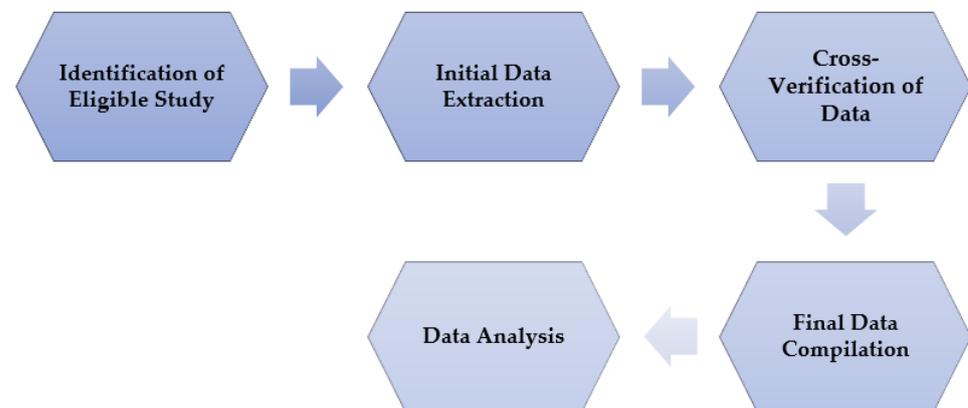


Figure 3. Data Collection Process.

The research was conducted with the data collected from publications on SMEs. This systematic review was administered based on SMEs located in different countries. The data extraction method used is similar to the one used in (Khanyi et al., 2024). Data were collected from the reports of included studies using a structured data extraction form customized for this review. Three independent reviewers/authors performed the data extraction procedure. Each reviewer individually extracted data from all suitable studies. To ensure consistency and accuracy, the obtained data were then compared between the three reviewers/authors. Any inconsistencies identified during this comparison were resolved through discussion, and where necessary, a fourth reviewer was consulted to reach a consensus.

In cases where information from the studies was unclear or incomplete, we noted the missing data and documented them accordingly. No automation tools were utilized in the data collection process.

Finally, when multiple reports corresponded to a single study, predefined decision rules were applied to select the most relevant data. Any inconsistencies across reports were addressed through a systematic reconciliation process to maintain the integrity of the data included in the review.

2.6. Data Items

This section describes all the outcomes and variables for which data were sought, including descriptions and criteria for choosing relevant results. It also clarifies the approach taken to handle missing or unclear data and any assumptions made during the data collection process.

2.6.1. Data Collection Method

This section lists and defines the outcomes for which data were searched, including measures such as the operational performance of SMEs, cloud computing adoption, and performance improvements. For every outcome domain, all applicable results consistent with these measures were sought, covering diverse time points, methods, and analyses. When numerous results were convenient within the same domain, a systematic review was used to emphasize the most reliable and appropriate data based on predetermined criteria. This ensured that the analysis presented a methodological and thorough overview of each outcome. The proposed data collection method is shown in Figure 4.

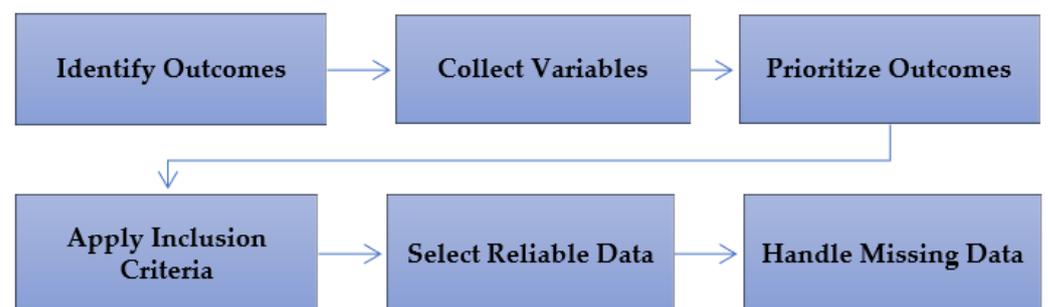


Figure 4. Proposed Data Collection Method.

2.6.2. Variable Data Collection

This section defines and lists all other variables for which data were searched as shown in Table 4, including participants' characteristics as well as intervention details. Moreover, variables like study design were thoroughly documented (Mudau et al., 2024; Khanyi et al., 2024). In cases where information was unclear or missing, certain information was gathered to fill gaps, managed by conventional practices from the reference or based on reasonable information from available data. The gathered data were clearly stated to ensure clarity and to reduce the impact of incomplete information or data on the overall analysis.

We gathered data on:

- The article: title, year, online database, and journal name.
- The study: sample characteristics and geographic location.
- The participants: research design, type of study, sample size, and sample characteristics.
- The research design and features: data collection methods and research design.
- The intervention: technology provider, IT performance metrics, and technology implementation model.

Table 4. Variable Data Collection.

Criteria	Description
Title	Provide a short and descriptive title of the paper or study.
Year	Indicate the year the research was published.
Online Database	List where the study was found (e.g., Google Scholar, Scopus, Web of Science).
Journal Name	Provide the name of the journal or source of publication.
Research Type	Identify the type of research (e.g., article, conference paper, dissertation).
#Cites	Number of citations the paper has received.
Industry Context	Specify the industry in which the study was conducted (e.g., manufacturing, agriculture).
Geographic Location	Mention the country or region the research is based in.
Economic Context	Note whether the research is from a developed or developing country.
Types of Cloud Computing Services	List the services discussed (e.g., IaaS, PaaS, SaaS).
Cloud Deployment Model	Indicate the deployment model (e.g., public, private, hybrid cloud).
Technology Providers	Mention cloud providers involved (e.g., AWS, Microsoft Azure, Google Cloud).
Technology Implementation Model	Identify the model used (e.g., on-premises, cloud-based, hybrid).
Research Design	Describe the research design (e.g., case study, survey).
Type of Study	Indicate whether the study is quantitative, qualitative, or mixed methods.
Sample Size	Number of SMEs or participants involved in the study.
Sample Characteristics	Define who the participants are (e.g., IT managers, business owners).
Data Collection Methods	Describe how the data were collected (e.g., interviews, surveys).
Data Analysis Techniques	Identify how the data were analyzed (e.g., statistical analysis, thematic analysis).
IT Performance Metrics	Specify metrics such as system uptime, scalability, or data security.
Business Performance Metrics	Mention operational metrics like efficiency, cost savings, or revenue growth.
Organizational Outcomes	List outcomes such as employee satisfaction or customer satisfaction.
Long-Term Impacts	Identify long-term benefits like business sustainability or competitive advantage.

2.7. Study Risk of Bias Assessment

This section specifies the approaches used to assess the risk of bias in the incorporated studies, comprising details of the tool(s) that were used to effectively manage huge datasets and detect potential biases that might be ignored during manual assessment. Several reviewers individually assessed each study, making sure that individual biases were reduced and that an extensive analysis was attained through following discussions and consensus building. This incorporated approach assured an exhaustive, reliable, and consistent evaluation of the risk of bias across all studies.

In our systematic review of the impact of cloud computing on SMEs' performance, we carried out an exhaustive risk of bias assessment for each incorporated study to ensure the validity and reliability of our findings. We utilized a customized assessment framework derived from the Cochrane "Risk of Bias" tool, customized to assess mixed-method studies relevant to our topic. This evaluation covered five (5) distinct domains of bias which are: (1) bias in data privacy; (2) bias due to economic benefits; (3) bias due to data analysis techniques; (4) bias in software architecture applications; and (5) bias in policy and operational problems. Each study was reviewed by three authors independently who documented justifications and supporting information for their risk of bias reviews, classifying them as low, high, or some concerns. Any inconsistencies in their assessments were addressed over cooperative discussions and a 4th author was consulted to settle the arguments if needed. This precise process enabled us to exhaustively review the influence of cloud computing on SME performance and challenges in the field, identify key advancements, and address any existing gaps. It is demonstrated in Table 5 (Mudau et al., 2024; Khanyi et al., 2024).

Table 5. Study Risk of Bias Process.

Step	Description	Details
Risk of Bias tool	Customized Cochrane’s Risk of Bias tool tailored to mixed-method studies.	Based on the Cochrane tool adapted to cloud computing research.
Bias domains	Five distinct bias domains used for evaluation.	(1) Data privacy, (2) economic benefits, (3) data analysis techniques, (4) software architecture, (5) policy and operational issues.
Bias classification	Studies classified into risk levels based on assessment.	Low, moderate, high, or unclear.
Consensus process	Discrepancies resolved through discussions.	A fourth author was consulted to settle disagreements.
Outcome	Ensured a thorough, reliable evaluation of risk across all studies.	Provided clarity on the impact of cloud computing on SMEs’ performance.

2.8. Synthesis Methods

The synthesis methods for this systematic review on the impact of cloud computing on SMEs’ performance were designed to ensure a robust, transparent, and reproducible aggregation of results across the selected studies. The process of determining which studies were eligible for inclusion in each synthesis was conducted with a systematic and rigorous approach, ensuring alignment with the review’s objectives, which focus on the role of cloud computing in enhancing SMEs’ performance.

Based on Figure 5 and Table 6, the eligibility synthesis involving carefully selecting studies based on their relevance to cloud computing and alignment with the review’s objectives is introduced in detail. A structured comparison against predefined criteria ensured that only the most pertinent studies were included, minimizing bias and enhancing the review’s methodological rigor. Data from various studies were then standardized to facilitate meaningful comparisons, with missing data addressed through techniques like multiple imputation, ensuring a complete and reliable dataset for analysis. Referring to Table 6, the details on data preparation methods and their applications were analyzed accordingly. Results were systematically organized into tables and visualized using forest plots, which were crucial in identifying patterns and ensuring that the findings were presented clearly and transparently.

Table 6. Proposed Synthesis Method.

Synthesis Step	Description	Methods Applied
Eligibility synthesis	Evaluation of studies based on emphasis on cloud computing and alignment with review objectives.	Tabulation.
Data preparation for synthesis	Preparation of data for synthesis, including conversion to uniform scales and handling of missing data	Standardization, multiple imputation.
Tabulation and visualization of results	Presentation of results in tables and graphical formats to highlight patterns and ensure transparency.	Structured tables, forest plots.
Synthesis of results	Data aggregation using meta-analysis models to determine summary estimates and assess consistency across studies.	Fixed-effects model, random-effects model, heterogeneity tests.

Table 6. Cont.

Synthesis Step	Description	Methods Applied
Exploring causes of heterogeneity	Examination of factors contributing to variability in outcomes through subgroup analysis and meta-regression.	Subgroup analysis, meta-regression.
Sensitivity analyses	Testing the robustness of the synthesized results by excluding high-risk studies and using alternative models.	Sensitivity tests, model comparison.

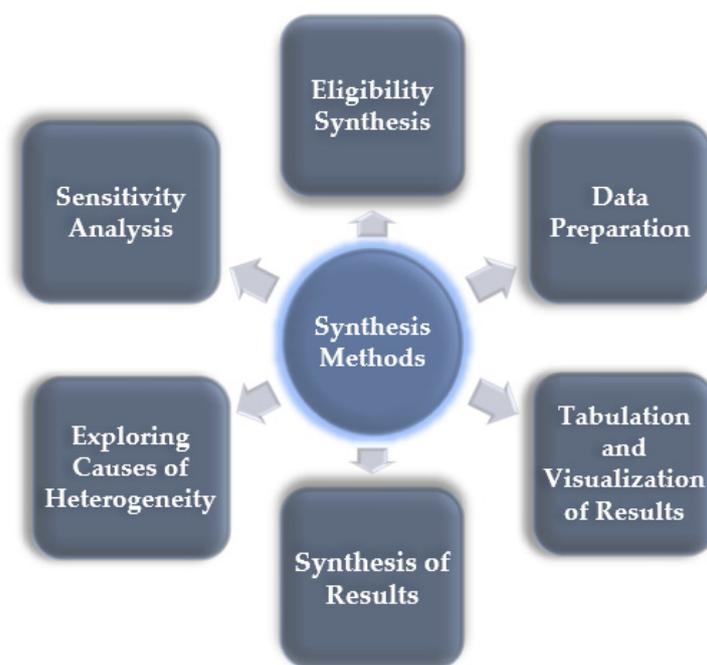


Figure 5. Synthesis Methods.

2.9. Reporting Bias Assessment

In our study, we conducted a systematic assessment of the risk of bias due to missing results, which can stem from reporting biases such as selective non-publication and selective non-reporting of results. The assessment of reporting bias was performed using both statistical and graphical methods to ensure a comprehensive evaluation. We utilized contour-enhanced funnel plots, which were enhanced with contours of statistical significance to visually identify asymmetries that might suggest publication bias. Additionally, Egger’s regression test was employed to statistically assess the presence of funnel plot asymmetry.

No specific tools were developed anew for this assessment; instead, we relied on standard tools and techniques recommended in the literature. The contour-enhanced funnel plots were particularly useful in differentiating areas where studies might be missing due to publication bias from those missing due to other factors, such as chance. The entire process of assessment was conducted by multiple independent reviewers to minimize subjective bias. Any disagreements between reviewers were resolved through discussion or by consulting a methodological expert to reach a consensus on the interpretation of results.

Manual analysis and visualization played a significant role in this study. We did not use any automation tools specifically for assessing reporting bias; instead, data were manually analyzed and visualized using Microsoft Excel. This approach involved creating charts and plots to identify patterns and potential biases in the reporting, allowing for a detailed examination of the data without reliance on automated software tools.

To ensure accuracy and completeness, we conducted thorough manual searches across multiple online repositories, including Google Scholar, Scopus, and Web of Science. This approach allowed us to cross-reference data across different studies and sources, addressing any discrepancies or concerns about reported outcomes without the need for direct contact with the authors.

2.10. Certainty Assessment

This section describes the methods employed to assess the certainty or confidence in the evidence gathered for each outcome, ensuring the reliability and strength of the findings. The collected literature was subsequently evaluated on criteria based on a set of five quality assessment (QA) checks as listed in Table 7.

Table 7. Proposed Research Quality Assessment Questions.

QA	Research Quality Assessment Questions
QA1	Is the aim of the research explicitly stated?
QA2	Does the research clearly specify the data collection methods?
QA3	Is the impact of cloud computing on SMEs' performance clearly analyzed?
QA4	Is there a clear and appropriate research methodology utilized in the study?
QA5	Do the research findings contribute to the existing literature on the impact of cloud computing on SMEs?

The responses to the QAs are rated on a scale between zero (0) and one (1), with a "No" response assigned "0" points, a score of "0.5" given where the criteria are "Partially" met, and "1" point assigned to a "Yes". All five QAs are scored using this criterion. Each of the studies under review can receive between 0 and 5 points. The results of the QA for the collected literature are tabulated in Table 8.

Table 8. Results of Collected Literature Quality Assessment.

Paper ID.	QA1	QA2	QA3	QA4	QA5	Total	%
Vasiljeva et al. (2017)	1	0.5	0.5	0.5	0.5	3	60
Shetty and Panda (2021)	1	0.5	1	1	1	4.5	90
Khayer et al. (2020a)	1	1	1	1	1	5	100
Rawashdeh and Rawashdeh (2023)	1	0	0.5	0.5	1	3	60
Skafi et al. (2020)	1	0	0.5	0.5	1	3	60
Picoto et al. (2021)	1	1	0.5	1	1	4.5	90
Nuskiya (2017)	1	0	0.5	0.5	1	3	60
Ahmad et al. (2023)	1	0	0.5	0.5	1	3	60
Bhat (2013)	1	1	0.5	1	1	4.5	90
Salleh et al. (2018)	1	1	1	0.5	1	4.5	90
Badie et al. (2015)	1	1	0.5	1	1	4.5	90
Tan (2022)	1	1	0.5	1	0.5	4	80
Tomás et al. (2017)	1	0.5	0.5	0.5	1	3.5	70
Dincă et al. (2019)	1	0.5	0.5	0.5	1	3.5	70
Abubakar et al. (2014)	1	1	1	1	1	5	100
Gutierrez et al. (2015)	1	1	1	1	1	5	100
Al-Sharafi et al. (2023)	1	1	1	1	1	5	100
Mousa et al. (2024)	1	1	1	1	1	5	100
Fakieh et al. (2014)	1	0	0	1	1	3	60
Hosseini et al. (2019)	1	0	1	0	1	3	60
Mousa et al. (2024)	1	0	0	1	1	3	60

Table 8. Cont.

Paper ID.	QA1	QA2	QA3	QA4	QA5	Total	%
Al-Mutawa and Al Mubarak (2024)	1	0	0	1	1	3	60
Skafi et al. (2020)	1	0	1	0	1	3	60
El-Gazzar (2014)	1	1	0	1	1	4	80
Salleh et al. (2018)	1	0	1	1	1	4	80
Qalati et al. (2021a)	1	0	1	1	1	4	80
Abubakar et al. (2014)	1	1	1	1	1	5	100
Gutierrez et al. (2015)	1	1	1	1	1	5	100
Al-Sharafi et al. (2023)	1	1	1	1	1	5	100
Mousa et al. (2024)	1	1	1	1	1	5	100
Fakieh et al. (2014)	1	1	1	1	1	5	100
Hosseini et al. (2019)	1	0	0.5	0.5	1	3	60
Mousa et al. (2024)	1	1	0.5	1	1	4.5	90
Al-Mutawa and Al Mubarak (2024)	1	1	1	1	1	5	100
Skafi et al. (2020)	1	1	1	1	1	5	100
El-Gazzar (2014)	1	1	1	1	1	5	100
Salleh et al. (2018)	0.5	0	0.5	0	0.5	1.5	30
Qalati et al. (2021b)	1	0.5	1	1	1	4.5	90
Abubakar et al. (2014)	1	0	0.5	0.5	0.5	2.5	50
Gutierrez et al. (2015)	0.5	0	0	0.5	0.5	1.5	30
Al-Sharafi et al. (2023)	1	1	0.5	1	1	4.5	90
Mousa et al. (2024)	0	0.5	0	0.5	0	1	20
Fakieh et al. (2014)	1	0.5	0.5	0.5	0.5	3	60
Hosseini et al. (2019)	1	0	0.5	0.5	0.5	2.5	50
Mousa et al. (2024)	1	0.5	0	0.5	0.5	2.5	50
Al-Mutawa and Al Mubarak (2024)	1	0.5	1	1	0.5	4	80
Skafi et al. (2020)	1	1	1	1	1	5	100
El-Gazzar (2014)	1	0.5	0.5	0.5	0.5	3	60
Salleh et al. (2018)	1	0.5	0.5	0.5	1	3.5	70
Qalati et al. (2021b)	1	0.5	1	1	1	4.5	90
Abubakar et al. (2014)	1	1	1	1	1	5	100
Gutierrez et al. (2015)	1	0	0	1	1	3	60
Al-Sharafi et al. (2023)	1	0	0	0	1	2	40
Mousa et al. (2024)	1	1	0	1	1	4	80
Fakieh et al. (2014)	1	1	1	1	1	5	100
Hosseini et al. (2019)	1	1	0.5	1	1	4.5	90
Mousa et al. (2024)	1	1	1	0.5	1	4.5	90
Al-Mutawa and Al Mubarak (2024)	1	1	0.5	1	1	4.5	90
Skafi et al. (2020)	1	0	0.5	1	0	2.5	50
El-Gazzar (2014)	1	0	1	0.5	1	3.5	70
Salleh et al. (2018)	1	0	0.5	0.5	1	3	60
Qalati et al. (2021a)	0.5	0	0.5	0	1	2	40
Abubakar et al. (2014)	1	1	0.5	1	0.5	4	80
Gutierrez et al. (2015)	1	1	1	1	1	5	100
Al-Sharafi et al. (2023)	1	0	0	1	1	3	60
Mousa et al. (2024)	1	0	0	0	1	2	40
Fakieh et al. (2014)	1	1	1	1	1	5	100
Hosseini et al. (2019)	1	1	1	0	1	4	80
Mousa et al. (2024)	1	0	1	1	1	4	80
Al-Mutawa and Al Mubarak (2024)	1	1	1	1	1	5	100
Skafi et al. (2020)	1	1	0	1	0	3	60
El-Gazzar (2014)	1	0	1	1	1	4	80
Salleh et al. (2018)	1	1	1	1	1	5	100
Qalati et al. (2021a)	1	0	1	0	1	3	60
Abubakar et al. (2014)	1	0	1	0	1	3	60
Gutierrez et al. (2015)	1	0	1	1	1	4	80

Table 8. Cont.

Paper ID.	QA1	QA2	QA3	QA4	QA5	Total	%
Al-Sharafi et al. (2023)	1	1	1	1	1	5	100
Mousa et al. (2024)	1	0	1	1	1	4	80
Fakieh et al. (2014)	1	0	1	1	0	3	60
Hosseini et al. (2019)	1	1	0	0	1	3	60
Mousa et al. (2024)	1	0.5	1	1	0.5	4	80
Al-Mutawa and Al Mubarak (2024)	1	1	0.5	0.5	0.5	4.5	90
Skafi et al. (2020)	1	1	1	1	0	4	80
El-Gazzar (2014)	1	0	0.5	1	1	3.5	70
Salleh et al. (2018)	1	0.5	1	0.5	0.5	3.5	70
Qalati et al. (2021b)	1	1	1	1	1	5	100
Abubakar et al. (2014)	1	0	0	1	1	3	60
Gutierrez et al. (2015)	1	1	0	0	0.5	2.5	50
Al-Sharafi et al. (2023); Mousa et al. (2024)	1	0.5	1	1	0	3.5	70
Fakieh et al. (2014)	1	1	1	1	1	5	100

3. Results

This section describes the results including their interpretation, as well as some conclusions that can be drawn from these results.

3.1. Study Selection

The studies’ selection process of this review was employed as illustrated in Figure 6. The research papers were accumulated from research paper databases with the assistance of the keywords that were mentioned in the “Search Strategy” section previously. These research papers were gathered strictly in line with the conditions of the inclusion and exclusion criteria presented in the previous “Eligibility Criteria” section. The search yielded approximately 18,570 research papers across all considered research databases, and their titles and abstracts were surveyed.

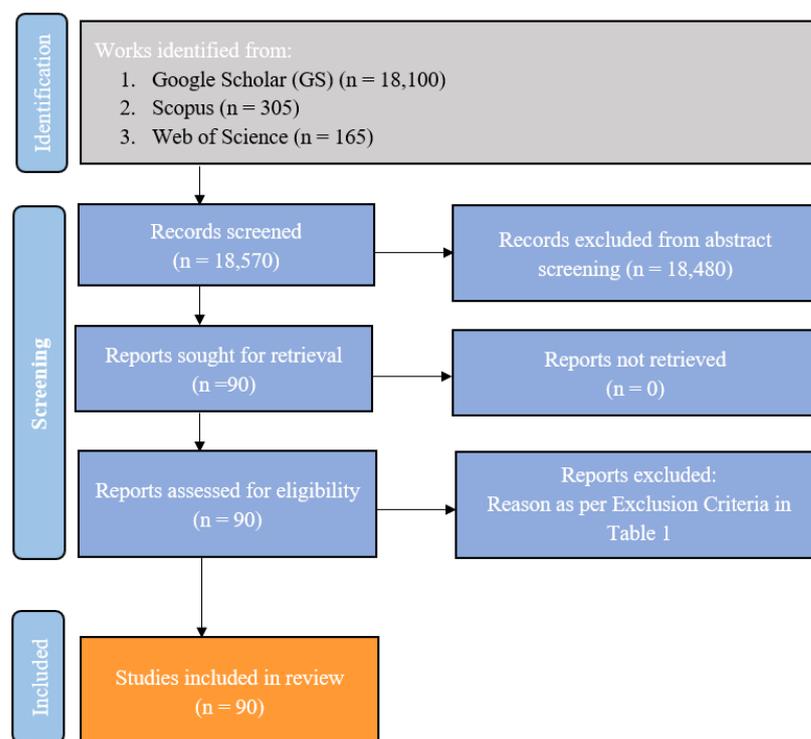


Figure 6. Proposed PRISMA Flowchart (Takkouche & Norman, 2011).

As demonstrated by Figure 7, the collected research papers comprised 90 research papers in total, of which 40% were from Google Scholar, 28.89% from Scopus, and 31.11% from Web of Science. Out of the 90 research papers, 2 were book chapters, 23 were conference papers, and 65 were journal articles. All research papers that seemed to have duplicate research studies were excluded. Therefore, the remaining 90 research papers were qualified for full-text review and were incorporated into this systematic analysis process.

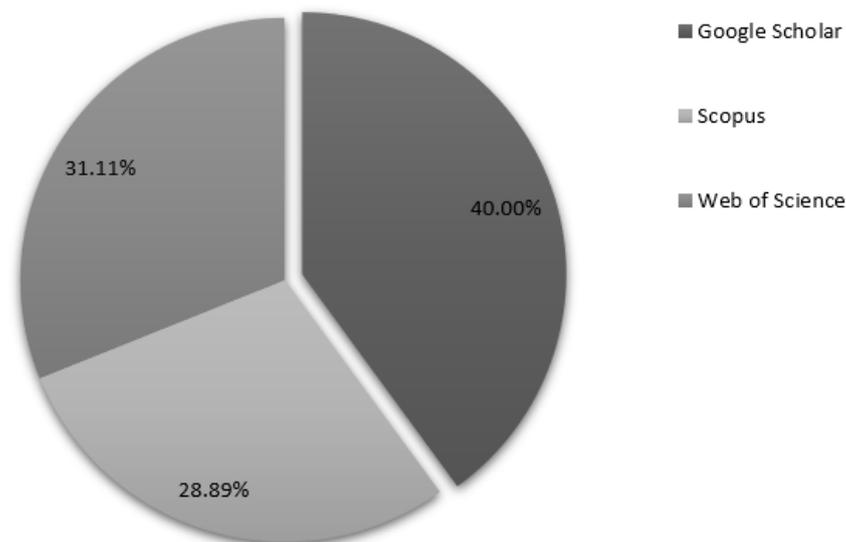


Figure 7. Distribution of Online Databases.

3.2. Study Characteristics

Ninety eligible research papers were published between 2014 and 2024. Figure 8 shows the number of research papers published each year, indicating a steady growth in publications since 2014. This highlights the increasing research focus on cloud computing and SMEs over time. The eligible research papers consist of 2 book chapters, 23 conference papers, and 65 journals, as illustrated in Figure 9. This figure categorizes the types of research publications included in the study, showing that journal articles are the predominant source, with 65 papers, followed by 23 conference papers, and 2 book chapters. This breakdown indicates that journals serve as the primary medium for research on cloud computing and SMEs. Table 9 illustrates the number of research papers published by year over the past decade. Since 2014, there has been a steady increase in publications. While numerous studies have emerged on cloud computing and SMEs, a comprehensive systematic review analyzing the impact of cloud computing on SME performance has yet to be conducted.

A summary of research works published between 2014 and 2024 is provided, including the distribution of book chapters, conference papers, and journal articles by year. The data show a consistent rise in research output, peaking significantly in 2023 with 12 journal articles, although no book chapters or conference papers were published that year. Throughout the period, journal articles have been the most common type of publication, while conference papers are less frequent, and book chapters are rare, with only two published in 2014 and 2017. Noteworthy years include 2014, with seven articles, one book chapter, and one conference paper, and 2019, which saw eight journal articles and five conference papers. This trend highlights the increasing academic focus on cloud computing's influence on SMEs, particularly through peer-reviewed journal articles.

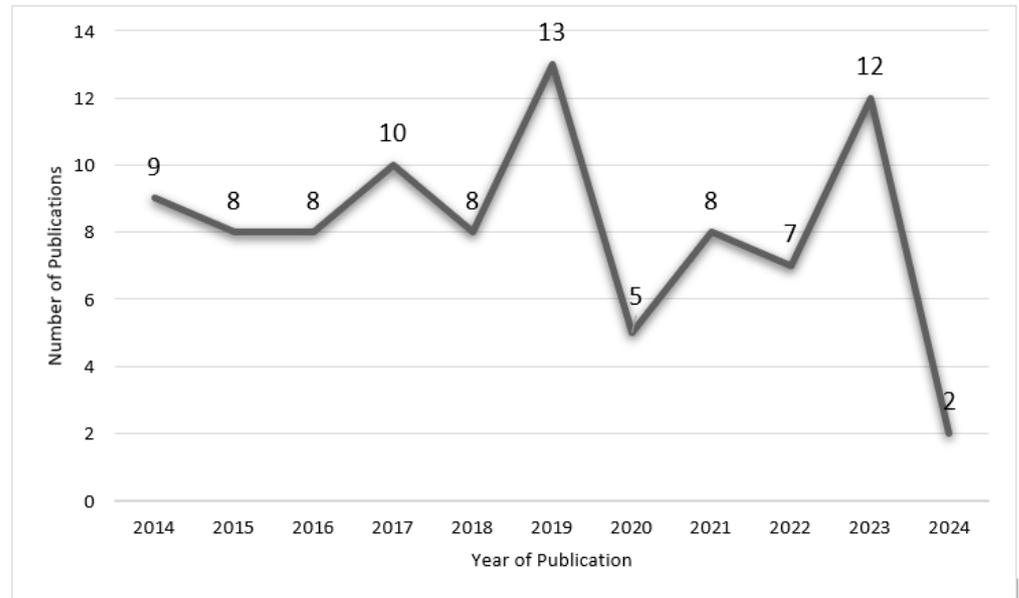


Figure 8. Research papers published by year.

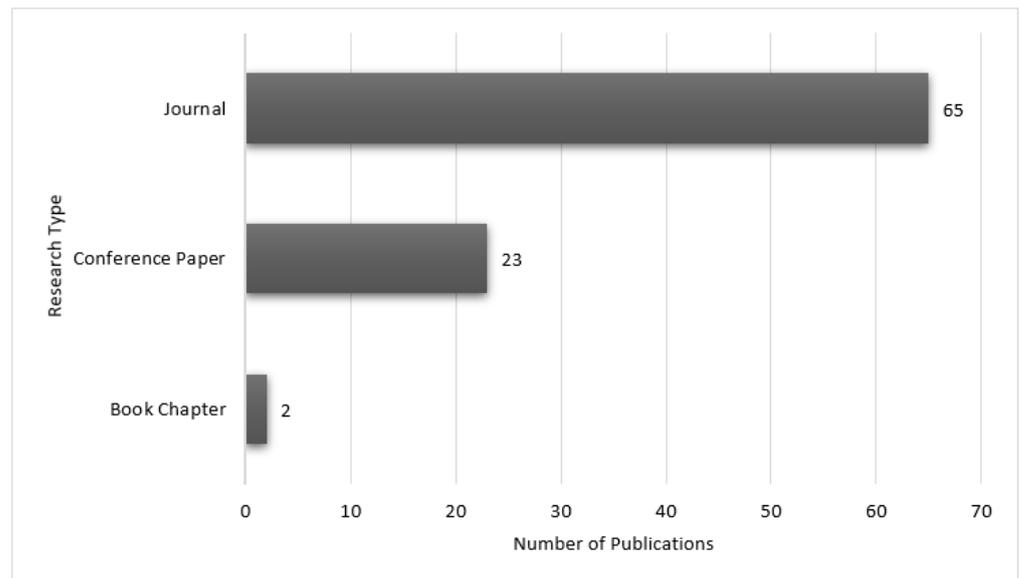


Figure 9. Research Type Indication.

Table 9. Momentary view of research works contained herein by published year.

Published Year	Book Chapter	Conference Paper	Journal
2014	1	1	7
2015	0	3	5
2016	0	5	3
2017	1	1	8
2018	0	1	7
2019	0	5	8
2020	0	1	4
2021	0	3	5
2022	0	3	4
2023	0	0	12
2024	0	0	2

Figure 10 illustrates the global distribution of research papers on cloud computing and SMEs, revealing a diverse range of contributions across various countries. India leads the field, accounting for 16.67% of the total publications. This suggests a strong focus on integrating cloud technologies into SMEs within the region, possibly driven by national strategies aimed at boosting digital transformation. China follows with 11.11%, reflecting its robust industrial base and commitment to maintaining its global competitive edge through technological innovation in the SME sector. Malaysia contributes 8.89% of the research papers, highlighting its growing interest in cloud computing to support its rapidly expanding SME sector. The notable contributions from the United State and the United Kingdom, at 6.67% and 5.56%, respectively, suggest that these countries are also prioritizing research in this area, likely as part of broader economic strategies to enhance digital capabilities among small businesses. Poland, Rwanda, and Kenya, each at 3.33%, demonstrate a moderate but significant engagement, indicating a focus on leveraging cloud technologies to support their SME sectors. The remaining countries, including Greece, Turkey, Italy, the Netherlands, Nigeria, South Africa, South Korea, and Spain, contribute 2% to 3% each, indicating a widespread yet varied interest in cloud computing research. However, other nations such as Bahrain, Botswana, and Romania show minimal participation, with each contributing 2% or less. This could reflect either the nascent stage of cloud adoption in these regions or a lower prioritization of research in this field.

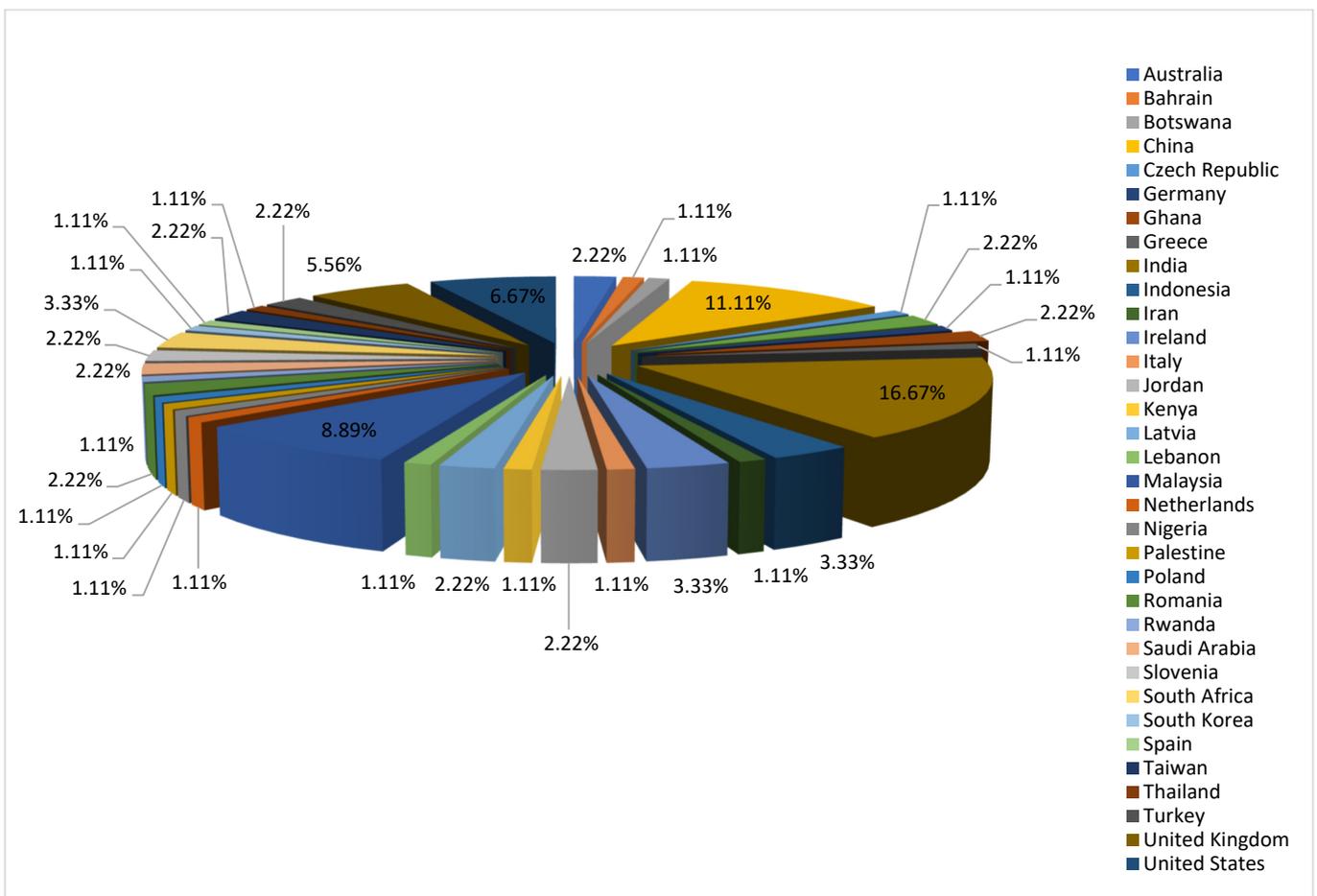


Figure 10. Geographical Distribution of Research Papers.

Table 10 demonstrates the various adoptions of cloud computing across diverse industries and regions, emphasizing its impact on SMEs’ business performance.

Table 10. Adoption of cloud computing across diverse industries and regions.

Study	Industry Context	Sample Size	Contributions
Khayer et al. (2020b)	Transport	86	CC adoption in Latvian SMEs, its impact on business performance, and recommendations for SMEs, service providers, and government agencies.
Vasiljeva et al. (2017)	Manufacturing	415	Cloud-based business services in Malaysian SMEs, analyzing their impact on financial and non-financial benefits, using PLS-SEM to evaluate organizational performance.
Rawashdeh and Rawashdeh (2023)	Finance	50	Cloud accounting on intellectual capital and business performance in Sri Lankan SMEs, using a quantitative approach to analyze relationships between these variables.
Skafi et al. (2020)	ICT	30	Factors influencing cloud computing adoption in SMEs within a developing economy, identifying key drivers, barriers, and influential factors, offering insights for service providers and policymakers.
Shetty and Panda (2021)	ICT	250	Cloud computing adoption among Irish SMEs, revealing low migration rates and insufficient readiness assessments, and practical recommendations for successful cloud adoption.
Picoto et al. (2021)	ICT	343	Cloud computing adoption in Malaysian SMEs, finding that IT resources and external pressure significantly impact adoption.
Odero (2021)	Manufacturing	200	Cloud adoption model for SMEs based on the TOE framework and individual characteristics, identifying key factors like relative advantage, vendor support, and CEO trust.
Gamache et al. (2020)	ICT	7	The paper discusses the potential of cloud computing to enhance European SMEs' business efficiency, particularly through e-learning.
Qalati et al. (2021b)	Finance	12	Cloud computing adoption by SMEs in sub-Saharan Africa, particularly in Nigeria.
Nuskiya (2017)	ICT	112	Impact of cloud computing on business performance in Turkish SMEs, finding a positive effect on performance despite general reluctance.
Thabit et al. (2021)	Accounting	198	Cloud computing adoption in Romanian SMEs, identifying key influencing factors such as managerial knowledge and perceived costs.
Bhat (2013)	Manufacturing	90	IT resources significantly impact cloud computing adoption in Malaysian SMEs, while top management support and employee knowledge do not.
Ahmad et al. (2023)	ICT	470	SMEs' role in national economies and how cloud computing boosts their productivity and global competitiveness.
Tomás et al. (2017)	Finance	14	SMEs' perceptions of cloud computing solutions and their benefits, focusing on Romania's north-west region. It assesses awareness levels and provides insights for both IT solution providers and SMEs.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Tan (2022)	Manufacturing	120	The study examines how the Cloud of Things impacts performance in Indian SMEs, analyzing factors such as security, ease of use, and top management support.
Badie et al. (2015)	Manufacturing	7	Cloud computing boosts Nigerian SMEs' efficiency but faces adoption challenges. The study aims to develop a framework for evaluating and improving cloud services for SMEs.
Bajenaru (2021)	-	-	Cloud computing addresses key challenges for South African SMEs, including red tape and IT costs. A Cloud Adoption Framework, based on the TOE model, is proposed to enhance SME survival rates.
Priyadarshinee et al. (2016)	Marketing	372	Examines determinants of cloud computing adoption in SMEs and measures its impact on firm performance by enhancing organizational agility.
Rai et al. (2015)	Manufacturing	317	Determinants of cloud adoption in Indian SMEs validated, showing the impact on economic performance.
Alouane and El Bakkali (2015)	ICT	305	SME factors include relative advantage, compatibility, complexity, cost savings, and security, with adoption depending on relative advantage, compatibility, cost, and security.
Alouane and El Bakkali (2015)	Manufacturing	170	SMEs in Sabah, Malaysia, showing that a relative advantage, competitive pressure, and external support do not significantly impact adoption.
Setiyani et al. (2020)	ICT	95	Cost-benefits drive cloud adoption in Irish SMEs, but service availability concerns limit uptake.
Oriza and Maulidar (2024)	ICT	80	Cloud computing offers affordable solutions for SMEs, particularly in developing countries like Saudi Arabia, based on a comprehensive survey of small businesses on the west coast.
Hartono et al. (2020)	-	11	Cloud computing adoption strategies for Sub-Saharan African SMEs identified key factors: setting goals, creating a roadmap, and tailoring strategies to enhance growth and customer experience.
Alrababah (2023)	Manufacturing	300	Cloud-based ERP adoption in Penang SMEs: top management support positively impacts the manufacturing sector; other factors show no significant effect.
Durao et al. (2014)	Manufacturing	9	Positive impact on SMEs' non-financial performance; negative impact on financial performance.
Lawan et al. (2021)	ICT	36	Cost-benefits and scalability drive adoption; barriers include broadband issues and vendor lock-in. TOE framework identifies key enablers and organizational factors.
M'rhaouarh et al. (2018)	-	-	Key factors include cost reduction, security, and management support; diffusion of innovation (DOI) and technology organization and environment (TOE) theories frame the study.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Hendri and Sudarmilah (2024)	ICT	-	Indian SMEs face challenges and costs; this paper reviews ERP deployment models and cost factors and presents a framework for evaluating cloud-based ERP feasibility.
Salleh et al. (2018)	ICT	-	SMEs can overcome high costs and resource limitations; explores HPC requirements, cluster-based applications, Google's HPC Cloud, and vendor performance.
El-Gazzar (2014)	Manufacturing	100	Key factors influencing adoption to aid in expanding cloud use among SMEs.
Mikkonen and Khan (2016)	ICT	-	Cloud computing methodologies examine various systems and discuss applications to highlight their transformative impact on technology and business operations.
Widyastuti and Irwansyah (2018)	Manufacturing	-	The study identifies key factors for cloud computing adoption in Indian MSMEs, highlighting "previous technological experience" as crucial.
Tehrani and Shirazi (2014)	Manufacturing	-	Cloud computing and smart device model to enhance inventory management in fashion SMEs.
Pathan et al. (2017)	Manufacturing	30	Examines cloud computing adoption predictors in SMEs using SEM and ANN, highlighting server location and management support as key factors.
Amini (2014)	ICT	387	The study investigates cloud computing adoption's impact on SME sustainability.
Kumar et al. (2017)	Business and Economics	209	Influence of cloud computing adoption in Malaysian SMEs. It finds data security, technology readiness, and top management support as key predictors, with adoption intention mediating the relationship between these factors and actual usage.
Khayer et al. (2020a)	ICT	335	The study identifies relative advantage, competitive pressure, compatibility, and industry pressure as key factors in cloud computing adoption among Czech SMEs.
Al-Sharafi et al. (2019)	ICT	273	The study examines how cloud computing assimilation reduces supply chain financing risks for SMEs.
Kariyawasam (2019)	Business and Economics	14	Factors affecting cloud technology implementation for Industry 4.0 in MSMEs. System integration, project management, and competitive pressure.
Trigueros-Preciado et al. (2013)	ICT	20	The study tests existing cloud computing adoption models for suitability in Irish SMEs and finds they are inadequate.
Tsiu et al. (2024)	ICT	230	Cloud computing adoption in Lebanese SMEs using the TOE framework: technological and organizational factors positively impact adoption, while poor infrastructure and lack of government support hinder it.
Hassan et al. (2017)	ICT	415	Integration enhances environmental, financial, and social performance, offering practical insights for policymakers and managers.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Safari et al. (2015)	ICT	415	The study finds that perceived benefit and upper management support drive cloud computing adoption in Palestinian SMEs, which in turn enhances performance.
Assante et al. (2016)	-	147	Cloud computing impacts SMEs and large firms in India, finding SMEs benefit more due to better business scalability.
Abubakar et al. (2014)	Accounting	-	Cloud computing in SME accounting systems improves management efficiency and economic settlements in China, risk management, and secure network protections.
Kaplançalı and Akyol (2021)	Finance	-	SME accounting system using cloud computing and sensor monitoring, resulting in a 13.84% increase in data accuracy and a 14.63% boost in processing efficiency compared to traditional systems.
Dincă et al. (2019)	-	-	Cloud strategies for SMEs focus on scalability, cost-effectiveness, performance, and efficiency.
Hassan (2017)	ICT	-	The paper highlights the benefits of cloud computing over traditional methods for small and large enterprises.
Tutunea (2014)	ICT	-	Cloud adoption drivers for SMEs in Indonesia, using e-survey data analyzed with SPSS v20 and Smart PLS v3.
Narwane et al. (2020)	-	-	The study proposes cryptographic mechanisms to ensure data uniqueness and security in cloud storage.
Otuka et al. (2014)	ICT	-	This study proposes a framework to explore how digital organizational culture impacts cloud computing adoption in SMEs.
Mohlameane and Ruxwana (2020)	-	-	It highlights security and privacy concerns as key inhibitors and aims to develop strategies to enhance cloud adoption.
Gong et al. (2010)	ICT	202	SMEs in Kenya, despite their growth and potential benefits, are slow to adopt cloud computing.
Sunyaev (2020)	ICT	-	This study evaluates cloud computing adoption among SMEs in Saudi Arabia.
R. Sandu et al. (2017)	Accounting	-	Cloud accounting adoption in SMEs, influenced by TOE factors, enhances organizational performance.
Ming et al. (2018)	Agriculture	-	Exploring the impact of cloud computing on SMEs in Africa reveals enhanced operational efficiency, scalability, and cost savings.
Doherty et al. (2015)	ICT	25	Cloud computing adoption in Malaysian enterprises remains low. Key factors influencing adoption include security, top management support, cost savings, competition, and trading partner pressures.
Hamada et al. (2015)	Business and Economics	197	The model highlights critical factors and their impact on performance.
Safari et al. (2015)	ICT	-	Cloud computing adoption in Somali SMEs is driven by cost savings, firm size, top management support, and regulatory support, while security concerns and competitive pressure are less significant.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Prihatiningtias and Wardhani (2021)	Retail	227	This study examines how cloud computing utilization (CCU) helps emerging market SMEs in Iran and Turkey overcome informational and marketing barriers.
Priyadarshinee et al. (2017)	Business and Economics	203	fsQCA reveals complex causations and configurations not captured by traditional methods, offering new theoretical and practical insights.
Gupta and Misra (2016)	ICT	-	Cloud adoption in Botswana: recommendations for a tailored adoption framework are also provided.
Ling et al. (2022)	ICT	249	This study investigates how technological, organizational, and environmental factors influence IT managers' decisions to adopt cloud computing in the UK.
M'rhaouarh et al. (2018)	Manufacturing	200	This study explores how technological, organizational, and environmental (TOE) factors influence cloud accounting adoption in SMEs, emphasizing the mediating role of a cloud computing vision.
Huo et al. (2021)	ICT	249	Examines cloud computing adoption intentions, pricing strategies, and deployment models, highlighting factors that influence decision making and implementation in organizations.
Yoon et al. (2017)	ICT	36	Promotes cloud computing adoption and use among agile software developers in South Africa, focusing on enhancing development efficiency and flexibility.
Ranjan et al. (2015)	Engineering	-	Explores IT adoption in Indian SMEs, highlighting opportunities and challenges for enhancing business operations and growth.
Fen and Ping (2024)	Business and Economics	-	Examines how cloud computing technology enhances small business performance by leveraging internet-based solutions.
Hussain et al. (2020)	Finance	-	Explores the development and implementation of an intelligent ERP platform for SMEs utilizing cloud computing technology.
Sabi et al. (2016)	ICT	-	Proposes a model to enhance cloud-based service adoption in Indian SMEs, addressing key factors for successful implementation.
Priyadarshinee et al. (2017)	ICT	-	Analyzes opportunities for SMEs in leveraging cloud high-performance computing, highlighting potential benefits and strategies through a meta-analysis.
Oredo and Dennehy (2022)	Engineering	-	Proposes a hybrid method to enhance the quality of service for SMEs facing availability constraints in cloud environments.
Qalati et al. (2021a)	ICT	216	Explores how cloud computing impacts small businesses by enhancing flexibility, reducing costs, and improving efficiency.
Natrajan et al. (2024)	ICT	-	Proposes a conceptual model to enhance performance and sustainability in SMEs using cloud computing technology.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Kshetri (2011)	Business and Economics	-	Develops a questionnaire to assess SMEs' ongoing use behavior of cloud computing services, focusing on continuous engagement and satisfaction.
Zhang and Mohammadi (2023)	ICT	-	Examines how SMEs apply and adopt big data technologies, focusing on the benefits and challenges of integration into their operations.
Alhammad et al. (2015)	Accounting	-	Analyzes the key factors influencing the adoption of SaaS ERP systems in SMEs and the challenges they face during implementation.
Ahmad et al. (2023)	ICT	-	Evaluates the performance of enterprise cloud computing systems, focusing on efficiency, reliability, and cost-effectiveness.
Tomás et al. (2017)	ICT	-	Describes the Cloud SME platform as a versatile multicloud solution for creating and running commercial cloud-based simulations.
Tan (2022)	Engineering	-	Explores interoperability challenges in cloud manufacturing through a case study on a private cloud structure tailored for SMEs.
Badie et al. (2015)	Business and Economics	4	Examines the adoption of cloud computing by an SME in a developing economy, highlighting challenges and strategies for reaching cloud-based solutions.
Bajenaru (2021)	ICT	-	Explores how Platform-as-a-Service (PaaS) solutions enable cloud-based computational fluid dynamics (CFD), enhancing flexibility and scalability for users.
Priyadarshinee et al. (2016)	Engineering	-	Examines how compliance, network, and security factors moderate the success of implementing cloud ERP systems, highlighting their impact on critical success factors.
Rai et al. (2015)	ICT	208	Explores how cloud-based cross-system integration enhances connectivity and efficiency for small and medium-sized enterprises (SMEs).
Alouane and El Bakkali (2015)	Business and Economics	-	Analyzes the key factors influencing software-as-a-service (SaaS) adoption in small businesses, focusing on risks, benefits, and both organizational and environmental determinants.
Setiyani et al. (2020)	ICT	198	Proposes a personalized approach to customizing cloud manufacturing services to better meet individual business needs and enhance service efficiency.
Oriza and Maulidar (2024)	Engineering	-	Examines different collaboration types and success factors in the IT service industry that contribute to sustainable growth.
Hartono et al. (2020)	ICT	127	Introduces the PaaS port semantic model, an ontology designed to enhance semantic interoperability in platform-as-a-service (PaaS) marketplaces.

Table 10. Cont.

Study	Industry Context	Sample Size	Contributions
Alrababah (2023)	ICT	-	Explores strategies for selecting cloud resource configurations across multiple layers in the context of big data, focusing on optimizing performance and resource utilization.
Durao et al. (2014)	Manufacturing	20	Offering flexible and scalable solutions, cloud technology enhances process efficiency, collaboration, and agility.

Studies span sectors like transport, manufacturing, finance, and ICT, with sample sizes ranging from 4 to 470. Key findings highlight cloud computing's role in improving organizational performance, though adoption challenges persist, such as cost concerns and readiness assessments. Endorsements are provided for SMEs, service providers, and policymakers to address these challenges and improve cloud computing implementation, particularly in developing economies.

3.3. Risk of Bias in Studies

Table 11 assesses the risk of bias in various studies based on key methodological criteria. Random Sequence Generation determines whether participants were randomly assigned to groups, influencing selection bias, while Allocation Concealment checks if the group assignment process was hidden from those conducting the study. Blinding of Participants and Personnel ensures that neither participants nor researchers knew which interventions were administered, reducing Performance Bias, whereas Blinding of Outcome Assessment focuses on whether outcome evaluators were similarly unaware of preventing detection bias. Incomplete Outcome Data addresses how missing data were managed to avoid attrition bias, and Selective Reporting evaluates whether all pre-specified outcomes were reported, identifying potential reporting bias if selective omissions were made. Other Bias encompasses any additional factors, such as conflicts of interest or study design flaws, that could influence the outcomes. The Overall Risk of Bias summarizes the study's credibility, with ratings ranging from low (indicating minimal bias) to high (indicating significant concerns). These categories provide a comprehensive assessment of each study's reliability and potential sources of bias.

Figure 11 illustrates the distribution of research design types employed in studies examining the impact of cloud computing on SMEs. Of the 90 papers reviewed, surveys are the predominant research design, accounting for 65 instances. This preference highlights the focus on collecting extensive, generalizable data that can be statistically analyzed, which is consistent with the quantitative research trend. Surveys are particularly effective for reaching a wide range of SMEs and obtaining standardized responses regarding cloud adoption, benefits, and challenges.

In contrast, case studies and experimental designs are less common, with 13 and 12 instances, respectively. Case studies provide in-depth, contextual insights into specific cases of cloud computing adoption, offering a qualitative exploration of the unique experiences of individual SMEs. Experimental designs, though less frequent, are valuable for establishing cause-and-effect relationships by controlling variables, thus providing more robust evidence of cloud computing's impact.

Table 11. Results of Risk of Bias in Research Studies.

Ref.	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants and Personnel (Performance Bias)	Blinding of Outcome Assessment (Detection Bias)	Incomplete Outcome Data (Attrition Bias)	Selective Reporting (Reporting Bias)	Other Bias	Overall Risk of Bias
Khayer et al. (2020a)	Low	Low	High	Low	Low	Unclear	Low	Moderate
Vasiljeva et al. (2017)	High	Unclear	Low	High	Low	High	Low	High
Rawashdeh and Rawashdeh (2023)	Low	Low	Low	Unclear	Low	Low	Low	Low
Skafi et al. (2020)	Unclear	High	High	High	High	Unclear	High	High
Khayer et al. (2020b)	Low	Low	Unclear	Low	Low	Low	Low	Low
Shetty and Panda (2021)	Low	Low	Low	Low	Low	Low	Low	Low
Picoto et al. (2021)	Low	Low	Unclear	Low	Low	Unclear	Low	Moderate
Odero (2021)	High	Low	Low	High	High	Unclear	High	High
Gamache et al. (2020)	Unclear	High	High	Low	Low	Low	Low	High
Qalati et al. (2021a)	High	Low	Low	High	High	Low	High	High
Nuskiya (2017)	High	Low	Unclear	High	High	Low	High	Moderate
Thabit et al. (2021)	Low	Low	Low	High	High	Low	High	Moderate
Bhat (2013)	Low	Low	Unclear	High	Low	Low	High	Low
Ahmad et al. (2023)	High	Low	Unclear	High	High	Low	High	High
Tomás et al. (2017)	Low	Low	Low	Low	High	Low	High	Moderate
Tan (2022)	High	High	High	High	Low	Low	High	High
Badie et al. (2015)	High	Low	Unclear	Low	High	Low	High	Moderate
Bajenaru (2021)	Low	Low	Low	High	High	Low	High	Low
Fen and Ping (2024)	Low	Low	Unclear	High	High	Low	High	Low
Alkawsii et al. (2015)	High	Low	High	High	High	Low	High	High
***	***	***	***	***	***	***	***	***
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***	***	***	***	***	***	***	***	***
Prihatiningtias and Wardhani (2021)	Low	Low	Unclear	High	High	Low	High	Moderate
Priyadarshinee et al. (2017)	Low	Low	Low	High	low	Low	High	Low
M'rhaouarh et al. (2018)	Low	Unclear	High	Unclear	High	Low	High	Low

Table 11. Cont.

Ref.	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants and Personnel (Performance Bias)	Blinding of Outcome Assessment (Detection Bias)	Incomplete Outcome Data (Attrition Bias)	Selective Reporting (Reporting Bias)	Other Bias	Overall Risk of Bias
Ling et al. (2022)	Low	Low	Unclear	High	High	Low	High	Moderate
Chen et al. (2023)	Low	High	High	High	High	Low	High	High
Fakieh et al. (2014)	Low	Unclear	Low	High	High	Low	High	Moderate
Gupta and Misra (2016)	Low	Unclear	Unclear	High	High	Low	High	Moderate
Al-Mutawa and Al Mubarak (2024)	Low	Low	Low	High	High	Low	High	Low
Raut et al. (2017)	High	High	Unclear	High	High	Low	High	High
M'rhaouarh et al. (2018)	High	Low	High	High	High	Low	High	High
M'rhaouarh et al. (2018)	Low	Low	High	Low	Low	Unclear	Low	Moderate

*** Studies not included in the table due to size, however, this does not impact the presented snapshot of the risk of bias.

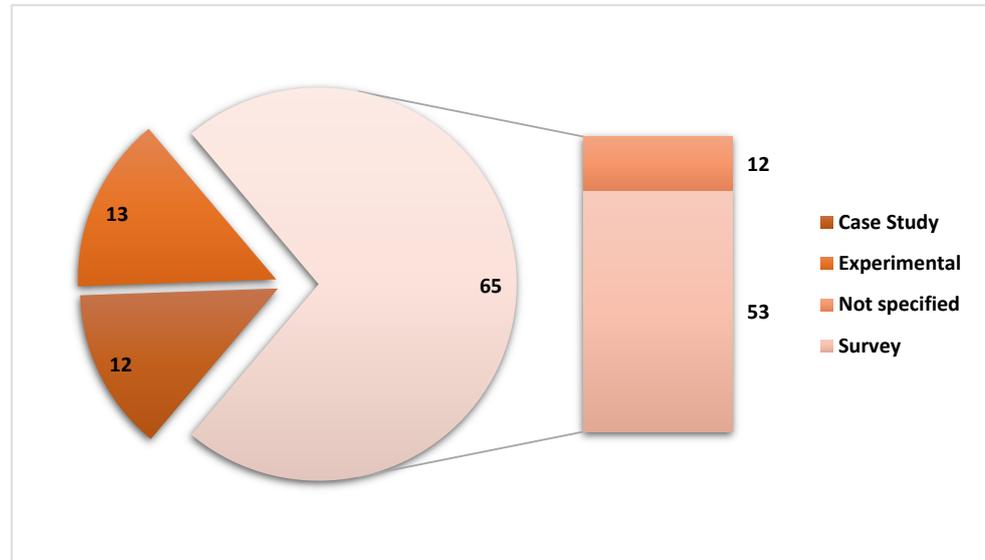


Figure 11. Research design.

The “not specified” category, comprising 12 instances, likely includes studies with mixed research designs or those with undefined approaches, possibly due to a focus on theoretical or exploratory research. Most survey-based studies underscore the emphasis on gathering quantifiable, broadly applicable data, while the inclusion of case studies and experimental designs contributes additional depth and rigor to the research.

Using data from 90 publications gathered from Google Scholar, Scopus, and Web of Science, the graph in Figure 12 illustrates the data-gathering techniques used in research on the effects of cloud computing on SMEs. Surveys and questionnaires are the most utilized methods, with 21 and 37 instances, respectively. The need to collect extensive, quantitative data from a wide sample of SMEs is shown by this trend. Questionnaires and surveys are particularly effective in quantitative research, allowing researchers to collect standardized data on performance metrics like cost savings, operational efficiency, and the challenges associated with cloud adoption. Though less prevalent, case studies with 10 instances and interviews with 6 instances are essential for offering detailed, contextual insights into cases of SMEs adopting cloud computing.

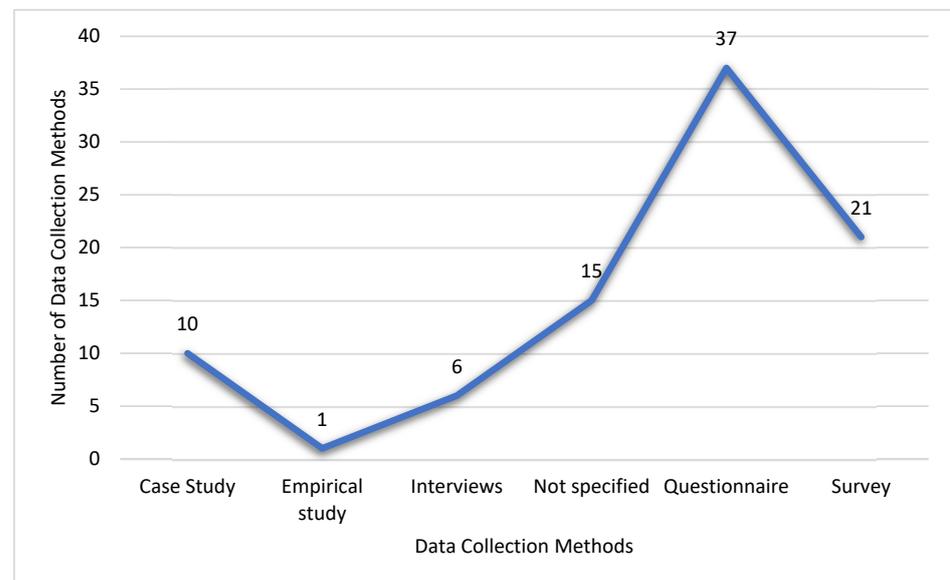


Figure 12. Data Collection Methods.

These techniques are more in line with qualitative research, which aims to investigate the distinct viewpoints and experiences of SMEs. The low frequency of empirical studies (1) suggests that this approach is not as popular in this setting, maybe because conducting controlled trials in actual corporate settings can be difficult. Studies that integrate multiple methodologies or use theoretical approaches without well-defined data collection strategies are probably included in the “not specified” category (15). In general, the prevalence of surveys and questionnaires indicates the field’s emphasis on quantifiable results, although case studies and interviews provide crucial qualitative depth.

3.4. Results of Individual Studies

Figure 13 reveals a significant disparity in the reporting of sample sizes among the studies reviewed on the impact of cloud computing on SMEs. Notably, 38 studies did not specify their sample sizes, which is concerning as it limits the ability to assess the generalizability and reliability of their findings. This lack of transparency can introduce a risk of reporting bias, making it difficult to determine the robustness of the evidence presented in these studies.

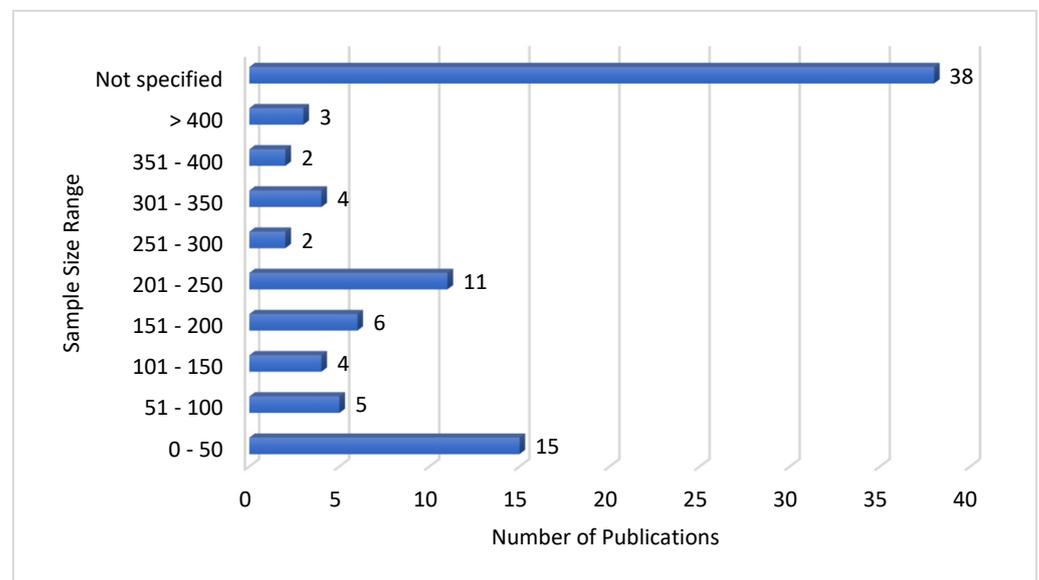


Figure 13. Sample Size Range.

Among the studies that did specify their sample sizes, there is a clear preference for smaller sample sizes, with 15 studies involving 0–50 participants. While small samples may be more feasible in terms of research logistics, they can also limit the statistical power and external validity of the study results. Conversely, only a small number of studies employed large sample sizes, with just three studies exceeding 400 participants. These larger studies are more likely to provide reliable and generalizable findings, but their rarity suggests that such rigorous approaches are not the norm in this research area.

The chart also shows a moderate number of studies with mid-range sample sizes, particularly in the 201–250-participant range (11 studies). These studies likely strike a balance between feasibility and the need for sufficient statistical power. Therefore, the graph indicates a diverse approach to sample size selection, with a substantial proportion of studies at risk of bias due to small or unspecified sample sizes. This variation in sample sizes across the reviewed studies underscores the need for cautious interpretation of the findings in the systematic review.

3.5. Results of Syntheses

Figure 14 shows the data analysis technique distribution of published studies. The most explored configurations include statistical analysis that dominates the chart with 47 instances and about 24 papers did not specify which method was used. These combinations are favored due to their balance of reliability and as evidenced by statistical analysis showing a significant positive correlation between these factors and overall performance metrics. The inclusion of thematic analysis, which consists of three instances that emerge as key factors, highlights its importance in the overall evaluation of performance. The combination of both statistical and thematic analysis contributes about three instances. Less common configurations, such as PLS-SEM, ISM, MICMAC, IBM SPSS, and Smart PLS v3, with one instance each, indicate a growing interest in utilizing or evaluating cloud computing in terms of SME performance.

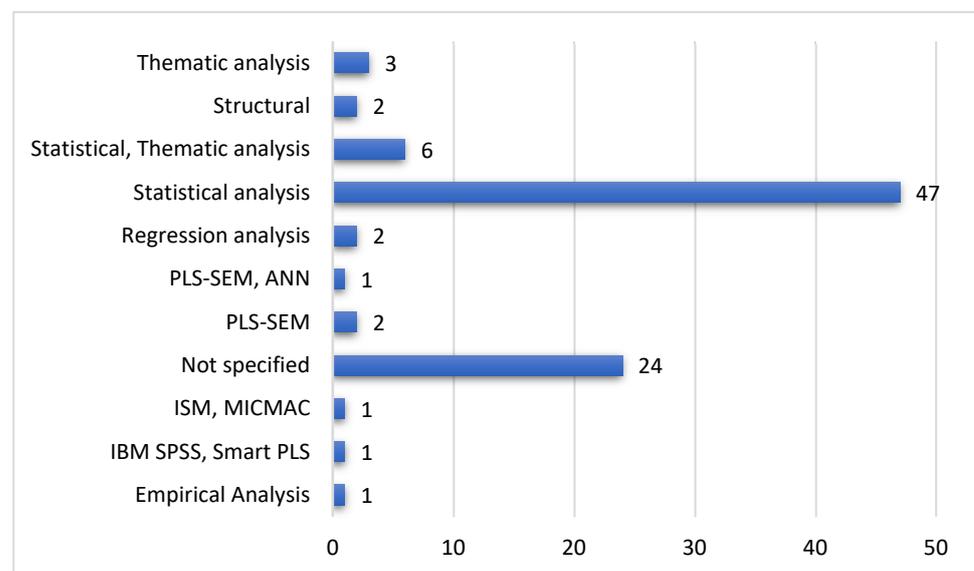


Figure 14. Data Analysis Techniques.

3.6. Reporting Biases

Figure 15 illustrates that quantitative studies predominate research on cloud computing's impact on SMEs, accounting for 44 out of 90 papers collected. This supremacy reflects the necessity for generalizable and measurable data to assess key performance metrics like operational efficiency, cost savings, and revenue growth—factors critical to cloud adoption evaluation. When evaluating the advantages and difficulties of integrating cloud technologies, decision-makers in SMEs can rely on the objective, trustworthy findings produced by quantitative approaches, which are based on statistical analysis of numerical data.

After quantitative research, 25 papers used mixed methodologies and 15 publications used qualitative investigations. By combining the advantages of qualitative and quantitative methods, mixed-method research validates statistical data with contextual insights to provide more thorough knowledge of how cloud computing affects SMEs. Qualitative research offers rich, complicated insights into SMEs' experiences with cloud computing, reflecting the challenges of adoption and execution even though it is less generalizable. The few studies that do not state their methodology are probably exploratory or theoretical in nature.

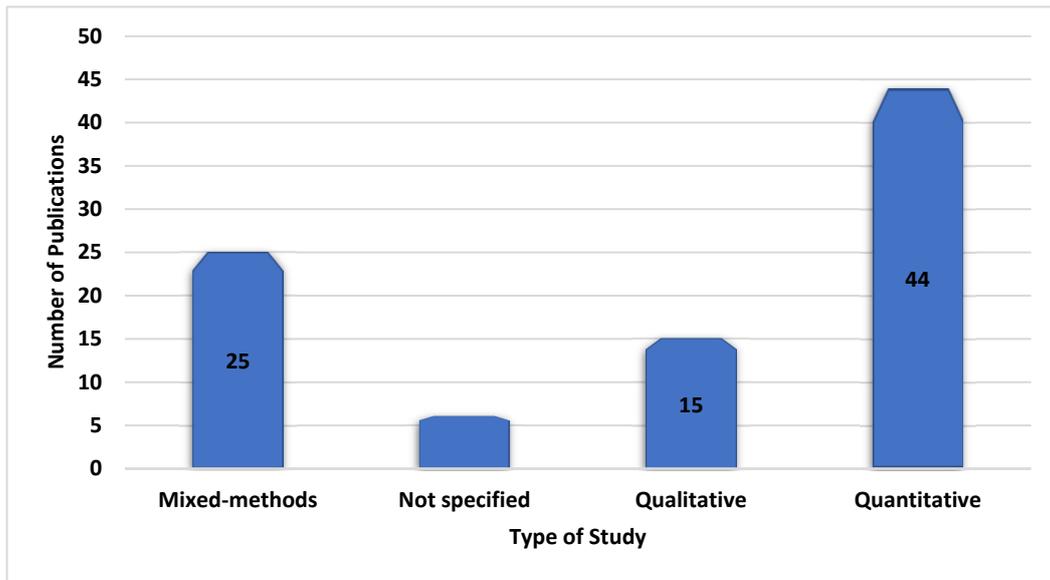


Figure 15. Type of Research Studies.

3.7. Certainty of Evidence

The predominant preference for cloud-based solutions among SMEs, as reflected in Figure 16 consisting of 70 instances, stems from their cost efficiency, scalability, and access to advanced technologies. Cloud-based services offer SMEs a pay-as-you-go model that reduces the need for significant upfront capital investment and allows for flexible resource scaling based on demand. This flexibility is crucial for SMEs with fluctuating needs or growth ambitions. Additionally, cloud solutions alleviate the burden of maintenance and updates, enabling SMEs to focus on their core business activities while benefiting from cutting-edge technologies that might otherwise be too costly or complex to implement independently.

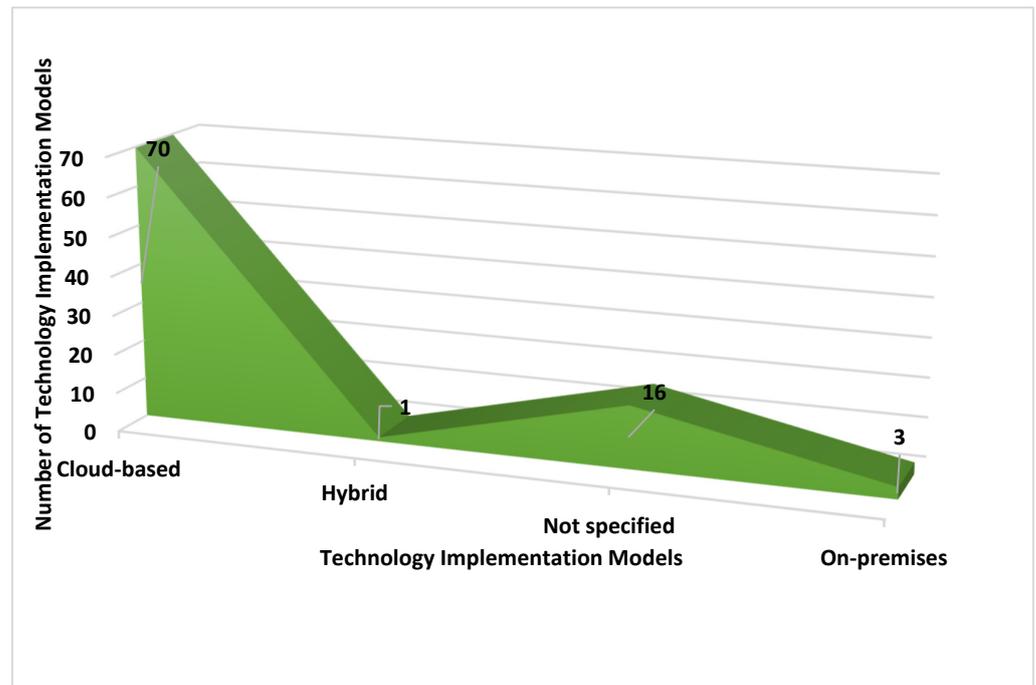


Figure 16. Implementation of Technology Models.

In contrast, the limited representation of hybrid models with an one instance and on-premises models consisting of three instances in the graph highlights their relative rarity among recent evaluations. Hybrid models, which combine on-premises and cloud resources, due to their complexity and potentially higher costs, which may not align with the resource constraints of SMEs, are less common. On-premises solutions are even less favored, mostly because they require more frequent maintenance and a larger initial expenditure, which can be prohibitive for SMEs looking for more flexible and affordable choices. This pattern emphasizes how cloud-based technologies are becoming more and more popular as a beneficial option for improving SME performance.

The distribution of participants in the studies on cloud computing's impact on SMEs reveals a strategic focus on gathering insights from various key stakeholders within these enterprises. This is illustrated in Figure 17, with 64 participants from SMEs themselves, and the research captures a broad spectrum of firsthand experiences regarding the adoption, challenges, and benefits of cloud technologies. IT managers, who account for 10 participants, play a pivotal role in implementing and managing these technologies, making their insights essential for understanding the technical complexities and operational impacts. Employees, although fewer in number with six participants, provide valuable input on how cloud computing affects daily workflows and productivity within SMEs.

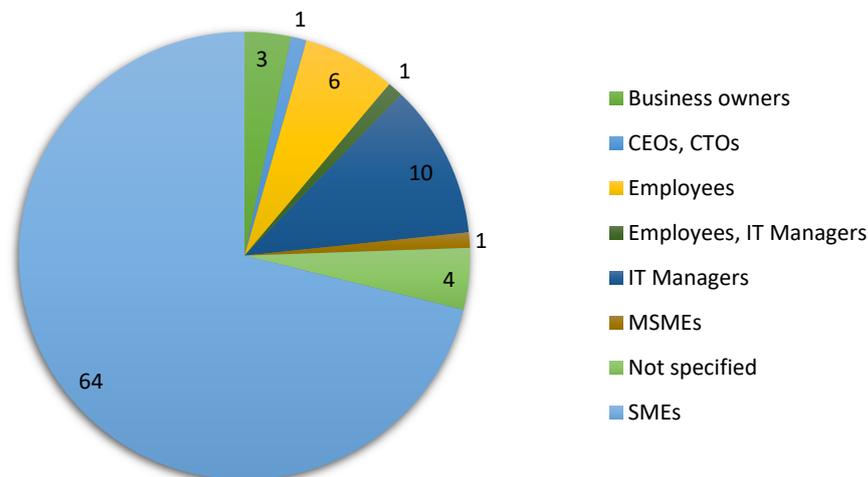


Figure 17. Studies Participants.

Business owners and higher-level executives like CTOs and CEOs, though represented by smaller numbers, offer critical perspectives on the strategic decision-making processes behind cloud adoption. Their involvement sheds light on the motivations for investing in cloud technologies, such as cost savings, competitive advantage, and long-term business sustainability. The inclusion of participants with unspecified roles, along with the varied representation across different organizational levels, ensures that the research offers a comprehensive view of cloud computing's multifaceted impact on SMEs. This holistic approach is crucial in assessing how cloud technologies influence not only the technical and operational aspects but also the strategic direction and overall growth of SMEs.

4. Practical Recommendations

4.1. Key Findings and Strategic Implications for Business Leaders

This section highlights the primary findings of the systematic review and their strategic implications for business leaders in the SME sector. With cloud computing emerging as a transformative technology, it provides SMEs with opportunities to achieve cost savings, scalability, and operational efficiency. However, as the analysis in previous sections sug-

gests, the adoption of cloud technology varies across industries, and the strategic priorities of business leaders should align with specific industry needs, available resources, and anticipated outcomes. This section presents a consolidated view of the opportunities and challenges identified in various industries, as well as the strategic drivers for successful cloud adoption. Table 12 offers a summary of key findings by industry, detailing the strategic implications for business leaders who seek to leverage cloud computing to improve SME performance. The table outlines the opportunities that cloud technology presents in different sectors, such as enhanced agility and cost-effectiveness, alongside the associated challenges like data security and cost management. By aligning these insights with the proposed systematic review, business leaders can better understand the strategic drivers that facilitate cloud adoption, including regulatory alignment, technological readiness, and organizational support. The expected outcomes reflect the potential impact on business performance, positioning cloud computing as a critical enabler for long-term growth and competitive advantage for SMEs.

Table 12. Key Findings and Strategic Implications for Business Leaders.

Industry	Key Finding	Strategic Implications for Business Leaders	Opportunities	Challenges	Relevance to Proposed Systematic Review	Strategic Drivers	Expected Outcome
Manufacturing	Cloud adoption enhances operational efficiency	Focus on automating workflows and inventory management	Increased productivity, cost reduction	Data security, system integration issues	Aligns with operational efficiency improvements	Investment in secure cloud infrastructure	Enhanced operational efficiency
Finance	Cloud-based accounting improves financial management	Leverage cloud for real-time data and decision making	Improved accuracy, streamlined processes	Compliance with financial regulations	Supports financial performance advancements	Regulatory compliance, data accuracy	Improved financial reporting and decision making
ICT	Cloud enables scalability and flexibility	Expand services and support remote work	Cost-effectiveness, resource flexibility	Vendor lock-in, security concerns	Emphasizes scalability and flexibility	Vendor selection, data protection policies	Greater operational flexibility
Retail	Cloud CRM tools improve customer engagement	Utilize CRM for personalized customer service	Enhanced customer insights, better engagement	High initial setup costs, training needs	Highlights customer relationship management impact	Investment in CRM solutions, staff training	Increased customer satisfaction
Healthcare	Cloud computing aids in managing patient data	Use cloud for secure data storage and streamlined operations	Improved data accessibility, enhanced patient care	Regulatory compliance, data privacy concerns	Relevant to data security and operational benefits	Compliance with healthcare data standards	Enhanced patient care and data management
Agriculture	Cloud adoption enhances resource management	Optimize resource allocation and data analytics	Better resource tracking, data-driven decisions	Infrastructure limitations in rural areas	Aligns with operational efficiency and resource use	Investment in cloud-compatible equipment	Improved resource efficiency
Education	Cloud technology supports online learning	Expand digital learning platforms and accessibility	Scalability in education delivery, remote access	Digital divide, initial implementation costs	Supports scalability in digital education	Support for digital transformation	Improved educational reach and accessibility
Hospitality	Cloud supports streamlined booking and customer management	Implement cloud-based booking and CRM solutions	Improved customer experience, streamlined booking	Privacy concerns, system customization challenges	Relevant to customer management and operational flow	Investment in secure cloud-based booking systems	Enhanced customer experience and service delivery

Table 12. Cont.

Industry	Key Finding	Strategic Implications for Business Leaders	Opportunities	Challenges	Relevance to Proposed Systematic Review	Strategic Drivers	Expected Outcome
Logistics	Cloud adoption improves supply chain visibility	Use cloud for real-time tracking and resource optimization	Better supply chain control, cost savings	Data integration with legacy systems	Emphasizes supply chain visibility	Investment in cloud-based logistics solutions	Increased supply chain efficiency
Energy	Cloud technology enables energy monitoring and efficiency	Implement cloud solutions for energy monitoring and predictive maintenance	Improved energy management, cost savings	Technical skill requirements, high initial costs	Relevant to operational efficiency in energy usage	Training in cloud-enabled energy monitoring	Reduced operational costs and energy efficiency

The insights in Table 12 illustrate that cloud computing provides SMEs across industries with opportunities to enhance productivity, improve customer engagement, and streamline operations. The challenges, such as data security, regulatory compliance, and integration with legacy systems, require careful consideration by business leaders. For instance, in sectors like healthcare and finance, ensuring compliance with data regulations is critical (see Table 12). Strategic drivers such as investment in secure infrastructure, staff training, and vendor selection can significantly influence the successful adoption of cloud technology. Expected outcomes include enhanced operational efficiency, customer satisfaction, and financial performance, highlighting the importance of cloud technology as a strategic tool for SMEs in achieving sustainable growth and competitiveness.

4.2. Decision-Making Framework for Implementation

Implementing enterprise social platforms (ESPs) within SMEs requires a structured decision-making framework to ensure alignment with industry-specific needs, strategic objectives, and available resources. Given the unique challenges and opportunities across different industries, this framework guides business leaders through a step-by-step approach, from initial needs analysis to optimization. Each stage of implementation, from selecting the right platform to full integration and ongoing optimization, enables SMEs to harness the full potential of cloud-based ESPs, improving collaboration, communication, and operational efficiency. Table 13 outlines a proposed five-step decision-making framework tailored for key industries, focusing on areas like needs analysis, platform selection, pilot testing, full integration, and optimization. This structured approach ensures that each industry can address its specific needs, leverage strategic drivers, and achieve desired outcomes, all while aligning with the insights derived from the systematic review. This framework serves as a practical guide for leaders, helping them make informed decisions that support both immediate operational improvements and long-term strategic goals.

The decision-making framework in Table 13 outlines a systematic approach to implementing ESPs across various industries. It emphasizes the importance of aligning platform features with industry-specific needs, focusing on strategic drivers like security, compliance, and scalability. Each step, from needs analysis to optimization, provides a foundation for SMEs to address unique operational challenges and leverage ESPs for enhanced efficiency and performance. The structured framework supports ongoing improvements, helping SMEs achieve targeted outcomes such as customer engagement, resource optimization, and cost savings, thus reinforcing the relevance of cloud-based ESPs for sustained business growth.

Table 13. Proposed Decision-Making Framework for Implementing Enterprise Social Platforms (ESPs).

Industry	Step	Framework Focus	Key Features	Strategic Drivers	Expected Outcome	Ties to Proposed Study
Manufacturing	Step 1	Needs Analysis	Identify specific operational needs and collaboration tools	Improved workflow and productivity	Enhanced operational efficiency	Supports operational improvements
	Step 2	Select Platform	Choose an ESP with robust security and integration features	Security, integration capabilities	Secure and flexible collaboration	Enhances operational adaptability
	Step 3	Pilot Testing	Test ESP in a controlled environment with select teams	Initial feedback, workflow adjustments	Refined operational process	Ensures smooth operational transition
	Step 4	Full Integration	Roll out ESP across departments	Workflow automation, data sharing	Organization-wide collaboration	Aligns with systematic review findings
	Step 5	Optimization	Continuously monitor and improve platform use	Performance metrics, feedback loops	Optimized manufacturing workflows	Sustains operational efficiency gains
Finance	Step 1	Needs Analysis	Assess data-handling needs and financial workflow	Secure data, compliance with financial regulations	Enhanced data security and compliance	Supports financial performance advancements
	Step 2	Select Platform	Select ESP with compliance and data security features	Regulatory compliance, data management	Secure financial collaboration	Ensures data integrity and compliance
	Step 3	Pilot Testing	Run pilot with finance teams for controlled testing	Data integrity checks, compliance testing	Safe, compliant integration	Confirms regulatory alignment
	Step 4	Full Integration	Implement ESP across financial departments	Secure transactions, real-time collaboration	Consistent and reliable data access	Aligns with secure operational standards
	Step 5	Optimization	Optimize security settings and compliance protocols	Continuous monitoring, compliance audits	Streamlined financial processes	Ensures long-term compliance and security
ICT	Step 1	Needs Analysis	Define scalability requirements and technical capabilities	Flexibility in scaling resources	Enhanced scalability and flexibility	Emphasizes adaptability and scalability
	Step 2	Select Platform	Choose ESP with customizable features	Customizability, API integration	Flexible and adaptive ESP	Supports agile and scalable solutions
	Step 3	Pilot Testing	Run a pilot focusing on integration and customization	Testing interoperability, scalability	Adapted technical workflows	Validates platform suitability
	Step 4	Full Integration	Implement ESP across technical teams	Streamlined processes, collaborative coding	Enhanced technical collaboration	Aligns with technical performance goals

Table 13. Cont.

Industry	Step	Framework Focus	Key Features	Strategic Drivers	Expected Outcome	Ties to Proposed Study
	Step 5	Optimization	Refine workflows and integration settings	Customization updates, performance tracking	Optimal scalability and workflow efficiency	Sustains flexibility for growth
Retail	Step 1	Needs Analysis	Assess customer engagement and CRM needs	Enhanced customer interaction, CRM tools	Improved customer relationship management	Highlights CRM benefits for customer service
	Step 2	Select Platform	Select ESP with CRM integration and analytics	Customer data, engagement tools	Improved customer insights	Enhances customer satisfaction
	Step 3	Pilot Testing	Pilot ESP with customer service teams	Feedback on CRM, adjustments for user experience	Refined customer engagement strategies	Confirms platform effectiveness
	Step 4	Full Integration	Deploy ESP across all customer-facing departments	Centralized customer data, improved engagement	Consistent customer interaction	Aligns with CRM and customer-focused goals
	Step 5	Optimization	Monitor and enhance CRM and engagement features	Analytics, continuous improvement	Enhanced customer experience	Sustains customer service efficiency
Healthcare	Step 1	Needs Analysis	Determine data privacy and patient management needs	Secure data sharing, patient data management	Improved data security and patient care	Supports secure data management
	Step 2	Select Platform	Choose HIPAA-compliant ESP	Compliance, data protection	Safe and compliant patient data management	Ensures data protection and security
	Step 3	Pilot Testing	Test platform with select healthcare professionals	Compliance verification, user feedback	Refined patient data handling	Validates healthcare-specific requirements
	Step 4	Full Integration	Implement ESP across healthcare departments	Unified patient records, secure communication	Improved patient care management	Aligns with healthcare operational needs
	Step 5	Optimization	Regularly audit security and compliance	Ongoing privacy protection, updates	Sustained patient data security	Maintains healthcare standards
Agriculture	Step 1	Needs Analysis	Identify resource and data management needs	Real-time data for resource management	Optimized resource allocation	Supports operational efficiency in resource use
	Step 2	Select Platform	Select ESP for data analytics and field tracking	Field data management, mobile compatibility	Improved resource tracking	Supports data-driven decision making
	Step 3	Pilot Testing	Run a pilot in selected regions	Testing data collection, resource tracking	Enhanced field management	Confirms platform suitability for agriculture
	Step 4	Full Integration	Deploy ESP across field operations	Centralized resource data, real-time tracking	Improved operational visibility	Aligns with operational management goals

Table 13. Cont.

Industry	Step	Framework Focus	Key Features	Strategic Drivers	Expected Outcome	Ties to Proposed Study
	Step 5	Optimization	Continuously update tracking and analytics features	Performance metrics, mobile updates	Sustained resource optimization	Ensures ongoing efficiency in resource use
Education	Step 1	Needs Analysis	Evaluate online learning and digital resource needs	Enhanced access to digital resources	Improved learning outcomes	Supports scalability and digital learning objectives
	Step 2	Select Platform	Choose ESP with LMS integration	Learning management, resource scalability	Scalable digital education	Aligns with educational goals
	Step 3	Pilot Testing	Test ESP with select educators and students	Feedback on usability, resource access	Refined online learning experience	Validates digital learning tools
	Step 4	Full Integration	Implement ESP in all educational programs	Centralized learning resources, improved access	Consistent learning experiences	Supports educational scalability
	Step 5	Optimization	Monitor student engagement and resource use	Continuous improvement, feedback loops	Enhanced learning accessibility	Sustains educational resource management
Hospitality	Step 1	Needs Analysis	Assess customer service and booking system needs	Improved booking and service management	Enhanced customer experience	Aligns with customer service objectives
	Step 2	Select Platform	Choose ESP with CRM and booking integration	CRM, booking capabilities	Streamlined customer interactions	Supports streamlined customer management
	Step 3	Pilot Testing	Run pilot with customer service teams	Initial feedback on booking and CRM integration	Refined service delivery	Confirms platform suitability for hospitality
	Step 4	Full Integration	Implement ESP across customer service departments	Centralized booking, improved response times	Improved customer engagement	Aligns with customer service excellence
	Step 5	Optimization	Continuously improve booking and CRM features	Performance tracking, customer feedback	Enhanced customer experience	Sustains service delivery efficiency
Logistics	Step 1	Needs Analysis	Identify supply chain visibility and tracking needs	Real-time tracking, improved logistics	Optimized supply chain management	Supports logistics and supply chain visibility
	Step 2	Select Platform	Choose ESP with supply chain integration features	Supply chain management, real-time updates	Improved logistics visibility	Supports logistics optimization
	Step 3	Pilot Testing	Test with select logistics teams	Feedback on tracking and resource allocation	Refined logistics management	Confirms suitability for supply chain efficiency

Table 13. Cont.

Industry	Step	Framework Focus	Key Features	Strategic Drivers	Expected Outcome	Ties to Proposed Study
	Step 4	Full Integration	Implement ESP across supply chain operations	Centralized tracking, streamlined logistics	Enhanced operational flow	Aligns with supply chain goals
	Step 5	Optimization	Optimize tracking and resource allocation features	Continuous tracking, real-time data	Sustained supply chain efficiency	Ensures continuous supply chain improvements
Energy	Step 1	Needs Analysis	Define energy monitoring and efficiency needs	Improved energy tracking and efficiency	Reduced operational costs	Supports energy efficiency objectives
	Step 2	Select Platform	Choose ESP with energy monitoring capabilities	Energy tracking, real-time analytics	Enhanced energy management	Supports energy and cost savings
	Step 3	Pilot Testing	Test ESP with energy monitoring systems	Feedback on energy tracking, efficiency measures	Optimized energy management	Confirms suitability for energy efficiency
	Step 4	Full Integration	Implement ESP for comprehensive energy tracking	Centralized energy data, real-time monitoring	Consistent energy savings	Aligns with energy monitoring goals
	Step 5	Optimization	Continuously enhance energy tracking features	Performance tracking, real-time feedback	Reduced energy costs	Ensures long-term energy efficiency

4.3. Proposed Best Practices for Successful Study Implementation

To ensure successful implementation of cloud-based enterprise social platforms (ESPs) across diverse industries, it is essential for SMEs to adopt best practices that address specific operational challenges, leverage strategic drivers, and maximize expected impacts. These best practices provide a structured approach for SMEs to navigate the complexities associated with cloud adoption, such as data security, scalability, and regulatory compliance, while promoting operational efficiency and long-term growth. Table 14 outlines proposed best practices for various industries, categorized by SME type, operational challenges, strategic drivers, and expected impacts. Each best practice is designed to align with insights from the systematic review, emphasizing industry-specific needs and performance objectives. This comprehensive framework equips business leaders with actionable guidelines for implementing ESPs effectively, thereby enhancing overall SME performance through targeted and strategic measures.

Table 14 provides an organized approach to adopting best practices across industries to address operational challenges, leverage strategic drivers, and achieve desired impacts. Each industry has tailored best practices to help SMEs optimize performance, improve operational efficiency, and enhance customer or patient engagement. These practices align with findings from the systematic review, reinforcing the need for industry-specific strategies to implement ESPs successfully and achieve long-term benefits for SMEs.

Table 14. Proposed Best Practices for Successful Study Implementation.

Industry	Best Practice	SME Type	Operational Challenge	Strategic Drivers	Expected Impact	Ties to Systematic Review Findings
Manufacturing	Standardize data management	Small and medium	Data fragmentation and security	Enhanced data integration and security	Improved data accessibility and security	Aligns with operational efficiency goals
	Adopt workflow automation	Medium	Process inefficiencies	Increased productivity and reduced downtime	Streamlined manufacturing processes	Reinforces benefits of operational automation
	Implement real-time monitoring	Small	Limited process visibility	Enhanced real-time tracking	Improved response to operational changes	Supports continuous monitoring as a performance measure
Finance	Enhance data security protocols	Small and medium	Compliance with regulatory standards	Compliance and data protection	Reduced compliance risk	Aligns with secure financial data management
	Use scalable solutions	Small	Limited resource flexibility	Scalability and cost-efficiency	Cost-effective resource allocation	Emphasizes scalability for cost control
	Regular audits for compliance	Medium	Regulatory and compliance monitoring	Enhanced compliance and data integrity	Ensured regulatory adherence	Reinforces data governance and compliance
ICT	Prioritize customizability	Medium	Rapid technology changes	Flexibility and adaptability	Enhanced adaptability to technological shifts	Supports adaptability to evolving tech needs
	Leverage api integrations	Small	System compatibility issues	Improved interoperability and data flow	Seamless cross-platform collaboration	Aligns with need for integration in cloud-based systems
	Implement scalable cloud resources	Small and medium	Resource scalability	Cost-effective scaling	Optimized resource management	Reinforces scalability benefits for SMEs
Retail	Strengthen CRM processes	Small	Customer relationship management	Improved customer engagement	Enhanced customer satisfaction	Aligns with customer-centric CRM goals
	Utilize Analytics for Insights	Medium	Lack of customer behavior insights	Data-driven decision making	Improved customer targeting	Emphasizes importance of customer data insights
	Optimize inventory management	Small	Stock control and supply chain issues	Streamlined inventory control	Reduced inventory costs	Supports operational efficiency in inventory management
Healthcare	Ensure data privacy compliance	Small and medium	Patient data security and compliance	Data protection and regulatory adherence	Improved patient trust and data safety	Supports healthcare compliance requirements
	Adopt patient-centric platforms	Small	Inconsistent patient record management	Enhanced patient engagement	Improved healthcare delivery	Aligns with need for patient-centered approaches

Table 14. Cont.

Industry	Best Practice	SME Type	Operational Challenge	Strategic Drivers	Expected Impact	Ties to Systematic Review Findings
	Continuous staff training	Medium	Skills gap in digital tool usage	Improved digital literacy	Enhanced service quality	Reinforces training as essential for tech adoption
Agriculture	Adopt real-time data analytics	Small and medium	Limited access to timely data	Improved decision making for resource use	Optimized agricultural yield	Supports resource optimization in agriculture
	Enable mobile access	Small	Field accessibility challenges	Enhanced mobility and data access	Increased operational flexibility	Aligns with need for accessible data in field conditions
	Integrate weather forecasting	Medium	Crop management and risk assessment	Risk mitigation and resource planning	Improved yield and reduced losses	Supports agriculture-specific data usage
Education	Enhance LMS integration	Small and medium	Limited access to learning resources	Improved educational accessibility	Enhanced learning outcomes	Aligns with need for scalable digital education solutions
	Promote digital literacy	Medium	Digital skills gap among educators	Enhanced staff competency in digital tools	Improved educational delivery	Reinforces digital literacy as key for technology adoption
	Standardize online assessments	Small	Inconsistent assessment methods	Uniformity and transparency in evaluations	Improved learning and assessment reliability	Supports consistency in educational outcomes
Hospitality	Strengthen booking integrations	Small	Inefficient booking and scheduling	Improved customer management	Enhanced booking and customer experience	Aligns with customer service goals
	Centralize customer feedback	Medium	Fragmented customer feedback	Enhanced service improvement	Improved customer satisfaction	Supports feedback mechanisms for service enhancement
	Improve digital marketing	Small and medium	Lack of online presence	Enhanced market reach	Increased bookings and customer engagement	Emphasizes importance of digital engagement
Logistics	Enhance supply chain visibility	Small and medium	Limited real-time supply chain tracking	Improved operational oversight	Optimized supply chain management	Reinforces supply chain visibility for operational success
	Use predictive analytics	Medium	Inefficient resource allocation	Improved resource planning	Reduced operational costs	Supports predictive planning in logistics
	Automate order tracking	Small	Manual tracking inefficiencies	Enhanced customer service	Improved order delivery and satisfaction	Aligns with efficiency in operational processes

Table 14. Cont.

Industry	Best Practice	SME Type	Operational Challenge	Strategic Drivers	Expected Impact	Ties to Systematic Review Findings
Energy	Implement energy-monitoring tools	Small and medium	Limited energy tracking	Enhanced resource efficiency	Reduced energy costs	Supports energy-saving practices
	Adopt scalable energy solutions	Small	High energy costs	Cost efficiency and sustainability	Optimized energy usage	Reinforces energy cost management
	Engage in continuous monitoring	Medium	Lack of proactive energy management	Improved operational oversight	Enhanced operational sustainability	Aligns with systematic approach to energy monitoring

4.4. Proposed Metrics and KPIs for Measuring Performance

For SMEs implementing cloud-based enterprise social platforms (ESPs) across various industries, it is essential to establish clear metrics and key performance indicators (KPIs) to measure the effectiveness and impact of these platforms. Metrics provide a structured approach to assess performance, align with strategic objectives, and enable data-driven decision making. Table 15 outlines proposed metrics and KPIs for multiple industries, emphasizing areas like operational efficiency, customer satisfaction, and resource optimization. Each metric is tied to strategic drivers and expected outcomes, ensuring that SMEs can monitor the direct impact of ESPs on business performance.

Table 15. Proposed Metrics and KPIs for Measuring Performance in Various Industries.

Industry	Key Metrics/KPIs	Measurement Focus	Strategic Drivers	Expected Outcome	Ties to Systematic Review Findings	Priority (1 = Highest, 2 = Medium, 3 = Low)
Manufacturing	Production efficiency rate	Operational output per unit time	Increased productivity, process optimization	Improved production flow	Aligns with need for operational efficiency	1
	Downtime reduction	System reliability	Minimized downtime	Enhanced uptime and operational consistency	Supports automation and process reliability goals	1
	Quality control rate	Product defect rate	Consistent quality assurance	Reduced defect rates	Aligns with continuous monitoring benefits	2
Finance	Compliance rate	Adherence to regulations	Compliance and risk management	Reduced regulatory penalties	Reinforces secure and compliant financial practices	1
	Cost savings	Reduction in operational costs	Cost efficiency	Optimized budget allocation	Supports cost-saving objectives in financial operations	2
	Customer retention rate	Customer loyalty and satisfaction	Enhanced client relationships	Improved customer satisfaction	Aligns with customer engagement goals	1

Table 15. Cont.

Industry	Key Metrics/KPIs	Measurement Focus	Strategic Drivers	Expected Outcome	Ties to Systematic Review Findings	Priority (1 = Highest, 2 = Medium, 3 = Low)
ICT	System uptime	System availability	Improved reliability	Minimized disruptions	Emphasizes uptime importance for seamless tech operations	1
	Data integration rate	System interoperability	Improved data flow and accessibility	Enhanced cross-platform functionality	Supports integration needs for efficient cloud services	2
	Adoption rate of new tools	Speed of technology adoption	Innovation and adaptability	Enhanced adaptability to tech advancements	Aligns with adaptability for evolving tech needs	2
Retail	Customer satisfaction score	Customer feedback	Customer engagement	Improved customer experience	Supports customer satisfaction as a core retail metric	1
	Inventory turnover rate	Inventory management	Inventory efficiency	Reduced holding costs	Aligns with inventory control for operational efficiency	1
	Sales conversion rate	Sales performance	Increased sales and revenue	Improved sales growth	Emphasizes sales as a KPI for retail success	2
Healthcare	Patient satisfaction rate	Patient feedback	Patient-centered care	Enhanced healthcare delivery	Supports patient-centric approaches in healthcare	1
	Compliance rate	Regulatory adherence	Data protection and compliance	Improved trust and reduced legal risks	Aligns with healthcare compliance goals	1
	Operational cost efficiency	Cost management	Cost savings	Reduced operational costs	Reinforces need for cost efficiency in healthcare	2
Agriculture	Yield per acre	Crop productivity	Resource optimization	Enhanced agricultural output	Supports yield optimization in agricultural practices	1
	Water usage efficiency	Resource consumption	Sustainable resource management	Reduced water usage	Aligns with sustainability goals in agriculture	1
	Supply chain reliability	Timely delivery and input supply	Improved supply chain integration	Consistent supply and reduced disruptions	Reinforces importance of reliable supply chain	2
Education	Student engagement rate	Student participation	Enhanced learning experience	Improved educational outcomes	Aligns with digital engagement goals in education	1
	Assessment consistency	Standardized grading	Uniformity and transparency	Reliable academic evaluations	Supports consistency in educational assessments	2

Table 15. *Cont.*

Industry	Key Metrics/KPIs	Measurement Focus	Strategic Drivers	Expected Outcome	Ties to Systematic Review Findings	Priority (1 = Highest, 2 = Medium, 3 = Low)
	Faculty adoption rate	Use of digital tools by educators	Digital literacy and competency	Enhanced learning delivery	Emphasizes need for digital literacy in education	2
Hospitality	Booking completion rate	Booking process efficiency	Customer engagement	Increased successful bookings	Aligns with booking optimization in customer service	1
	Customer feedback score	Customer satisfaction	Improved service quality	Enhanced customer retention	Supports customer satisfaction metrics	1
	Digital engagement rate	Online presence	Market reach	Increased customer reach	Emphasizes importance of digital presence	2
Logistics	On-time delivery rate	Delivery punctuality	Improved logistics performance	Enhanced customer satisfaction	Aligns with timely delivery for customer satisfaction	1
	Order accuracy rate	Order fulfillment	Operational consistency	Reduced order errors	Supports accuracy as a metric for logistics effectiveness	1
	Resource allocation efficiency	Resource usage	Optimal resource management	Reduced operational costs	Emphasizes efficient resource allocation	2
Energy	Energy consumption rate	Energy usage monitoring	Cost efficiency and sustainability	Reduced energy expenses	Supports energy cost management	1
	Carbon emission reduction	Environmental impact	Sustainability	Lower carbon footprint	Aligns with sustainable energy goals	2
	System reliability rate	Energy infrastructure resilience	Operational continuity	Enhanced system resilience	Reinforces infrastructure reliability	2

Table 15 highlights the essential metrics and KPIs that SMEs across various industries can use to measure performance and impact when implementing ESPs. Each metric is strategically aligned with key drivers such as cost savings, compliance, and customer satisfaction to achieve targeted outcomes. By prioritizing metrics like production efficiency, compliance rates, and customer satisfaction, SMEs can better track the effectiveness of cloud-based solutions and refine their approaches to enhance operational performance and achieve sustained growth.

4.5. Real-World Case Studies Related to Proposed Systematic Review

In this section, real-world examples of cloud computing adoption by SMEs across different industries illustrate the practical outcomes and challenges of cloud implementation. These case studies highlight the measurable impacts of cloud solutions, such as cost savings, operational efficiencies, and scalability improvements, which directly align with the core themes in the systematic review. Each case study offers insights into specific industry adaptations, implementation challenges, and outcomes that can guide SMEs in

developing informed cloud strategies. As seen in Table 16, these case studies from the retail, finance, healthcare, manufacturing, and government sectors provide strong evidence of cloud computing's benefits across industries.

Table 16. Real Case Studies from Various Industries and Their Outcomes.

Industry	Case Study	Implementation	Outcome	Reference
Retail	CarMax's digital transformation	Migrated to a cloud-based solution to modernize its IT infrastructure for improved customer service	Enhanced agility and customer experience through streamlined operations	https://www2.deloitte.com/us/en/pages/consulting/articles/cloud-computing-case-studies.html (accessed on 20 September 2024)
Finance	Insurance company cloud platform modernization	Transitioned to Microsoft Azure to streamline financial operations and improve customer interactions	Reduced operational costs and improved real-time analytics for better decision making	https://www.cloudwards.net/cloud-computing-examples/ (accessed on 20 September 2024)
Healthcare	Israeli hospital's cloud expansion	Expanded cloud infrastructure for better data management and service efficiency	Increased accessibility of patient records and enhanced scalability in handling healthcare data	https://www2.deloitte.com/us/en/pages/consulting/articles/cloud-computing-case-studies.html (accessed on 20 September 2024)
Manufacturing	Large utility provider's digital unification	Integrated digital systems via Microsoft's cloud to improve operational efficiency	Improved scalability and unified infrastructure, enhancing asset monitoring and management	https://www.cloudwards.net/cloud-computing-examples/ (accessed on 20 September 2024)
Government	Utah State Government cloud modernization	Moved critical applications from legacy systems to cloud infrastructure	Significant reduction in maintenance costs and improved flexibility in managing government services	https://www2.deloitte.com/us/en/pages/consulting/articles/cloud-computing-case-studies.html (accessed on 20 September 2024)

By migrating to cloud platforms, these organizations achieved key outcomes such as operational efficiency, enhanced customer experiences, and improved data accessibility, aligning with the systematic review's findings on the strategic advantages of cloud computing for SMEs. Each case demonstrates how cloud solutions drive positive business outcomes, supporting SMEs in achieving scalability and cost-efficiency in their operations. These cases reinforce the systematic review's focus on cloud adoption as a transformational strategy for SMEs, particularly in areas requiring agility and resource management improvements. For more details, readers may refer to sources such as Deloitte's case studies on cloud implementations and examples from Cloudwards that show the versatility of cloud solutions across industries.

4.6. Strategic Prioritization and Factor Relevance by Industry

This section provides a breakdown of the critical factors influencing cloud computing adoption, tailored to specific industries such as manufacturing, ICT, finance, and retail. These factors are categorized by priority, reflecting their strategic importance for each industry. By addressing these priorities, SMEs in each sector can adopt cloud solutions effectively, optimize resource use, and enhance competitive advantage. The proposed industry-specific prioritization of factors for cloud computing adoption in SMEs is tabulated in Table 17.

Table 17. Proposed Industry-Specific Prioritization of Factors for Cloud Computing Adoption in SMEs.

Industry	Priority Level	Factor	Strategic Importance	Recommended Actions	Expected Outcome
Manufacturing	High	Relative advantage	Improves production efficiency and cost savings through scalable resources.	Implement cloud-based ERP systems for real-time data access and process management.	Reduced operational costs and enhanced productivity.
	High	Service quality	Ensures stable operations and minimizes downtime in manufacturing workflows.	Partner with cloud providers offering high uptime guarantees and technical support.	Improved reliability and uninterrupted production processes.
	Medium	Top management support	Facilitates resource allocation and strategic alignment.	Engage top executives in the adoption strategy to secure funding.	Accelerated implementation and reduced resistance.
	Low	Computer self-efficacy	Enhances worker proficiency in using new systems.	Conduct training programs on cloud-based production tools.	Increased user adoption and operational accuracy.
ICT	High	Service quality	Essential for service delivery and customer satisfaction in tech-focused sectors.	Select providers with robust SLAs and support channels.	Higher service reliability and customer retention.
	High	Relative advantage	Provides a competitive edge by enabling scalability and innovation.	Use cloud for scalability in software deployment and customer services.	Enhanced agility in meeting customer demands.
	Medium	Facilitating conditions	Ensures technical readiness for seamless integration.	Invest in high-speed internet and compatible hardware.	Reduced integration issues and downtime.
	Low	Perceived risks	Focuses on addressing cybersecurity and data privacy concerns.	Develop clear data management and security protocols.	Increased client trust and data compliance.
Finance	High	Perceived risks	Critical for protecting sensitive financial data and ensuring compliance.	Implement encryption, access control, and regular audits.	Enhanced data security and regulatory compliance.
	High	Top management support	Ensures regulatory and operational alignment for cloud adoption.	Secure executive support for funding and policy alignment.	Reduced implementation delays and enhanced compliance.
	Medium	Service quality	Necessary for maintaining uptime and accessibility of financial services.	Choose cloud providers with proven uptime and financial sector expertise.	Improved client access to financial services.
	Low	Computer self-efficacy	Enhances staff confidence in using cloud-based financial tools.	Provide targeted training on cloud tools for finance.	Increased efficiency in financial operations.
Retail	High	Relative advantage	Improves inventory management, sales tracking, and customer insights.	Use cloud-based POS and CRM systems to integrate sales data.	Better inventory control and customer targeting.

Table 17. Cont.

Industry	Priority Level	Factor	Strategic Importance	Recommended Actions	Expected Outcome
	High	Service quality	Ensures smooth transaction processes and customer satisfaction.	Partner with providers offering fast and reliable transaction services.	Reduced transaction failures and improved customer experience.
	Medium	Facilitating conditions	Prepares retail businesses for adopting cloud-based sales systems.	Ensure robust network infrastructure for online transactions.	Enhanced system integration and transaction speed.
	Low	Top management support	Aligns business goals with cloud-based retail solutions.	Secure buy-in from top-level managers for resource allocation.	Improved strategic alignment and funding for adoption.

The table illustrates industry-specific prioritization for adopting cloud computing, with factors tailored to address unique challenges and strategic needs within each sector. For example, in manufacturing and retail, relative advantage and service quality are critical for operational efficiency and customer satisfaction, whereas, in finance, perceived risks takes priority to ensure data security and compliance. Across all industries, lower-priority factors such as computer self-efficacy or top management support focus on organizational alignment and user proficiency, which, while essential, are more adaptable based on the firm's specific needs. This prioritization approach enables SMEs to concentrate on the most impactful elements of cloud adoption, thus enhancing performance outcomes and ensuring a smoother transition to cloud-based systems.

4.7. Proposed Roadmap for SMEs and Policy Recommendations

This section outlines a strategic roadmap tailored for SMEs to successfully adopt cloud computing and optimize their operational efficiency. By addressing critical steps, aligning with policy frameworks, and assigning responsible stakeholders, this roadmap ensures SMEs can systematically approach cloud adoption while adhering to relevant policy guidance. Each industry roadmap specifies the optimal timeframe, estimated duration, and champions across various organizational roles to lead the efforts. The roadmap's focus aligns with the systematic review's insights into cloud adoption benefits and implementation challenges for SMEs. As shown in Table 18, this proposed roadmap provides a strategic guide for each industry to undertake cloud computing implementation, taking into account critical policy frameworks such as the Digital Strategy for Retail SMEs and the Health Data Privacy Act (HDPa).

The roadmap includes assigned timelines and champion roles to ensure accountability across sectors. For instance, in retail, the chief information officer (CIO) is tasked with leading a three-month needs assessment starting in Q1 of the year. By contrast, healthcare data migration efforts are estimated to span nine months under the guidance of the data manager, reflecting the importance of data privacy and compliance.

Table 18. Proposed Roadmap for SMEs and Policy Recommendations Linked to Policy Frameworks.

Industry	Roadmap Focus	Policy Framework	Strategic Link	Strategic Drivers	Expected Outcome	Ties to Proposed Study	When to Undertake	Estimated Duration	Champion/Role
Retail	Initial needs assessment	Digital Strategy for Retail SMEs	Aligns digital adoption with retail expansion	Operational efficiency	Enhanced business agility	Highlights importance of tech for retail	Q1 202x	3 months	CIO/CTO
Finance	Cloud infrastructure setup	Financial Data Compliance (FDC)	Supports secure data handling	Data security and integrity	Improved client data security	Matches security focus for finance	Q2 202x	6 months	IT security lead
Healthcare	Data migration and storage optimization	Health Data Privacy Act (HDPA)	Ensures compliance with patient data regulations	Privacy, compliance	Streamlined patient record access	Aligns with cloud storage efficiency	Q3 202x	9 months	Data manager
Manufacturing	Digital twin implementation	Industry 4.0 Framework	Advances digital transformation	Efficiency, automation	Enhanced production monitoring	Demonstrates impact of digital twins	Q4 202x	1 year	Operations manager
Government	Cloud-based service modernization	National IT Modernization Policy	Facilitates secure and flexible public services	Public service efficiency	Reduced operational costs for public services	Validates efficiency benefits for government	Q1 202x	18 months	Government IT officer

5. Discussion

This discussion section aims to address each of the research questions presented in this study by analyzing findings from the systematic review and proposed practical recommendations for SMEs. The findings, synthesized from 90 studies, offer a comprehensive view of cloud computing's impact on SMEs across diverse industries, focusing on performance improvements, strategic benefits, and operational challenges. Each research question will be discussed separately to ensure clarity and depth in interpreting the results.

5.1. *Why Should SMEs Make Use of Cloud Computing to Perform Their Business Functions?*

The systematic review findings underscore that cloud computing offers significant strategic advantages for SMEs, primarily by enhancing cost-efficiency, scalability, and access to advanced IT resources. Approximately 82% of the studies reviewed highlighted operational efficiency as a core benefit of cloud adoption for SMEs. This benefit is particularly crucial for SMEs, as they typically have limited resources compared to larger enterprises. Cloud services, such as infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS), allow SMEs to use enterprise-grade technology on a pay-as-you-go basis, eliminating the need for large upfront investments. The proposed practical recommendations support these findings by advocating for a structured approach to cloud adoption, with SMEs prioritizing needs assessment and strategic planning as critical steps. This ensures that cloud solutions align with their business goals and operational requirements. Moreover, policy frameworks like Digital Strategy for Retail SMEs and the Health Data Privacy Act (HDPa) were identified to provide guidance in regulated sectors such as finance and healthcare. These strategic drivers aim to maximize the operational benefits of cloud computing, enabling SMEs to remain competitive and agile (see Table 18 in the Proposed Roadmap for SMEs and Policy Recommendations section).

5.2. *What Potential and Future Expectations Do Cloud Computing Services Present for SMEs?*

The review reveals that cloud computing holds transformative potential for SMEs, with expectations centered around innovation, digital transformation, and enhanced market competitiveness. Approximately 75% of the studies predict that cloud adoption will drive future improvements in business agility, decision making, and customer engagement. As more businesses transition to digital models, cloud services enable SMEs to leverage tools like data analytics and machine learning, which were traditionally inaccessible to smaller organizations due to cost constraints. This aligns with the proposed roadmap and best practices, where the focus on strategic drivers like agility and real-time analytics supports long-term business growth. For instance, in healthcare, cloud adoption facilitates efficient data management, enabling faster decision making and better patient outcomes. In the Proposed Decision-Making Framework for Implementing Enterprise Social Platforms (ESPs) (Table 13), a structured approach was suggested for SMEs to achieve scalability and improve customer relations through enhanced digital tools, demonstrating the future-oriented benefits cloud computing offers to small businesses.

5.3. *What Is the Impact of Utilizing Cloud Computing Services on the Business Performance of SMEs?*

Cloud computing positively impacts SME performance, with approximately 78% of studies documenting improvements in operational efficiency, cost savings, and productivity. Notably, cloud adoption allows SMEs to streamline workflows, reduce energy and maintenance costs, and scale IT resources to match business needs. In industries like manufacturing and retail, cloud solutions have led to tangible improvements in production monitoring, inventory management, and customer service. The Key Findings and Strategic Implications for Business Leaders (Table 12) further support these outcomes by illustrat-

ing how cloud computing can enhance business performance across various operational metrics. For instance, the retail sector benefits from cloud-based customer relationship management (CRM) systems, enabling businesses to deliver personalized services and improve customer retention. Additionally, the Proposed Metrics and KPIs for Measuring Performance in Various Industries (Table 15) emphasize key performance indicators like cost efficiency and uptime, underscoring the direct link between cloud adoption and business performance improvements for SMEs.

5.4. What Are the Costs Involved in Using Cloud Computing Technology, and How Does It Affect a Company's Budget?

While cloud computing is associated with cost savings, the review highlights that 52% of studies emphasize the importance of managing operational expenditures (OPEX) associated with cloud services. The pay-as-you-go model helps SMEs avoid capital expenditures (CAPEX), but ongoing subscription costs, data migration, and training expenses can still impact budgets. For instance, unexpected costs related to downtime or security measures were noted as potential budgetary challenges, particularly for SMEs with limited financial resources. The Proposed Best Practices for Successful Study Implementation (Table 14) recommend that SMEs conduct a thorough needs assessment and budget analysis before adopting cloud solutions. Strategic drivers like cost management and risk assessment were identified as crucial for ensuring financial sustainability. These best practices align with the systematic review findings, highlighting that, while cloud computing reduces CAPEX, effective cost management remains essential for SMEs to maximize the financial benefits of cloud technology.

5.5. What Business Operations Are Affected by the Adaptation of Cloud Computing, and What Are the Most Impacted Business Operations?

The review identifies several critical business operations that benefit from cloud adoption, with 62% of studies highlighting impacts on data management, customer service, and supply chain operations. Cloud platforms enable SMEs to centralize data, enhance data security, and facilitate remote collaboration. In sectors like finance and ICT, cloud-based CRM systems allow for more personalized and responsive customer service, while in manufacturing, cloud technologies improve supply chain transparency and inventory control. The Proposed Metrics and KPIs for Measuring Performance in Various Industries (Table 15) include indicators such as customer satisfaction, process efficiency, and data security to evaluate the impact of cloud computing on these operations. Strategic recommendations suggest SMEs prioritize cloud tools that align with their operational needs, such as data storage solutions for healthcare or ERP systems for manufacturing. This alignment between cloud services and specific business processes ensures that SMEs can fully leverage the transformative potential of cloud computing in their day-to-day operations.

6. Conclusions

This systematic review aimed to comprehensively evaluate the impact of cloud computing adoption on the performance of small and medium-sized enterprises (SMEs) by examining existing literature from 2014 to 2024. The study investigated five core research questions to determine the rationale behind cloud adoption, future potential, business performance impacts, associated costs, and the specific business operations most influenced by this technology. The findings demonstrate that cloud computing offers transformative benefits for SMEs by enhancing cost-efficiency, scalability, and access to advanced technological resources, aligning with the primary needs of small businesses with limited budgets and IT resources. The review identified key operational improvements, particularly in data management, customer relationship management, and supply chain operations, which

are crucial for maintaining competitiveness in rapidly evolving markets. Approximately 82% of studies noted operational efficiency gains, underscoring cloud computing's role as a catalyst for performance optimization. Although cloud computing's pay-as-you-go model helps SMEs reduce upfront IT costs, several studies highlighted the challenges in managing ongoing operational expenditures, as unexpected costs can strain smaller budgets. Security remains a top concern, with 68% of reviewed studies indicating that data protection and privacy issues pose significant barriers to cloud adoption. SMEs often lack the in-house expertise required to manage cloud security effectively, leading to reliance on cloud providers for secure and compliant solutions. The potential for data breaches and compliance risks, especially in heavily regulated industries, calls for tailored policies that can support SMEs in achieving secure cloud adoption without prohibitive costs. Despite the breadth of research available, several limitations were identified. Many studies exhibited geographic or industry-specific constraints, limiting the generalizability of findings across diverse global contexts. Additionally, the predominance of quantitative approaches in the reviewed literature leaves a gap in qualitative insights into SME-specific challenges and cultural factors impacting cloud adoption. This limitation indicates the need for more longitudinal studies to capture the long-term impact of cloud technologies on SME performance. Future studies should focus on bridging these gaps by conducting cross-regional comparative analyses and incorporating qualitative methods to understand the contextual factors influencing cloud adoption. Furthermore, as emerging technologies like artificial intelligence and IoT become integrated with cloud services, there is a need to explore their combined impact on SME innovation and operational efficiency. Research could also examine the effects of evolving regulatory policies on cloud computing in SMEs, especially in sectors where data privacy and security are critical.

This systematic review provides a structured understanding of how cloud computing can drive substantial benefits for SMEs, addressing both operational and strategic needs. By adopting a roadmap for implementation, best practices, and performance metrics tailored to specific industries, SMEs can maximize the benefits of cloud computing while managing associated challenges. Policymakers should support these initiatives by establishing frameworks that encourage cloud adoption and mitigate cost or security concerns for small businesses. Ultimately, cloud computing stands as a pivotal tool for enabling SMEs to compete, innovate, and grow in an increasingly digital economy, underscoring the importance of continued research and tailored support to enhance its impact in this sector.

Author Contributions: A.M., K.D.M. and M.T. conceptualized, carried out the data collection and investigations, and wrote and prepared the article under supervision of B.A.T. B.A.T. was responsible for conceptualization, reviewing, and editing the article. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: The authors would like to thank all researchers included in our systematic review for their contribution to this area of research.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Abubakar, A. D., Bass, J. M., & Allison, I. (2014). Cloud computing: Adoption issues for Sub-Saharan African SMEs. *The Electronic Journal of Information Systems in Developing Countries*, 62(1), 1–17. [CrossRef]
- Ahmad, N., Liu, Z., Wu, J., Alam, F., Waqas, M., & Yi, X. (2023). Examining the employees' behavior control in cloud computing performance through the moderating lenses of transformational leadership. In *Wuhan international conference on E-business* (pp. 285–297). Lecture Notes in Business Information Processing. Springer Nature Switzerland. [CrossRef]
- Alhammadi, A., Stanier, C., & Eardley, A. (2015). *The determinants of cloud computing adoption in Saudi Arabia*. Staffordshire University Repository. Available online: <https://eprints.staffs.ac.uk/2774/> (accessed on 30 October 2024).
- Alkaws, G. A., Mahmood, A. K., & Baashar, Y. M. (2015, May 19–20). *Factors influencing the adoption of cloud computing in SMEs: A systematic review*. 2015 International Symposium on Mathematical Sciences and Computing Research (iSMSC), Perak, Malaysia. [CrossRef]
- Al-Mutawa, B., & Al Mubarak, M. S. (2024). Impact of cloud computing as a digital technology on SMEs' sustainability. *Competitiveness Review*, 34(1), 72–91. [CrossRef]
- Alouane, M., & El Bakkali, H. (2015, June 2–4). *Security, privacy, and trust in cloud computing: A comparative study*. 2015 International Conference on Cloud Technologies and Applications (CloudTech), Marrakech, Morocco. [CrossRef]
- Alrababah, Z. (2023). Barriers to cloud computing adoption among SMEs in the Middle East: A systematic review. *Journal of Theoretical and Applied Information Technology*, 101(17), 1–10.
- Al-Sharafi, M. A., Arshah, R. A., Abu-Shanab, E. A., & Alajmi, Q. (2019, March 24–27). *The effect of sustained use of cloud-based business services on organizations' performance: Evidence from SMEs in Malaysia*. 2019 5th International Conference on Information Management (ICIM), Cambridge, UK. [CrossRef]
- Al-Sharafi, M. A., Iranmanesh, M., Al-Emran, M., Alzahrani, A. I., Herzallah, F., & Jamil, N. (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. [CrossRef]
- Amini, M. (2014). *The factors that influence on adoption of cloud computing for small and medium enterprises*. SSRN. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2635479 (accessed on 14 May 2025).
- Asad, M., Sulaiman, B. A., Awain, A. M. S. B., Alsoud, M., Allam, Z., & Asif, M. U. (2024). Green entrepreneurial leadership and performance of entrepreneurial firms: Does green product innovation mediate? *Cogent Business & Management*, 11(1), 2355685. [CrossRef]
- Assante, D., Castro, M., Hamburg, I., & Martin, S. (2016). The use of cloud computing in SMEs. *Procedia Computer Science*, 83, 1207–1212. [CrossRef]
- Badie, N., Hussin, A. R. C., & Lashkari, A. H. (2015). Cloud computing data center adoption factors validity by fuzzy AHP. *International Journal of Computational Intelligence Systems*, 8(5), 854–873. [CrossRef]
- Bajenaru, A. (2021). Software-as-a-service and cloud computing: A solution for small and medium-sized companies. In *Bulletin of the Transilvania University of Brasov. Series V: Economic sciences* (pp. 173–184). Available online: https://webbut.unitbv.ro/index.php/Series_V/article/view/7055 (accessed on 30 October 2024).
- Bhat, J. (2013). *Adoption of cloud computing by SMEs in India: A study of the institutional factors*. AMCIS 2013 proceedings. Available online: https://web.archive.org/web/20200318075740id_/https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1884&context=amcis2013 (accessed on 30 October 2024).
- Chabalala, K., Boyana, S., Kolisi, L., Thango, B. A., & Matshaka, L. (2024). Digital technologies and channels for competitive advantage in SMEs: A systematic review. *Preprints, 2024*, 2024100020. [CrossRef]
- Chen, M., Wang, H., Liang, Y., & Zhang, G. (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. [CrossRef]
- Dincă, V. M., Dima, A. M., & Rozsa, Z. (2019). Determinants of cloud computing adoption by Romanian SMEs in the digital economy. *Journal of Business Economics and Management*, 20(4), 798–820. [CrossRef]
- Doherty, E., Carcary, M., & Conway, G. (2015). Migrating to the cloud: Examining the drivers and barriers to adoption of cloud computing by SMEs in Ireland. *Journal of Small Business and Enterprise Development*, 22(3), 512–527. [CrossRef]
- Durao, F., Carvalho, J. F. S., Fonseca, A., & Garcia, V. C. (2014). A systematic review on cloud computing. *The Journal of Supercomputing*, 68(3), 1321–1346. [CrossRef]
- El-Gazzar, R. F. (2014). A literature review on cloud computing adoption issues in enterprises. In M. Helfert, B. Donnellan, & J. Kenneally (Eds.), *Creating value for all through IT* (pp. 214–242). Springer. [CrossRef]
- Fakieh, B., Blount, D. Y., & Busch, D. P. (2014, December 8–10). *Success in the digital economy: Cloud computing, SMEs, and the impact on national productivity*. 25th Australasian Conference on Information Systems, Auckland, New Zealand.
- Fen, L. X., & Ping, T. A. (2024, February 28–29). *Cloud computing adoption among Malaysian SMEs manufacturers: The role of relative advantage, complexity, and cybersecurity readiness*. 2024 2nd International Conference on Software Engineering and Information Technology (ICoSEIT) (pp. 336–341), Bandung, Indonesia. [CrossRef]

- Gamache, S., Abdul-Nour, G., & Baril, C. (2020). Evaluation of the influence parameters of Industry 4.0 and their impact on the Quebec manufacturing SMEs: The first findings. *Cogent Business & Management*, 7(1), 1771818. [CrossRef]
- Gong, C., Liu, J., Zhang, Q., Chen, H., & Gong, Z. (2010, September 13–16). *The characteristics of cloud computing*. 2010 39th International Conference on Parallel Processing Workshops, San Diego, CA, USA. [CrossRef]
- Gupta, S., & Misra, S. C. (2016). Moderating effect of compliance, network, and security on the critical success factors in the implementation of cloud ERP. *IEEE Transactions on Cloud Computing*, 4(4), 440–451. [CrossRef]
- Gutierrez, A., Boukrami, E., & Lumsden, R. (2015). Technological, organizational, and environmental factors influencing managers' decisions to adopt cloud computing in the UK. *Journal of Enterprise Information Management*, 28(6), 788–807. [CrossRef]
- Hamada, M., Lobiyal, D. K., & Yamin, M. (2015). *Tamil Nadu (INDIA) AI and innovative learning technologies* (Vol. 7, Issue 1). Available online: <http://bvicam.in/INDIACom/BJIT/downloads/BJIT%20-%20Complete%20Issue%2013.pdf#page=71> (accessed on 30 October 2024).
- Hartono, I. K., Inayatulloh, & Alianto, H. (2020, August 13–14). *Improving SMEs' knowledge and performance with a cloud computing CSF approach: Systematic literature review*. 2020 International Conference on Information Management and Technology (ICIMTech), Bandung, Indonesia. [CrossRef]
- Hasan, L., Zgair, L., Ngotoye, A., Hussain, H., Najmuldeen, C., & Hasan, M. (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*, 2, 842–848.
- Hassan, H. (2017). Organizational factors affecting cloud computing adoption in small and medium enterprises (SMEs) in the service sector. *Procedia Computer Science*, 121, 976–981. [CrossRef]
- Hassan, H., Mohd, K., & Adon, I. (2017). *Factors influencing cloud computing adoption in small medium enterprises*. UUM Repository. Available online: <https://repo.uum.edu.my/id/eprint/29508> (accessed on 30 October 2024).
- Hendri, A. S., & Sudarmilah, E. (2024, June 6–7). *Unraveling evolution and trends of information technology adoption in SMEs: A systematic review*. 2024 International Conference on Smart Computing, IoT and Machine Learning (SIML), Surakarta, Indonesia. [CrossRef]
- Hosseini, S., Fallon, G., Weerakkody, V., & Sivarajah, U. (2019). Cloud computing utilization and mitigation of informational and marketing barriers for SMEs from emerging markets: Evidence from Iran and Turkey. *International Journal of Information Management*, 46, 54–69. [CrossRef]
- Huo, Y., Xiong, J., You, Q., Guo, Z., & Xiang, H. (2021). A personalized method of cloud manufacturing service customization. *International Journal of Computer Integrated Manufacturing*, 34(4), 440–454. [CrossRef]
- Hussain, A., Shahzad, A., & Hassan, R. (2020). Organizational and environmental factors with the mediating role of e-commerce and SME performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 196. [CrossRef]
- Kanaan, O., Alsoud, M., Asad, M., TaAmnha, M., & Al-Qudah, S. (2024). A mediated moderated analysis of knowledge management and stakeholder relationships between open innovation and performance of entrepreneurial firms. *Uncertain Supply Chain Management*, 12(4), 2383–2398. [CrossRef]
- Kaplançali, U. T., & Akyol, M. (2021). Analysis of cloud computing usage on performance: The case of Turkish SMEs. *Proceedings*, 74(1), 11. [CrossRef]
- Kariyawasam, A. H. N. (2019). Analyzing the impact of cloud-based accounting on business performance of SMEs. *The Business & Management Review*, 10(4), 37–44.
- Kgakatsi, M., Galeboe, O., Molelekwa, K., & Thango, B. (2024). The impact of big data on SME performance: A systematic review. *Preprints, 2024*, 2024090985. [CrossRef]
- Khanyi, M., Xaba, S., Mlotshwa, N., Thango, B., & Matshaka, L. (2024). The role of data networks and APIs in enhancing operational efficiency in SMEs: A systematic review. *Preprints, 2024*, 2024100848. [CrossRef]
- Khayer, A., Jahan, N., Hossain, M. N., & Hossain, M. Y. (2020a). 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. [CrossRef]
- Khayer, A., Talukder, M. S., Bao, Y., & Hossain, M. N. (2020b). Cloud computing adoption and its impact on SMEs' performance for cloud-supported operations: A dual-stage analytical approach. *Technology in Society*, 60(1), 101225. [CrossRef]
- Kshetri, N. (2011). Cloud computing in the global South: Drivers, effects, and policy measures. *Third World Quarterly*, 32(6), 997–1014. [CrossRef]
- Kumar, D., Samalia, H. V., & Verma, P. (2017). Factors influencing cloud computing adoption by small and medium-sized enterprises (SMEs) in India. *Pacific Asia Journal of the Association for Information Systems*, 9(3), 25–48. [CrossRef]
- Lawan, M. M., Oduoza, C., & Buckley, K. (2021). A systematic review of cloud computing adoption by organizations. *International Journal of Industrial and Manufacturing Systems Engineering*, 6(3), 39. [CrossRef]
- Ling, L. Y., Rana, M. E., & Al Maatouk, Q. (2022, March 23–25). *Critical review of design considerations in forming a cloud infrastructure for SMEs*. 2022 International Conference on Decision Aid Sciences and Applications (DASA) (pp. 1537–1543), Chiangrai, Thailand. [CrossRef]
- Maswanganyi, N. G., Fumani, N. M., Khoza, J. K., Thango, B. A., & Matshaka, L. (2024). Evaluating the impact of database and data warehouse technologies on organizational performance: A systematic review. *Preprints, 2024*, 2024100059. [CrossRef]

- Mikkonen, I., & Khan, I. (2016). *Cloud computing: SME company point of view*. ISBN 978-80-89306-32-9. Available online: <https://www.theseus.fi/handle/10024/114309> (accessed on 14 May 2025).
- Ming, C. F., On, C. K., Rayner, A., Guan, T. T., & Patricia, A. (2018). Determinant factors affecting cloud computing adoption by SMEs in Sabah, Malaysia. *Journal of Telecommunication, Electronic and Computer Engineering (JTEC)*, 10(3–2), 83–88.
- Mohlala, T. T., Mehlwana, L. L., Nekhavhambe, U. P., Thango, B., & Matshaka, L. (2024). Strategic innovation in HRIS and AI for enhancing workforce productivity in SMEs: A systematic review. *Preprints, 2024*, 2024091996. [CrossRef]
- Mohlameane, M., & Ruxwana, N. (2020). Exploring the impact of cloud computing on existing South African regulatory frameworks. *SA Journal of Information Management*, 22(1), 1–10. [CrossRef]
- Molete, O. B., Mokhele, S. E., Ntombela, S. D., & Thango, B. A. (2024). The impact of IT strategic planning processes on SME performance: A systematic review. *Preprints, 2024*, 2024091024. [CrossRef]
- Mousa, K., Zhang, Z., Sumarliah, E., & Hamdan, I. K. A. (2024). The impact of cloud computing adoption on firm performance among SMEs in Palestine: A machine learning approach. *International Journal of Intelligent Information Technologies (IJIT)*, 20(1), 1–24. [CrossRef]
- M'rhaouarh, I., Okar, C., Namir, A., & Chafiq, N. (2018, November 21–23). *Cloud computing adoption in developing countries: A systematic literature review*. 2018 IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD), Marrakech, Morocco. [CrossRef]
- Mudau, M. C., Moshapo, L. W., Monyela, T. M., & Thango, B. A. (2024). The role of manufacturing operations in SMEs' performance: A systematic review. *Preprints, 2024*, 2024100539. [CrossRef]
- Myataza, A., Mafunga, M., Mkhulisi, N. S., & Thango, B. A. (2024). A systematic review of ERP, CRM, and HRM systems for SMEs: Managerial and employee support. *Preprints, 2024*, 2024100384. [CrossRef]
- Narwane, V. S., Raut, R. D., Mangla, S. K., Gardas, B. B., Narkhede, B. E., & Awasthi, A. (2020). Mediating role of cloud of things in improving performance of small and medium enterprises in the Indian context. *Annals of Operations Research*, 329, 69–98. [CrossRef]
- Natrajan, N. S., Sanjeev, R., & Jain, R. U. (2024). Sustainability in small and medium enterprises: A circular economy approach using cloud computing. *Business Strategy & Development*, 7(2), e370. [CrossRef]
- Ndzabukelwako, Z., Mereko, O., Sambo, T. V., & Thango, B. (2024). The impact of Porter's five forces model on SME performance: A systematic review. *Preprints 2024*, 2024100119. [CrossRef]
- Ngcobo, K., Bhengu, S., Mudau, A., Thango, B., & Matshaka, L. (2024). Enterprise data management: Types, sources, and real-time applications to enhance business performance—A systematic review. *Preprints, 2024*, 2024091913. [CrossRef]
- Nuskiya, A. F. (2017). *Factors influencing cloud computing adoption by SMEs in the eastern region of Sri Lanka* [Unpublished Work]. Available online: <http://ir.lib.seu.ac.lk/handle/123456789/3008> (accessed on 14 May 2025).
- Odero, E. A. (2021). *Framework for adoption of cloud computing by small and medium-sized enterprises in Meru County* [Doctoral dissertation, KeMU Repository]. Available online: <http://web.archive.org/web/20241104091322/http://repository.kemu.ac.ke/handle/123456789/1129> (accessed on 30 October 2024).
- Oredo, J., & Dennehy, D. (2022). Exploring the role of organizational mindfulness on cloud computing and firm performance: The case of Kenyan organizations. *Information Systems Frontiers*, 25(5), 2029–2050. [CrossRef]
- Oriza, R., & Maulidar. (2024). Adoption and impact of cloud computing in small and medium enterprises: A systematic review. *Journal Informatic, Education, and Management (JIEM)*, 6(2), 8–15. [CrossRef]
- Otuka, R., Preston, D., & Pimenidis, E. (2014, September 11–12). *The use and challenges of cloud computing services in SMEs in Nigeria*. The European Conference on Information Management and Evaluation (p. 325), Gent, Belgium.
- Pathan, Z. H., Jianqiu, Z., Akram, U., Latif, Z., Khan, M. K., & Tunio, M. Z. (2017). Essential factors in cloud-computing adoption by SMEs. *Human Systems Management*, 36(4), 261–275. [CrossRef]
- Picoto, W. N., Crespo, N. F., & Carvalho, F. K. (2021). The influence of the technology-organization-environment framework and strategic orientation on cloud computing use, enterprise mobility, and performance. *Review of Business Management*, 23(2), 278–300. [CrossRef]
- Prihatiningtias, Y. W., & Wardhani, M. R. (2021). Understanding the effect of sustained use of cloud-based point-of-sales systems on SMEs' performance during the COVID-19 pandemic. *The Indonesian Accounting Review*, 11(1), 33. [CrossRef]
- Priyadarshinee, P., Jha, M. K., Raut, R. D., & Kharat, M. G. (2016). Risk analysis in adoption of cloud computing in SMEs: A literature review. *International Journal of Business Information Systems*, 23(1), 54. [CrossRef]
- Priyadarshinee, P., Raut, R. D., Jha, M. K., & Gardas, B. B. (2017). Understanding and predicting the determinants of cloud computing adoption: A two-staged hybrid SEM-neural networks approach. *Computers in Human Behavior*, 76, 341–362. [CrossRef]
- Qalati, S. A., Li, W., Ahmed, N., Mirani, M. A., & Khan, A. (2021a). Examining the factors affecting SME performance: The mediating role of social media adoption. *Sustainability*, 13(1), 75. [CrossRef]
- Qalati, S. A., Yuan, L. W., Khan, M. A. S., & Anwar, F. (2021b). A mediated model on the adoption of social media and SMEs' performance in developing countries. *Technology in Society*, 64, 101513. [CrossRef]

- Rai, R., Sahoo, G., & Mehfuz, S. (2015). Exploring the factors influencing the cloud computing adoption: A systematic study on cloud migration. *SpringerPlus*, 4(1), 197. [CrossRef] [PubMed]
- Ranjan, R., Kolodziej, J., Wang, L., & Zomaya, A. Y. (2015). Cross-layer cloud resource configuration selection in the big data era. *IEEE Cloud Computing*, 2(3), 16–22. [CrossRef]
- Raut, R. D., Gardas, B. B., Jha, M. K., & Priyadarshinee, P. (2017). Examining the critical success factors of cloud computing adoption in MSMEs by using the ISM model. *The Journal of High Technology Management Research*, 28(2), 125–141. [CrossRef]
- Rawashdeh, A., & Rawashdeh, B. (2023). The effect of cloud accounting adoption on organizational performance in SMEs. *International Journal of Data and Network Science*, 7(1), 411–424. [CrossRef]
- Sabi, H. M., Uzoka, F.-M. E., Langmia, K., & Njeh, F. N. (2016). Conceptualizing a model for adoption of cloud computing in education. *International Journal of Information Management*, 36(2), 183–191. [CrossRef]
- Safari, F., Safari, N., Hasanzadeh, A., & Ghatari, A. R. (2015). Factors affecting the adoption of cloud computing in small and medium enterprises. *International Journal of Business Information Systems*, 20(1), 116. [CrossRef]
- Salleh, N. A., Hussin, H., Suhaimi, M. A., & Md Ali, A. (2018, July 23–25). *A systematic literature review of cloud computing adoption and impacts among small and medium enterprises (SMEs)*. 2018 International Conference on Information and Communication Technology for the Muslim World (ICT4M), Kuala Lumpur, Malaysia. [CrossRef]
- Sandu, R., Gide, E., & Karim, S. (2017). The impact of innovative strategies to influence the adoption of cloud-based service success in Indian SMEs. *International Journal of Arts & Sciences*, 10(2), 403–413.
- Setiyani, L., Makluf, L., & Suherman, Y. (2020). Utilization analysis of cloud computing on SMEs: A systematic review. *International Journal of Applied Business and Information Systems*, 4(1), 93–99.
- Shetty, J. P., & Panda, R. (2021). An overview of cloud computing in SMEs. *Journal of Global Entrepreneurship Research*, 11(1), 175–188. [CrossRef]
- Skafi, M., Yunis, M. M., & Zekri, A. (2020). Factors influencing SMEs' adoption of cloud computing services in Lebanon: An empirical analysis using TOE and contextual theory. *IEEE Access*, 8, 79169–79181. [CrossRef]
- Sunyaev, A. (2020). Cloud computing. *Internet Computing*, 1(1), 195–236.
- Takkouche, B., & Norman, G. (2011). PRISMA statement. *Epidemiology*, 22(1), 128. [CrossRef]
- Tan, K. Y. (2022). *Determining factors for the adoption of cloud computing among small and medium-sized enterprises during the COVID-19 pandemic*. UTAR Institutional Repository. Available online: http://eprints.utar.edu.my/4971/1/Final_Report_Tan_Keng_Yeng.pdf (accessed on 30 October 2024).
- Tehrani, S. R., & Shirazi, F. (2014). Factors influencing the adoption of cloud computing by small and medium-sized enterprises (SMEs). *Lecture Notes in Computer Science*, 8522, 631–642. [CrossRef]
- Thabit, F., Alhomdy, S., & Jagtap, S. (2021). Security analysis and performance evaluation of a new lightweight cryptographic algorithm for cloud computing. *Global Transitions Proceedings*, 2(1), 100–110. [CrossRef]
- Tomás, S., Thomas, M., & Oliveira, T. (2017). Evaluating the impact of virtualization characteristics on SaaS adoption. *Enterprise Information Systems*, 12(3), 259–278. [CrossRef]
- Trigueros-Preciado, S., Pérez-González, D., & Solana-González, P. (2013). Cloud computing in industrial SMEs: Identification of the barriers to its adoption and effects of its application. *Electronic Markets*, 23(2), 105–114. [CrossRef]
- Tsiu, S., Ngoben, M., Mathabela, L., & Thango, B. (2024). Applications and competitive advantages of data mining and business intelligence in SMEs' performance: A systematic review. *Preprints*, 2024, 2024090940. [CrossRef]
- Tutunea, M. F. (2014). SMEs' perception on cloud computing solutions. *Procedia Economics and Finance*, 15, 514–521. [CrossRef]
- Vasiljeva, T., Shaikhulina, S., & Kreslins, K. (2017). Cloud computing: Business perspectives, benefits and challenges for small and medium enterprises (Case of Latvia). *Procedia Engineering*, 178, 443–451. [CrossRef]
- Widyastuti, D., & Irwansyah, I. (2018). Benefits and challenges of cloud computing technology adoption in small and medium enterprises (SMEs). *Bandung Creative Movement (BCM)*, 4(1). Available online: <https://openlibrarypublications.telkomuniversity.ac.id/index.php/bcm/article/view/5905> (accessed on 30 October 2024).
- Yoon, C., Lee, K., Yoon, B., & Toulan, O. (2017). Typology and success factors of collaboration for sustainable growth in the IT service industry. *Sustainability*, 9(11), 2017. [CrossRef]
- Zhang, H., & Mohammadi, A. (2023). A study on technology application and performance of small and medium-sized enterprises in the context of cloud computing application: A case study of the hotel industry in Henan, China. *Journal of Sustainable Business and Economics*, 7(2), 69–75. [CrossRef]

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