

Review

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[Ramolatela Lebaea](#) , [Yamkela Roshe](#) , [Sinalo Ntontela](#) , [Bonginkosi A. Thango](#) *

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Review

The Role of Data Governance in Ensuring System Success and Long-Term IT Performance: A Systematic Review

Ramolatela Lebaea, Yamkela Roshe, Sinalo Ntontela and Bonginkosi A. Thango*

Department of Electrical Engineering Technology, University of Johannesburg, Johannesburg, South Africa

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

Abstract: Data governance has emerged as a critical factor in determining the effectiveness and long-term stability of IT systems in today's data-driven environment. It encompasses frameworks that guide organizations in managing data collection, storage, processing, usage, and sharing, while ensuring alignment with business objectives, compliance with regulations, and adherence to ethical standards. However, the complexities associated with data governance, particularly in the context of new technological models, pose significant challenges. This systematic review aims to explore the role of data governance in enhancing data quality, system stability, and regulatory compliance. It seeks to identify common issues, effective practices, and strategic implications for implementing data governance frameworks across diverse industries, focusing particularly on small and medium enterprises (SMEs). We conducted a systematic review of 68 eligible studies published between 2014 and 2024, using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The included studies were assessed for risk of bias using the Cochrane Risk of Bias Assessment Tool. The review covered a range of study types, including qualitative (60%), quantitative (19%), and mixed-methods (21%) research, to provide a comprehensive understanding of data governance's impact on IT performance. The findings highlight that data governance significantly influences system success by improving data quality, operational efficiency, and regulatory compliance. Although qualitative studies predominantly emphasized in-depth analysis, a moderate representation of empirical validation through quantitative studies was observed. Common challenges identified include data migration issues, resistance to change, and budget constraints, particularly during system upgrades. Effective practices involve aligning data governance with business strategies, employing hybrid models, and regularly updating governance policies to adapt to technological advancements such as AI and big data. This review provides practical recommendations for IT managers and policymakers to enhance data governance frameworks. These include phased implementation approaches, the establishment of data governance committees, and the use of performance metrics to monitor data quality and system resilience. While significant progress has been made, further research is needed to address gaps related to emerging technologies and the unique challenges faced by SMEs in developing regions.

Keywords: Data governance; information technology; IT performance; SME challenges; systematic review; regulatory compliance; big data; AI; systematic review

1. Introduction

The idea of data governance in the current technology environment has new and emerging challenges when applying data governance frameworks in today's world [1]. It is also important to face the overwhelming and constantly increasing of big data, which is created by new technologies like IoT, AI, big data analytics and others [2]. There are always cases where there is data reserve, meaning that data is contained within an organization's various departments, and this causes problems of data convergence [3]. Furthermore, there is also a great challenge of checking data quality and data accuracy since the quality of data determines how decisions will be made or even the rate at which operations are carried out[4]. Resistance to change and, to some extent, ignorance of or

apathy towards data governance as an issue add another layer of complexity to the process [5]. Findings show that IT data governance significantly affects the sustainability of IT architectures, especially in SMEs in the long run [6]. The principles of data governance are to guarantee the data quality, coherence, and availability, which is essential to keep IT systems reliable and responsive [7]. For SMEs, which, as already mentioned, may work with relatively small budgets, and must choose priorities carefully, proper data governance increases organizational effectiveness mainly by lowering risks associated with improper handling of data [8]. Also, it enables SMEs to address compliance issues that are a legal requirement, thus reducing legal risks and fines that may prove detrimental to the sustainability of their business [9]. Therefore, it is critical to ensure that data governance practices are integrated with new and emerging technologies such as Artificial Intelligence, Big Data, and Cloud Computing technologies [10]. These technologies depend on quality information to work efficiently as well as provide reliable information [11]. Data governance frameworks are proven to keep data used by AI and big data analytics clean, well-organized, and secure to improve performance and credibility [12]. Regarding the role of data governance within the context of cloud computing, it plays a role in the proper management of data that is collected and stored across different cloud structures while adhering to numerous standards of compliance [13]. This alignment also means that the advanced technologies are fully utilized while risks involved in data breaches and privacy issues are managed [14].

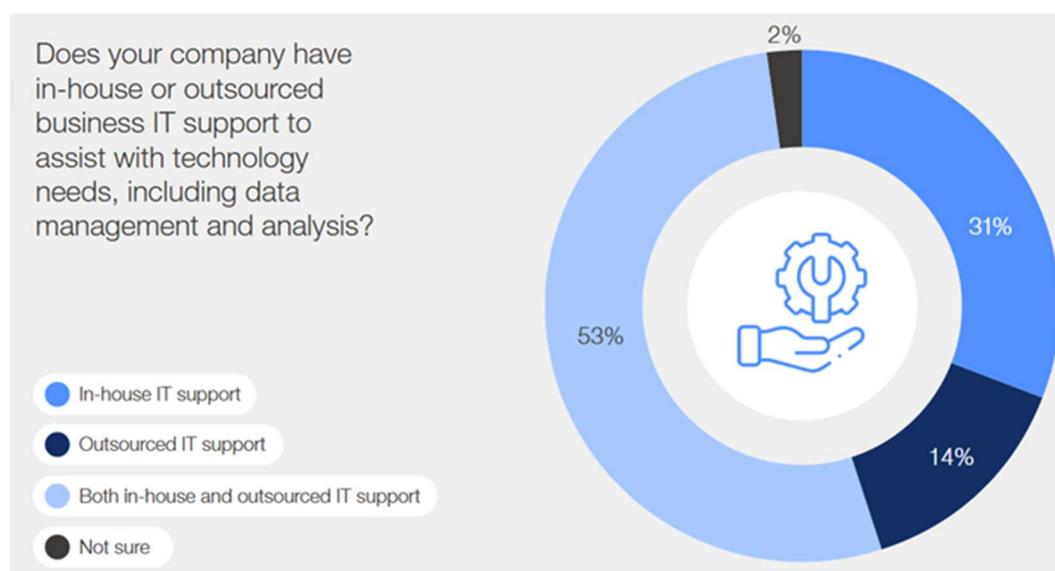


Figure 1. SMEs and their IT Support [15].

Growth in system security, compliance, and data quality are some of the ways that organizations use different assessment parameters and KPIs to evaluate the effectiveness of data governance [16]. These are data accuracy, data completeness, data consistency, data timeliness, and data validity [17]. They have stated that compliance with the regulatory requirements and internal policies involves routine audits and assessments [18]. Also, organizations monitor the number of data breaches, compliance issues, and the rate of progress in enhancing the quality of data over some time to determine the viability of their data governance frameworks [19]. This way, all the goals will be measurable, and organizations will be able to regulate and enhance data governance on a regular basis [20]. Governance practices have the effect of managing risks including data leaks, privacy infringement, and legal noncompliance [21]. Subsequently, to achieve strong data management procedures, organizations can effectively assign responsibilities to handle data or access to data in an efficient way [22]. All the above practices help safeguard sensitive information and ensure only users with access permission get access to it [23]. In addition, data governance assists organizations in avoiding legal claims and maintaining compliance with data protection laws like the GDPR and the CCPA [24]. Another aspect of data governance is its constant risk assessment and security model updates because of the new threats [25]. The reallocation of data governance frameworks should cater

for the size of the organization differentiating between SMEs and large-scale organizations [26]. For SMEs, the best practices for data governance must be efficient and minimal expense financially and in terms of data quantity since they are more likely to have restricted funds and handle less data than their larger counterparts [27]. Therefore, cloud-based data governance solutions can be interesting for SMEs since they are more flexible and require less initial capital investments, whereas large enterprises need more rigorous and comprehensive approaches to master and govern even a larger number of data resources and intricate structures [28]. These frameworks typically include a dedicated data governance team, efficient and effective data management capabilities, and comprehensive training of personnel [29].

Therefore, the application of data governance frameworks would be very useful for the organization due to the challenging demands of the present-day technological environment [30]. With the focus on new challenges, an organization's adjustment to modern technologies, and clear control over the measures of success, the quality, security, and compliance of the data being collected can improve [31]. Thus, while data governance helps manage risks, it also contributes to long-term efficient IT system functioning, especially in the context of SMEs. Applying data governance approaches that fit small and big businesses helps avoid failure in SMEs and address the issues organizations of different sizes face with data management.

Table 1. This Table is used for Comparing Previous Systematic Reviews of Data Governance in SMEs.

Ref	Cites	Year	Contribution	Pros	Cons
[32]	2	2014	This investigation is among the initial to concentrate on SME-particular issues and the preparation process involved in implementing cloud technologies in Ireland.	The investigation offers actionable insights for policymakers and SMEs, specifically in bridging the gap between theoretical advice and real-world application.	The writers admit that the respondent number is limited, presenting the discoveries as not fully generalizable.
[33]	326	2015	It highlights the necessity for a rounded approach to information security supervision.	Contributes a new dimension to information security supervision research.	Results may not relate to all business settings.
[34]	63	2015	Framework for classifying cloud computing research for SMEs in developing countries.	The socio-technical structure is an innovative tool that classifies research into various lifecycle stages (requirement, adoption, adaptation, impact).	Results are geographically constrained, with little research beyond specific regions.
[35]	173	2015	The journal makes a crucial offering by systematically re-evaluating the literature on danger supervision in SMEs.	The results are vastly relevant to SME online safety	The analysis might profit from a deeper investigation of how external influences like economic policies influence danger supervision in SMEs.
[36]	73	2015	This paper focuses on how Big Data can be harnessed to assist the growth of SMEs regional economies.	The potential of Big Data to influence policy in practice in SMEs.	Challenges in the successful implementation of technological and analytical frameworks by SMEs.
[37]	25	2016	Identifying four key principles for effective data governance.	Offers a framework for both researchers and practitioners.	The effectiveness of the principles in various contexts remains to be validated.
[38]	4	2016	Highlights the security challenges SMEs face in adopting cloud-based BI systems.	Cloud-based BI systems are affordable and accessible, especially public clouds.	Difficulty in migrating data between cloud service providers, leading to dependency on a single provider.
[39]	33	2016	The research analyses the use of Information Technology Service Management (ITSM) models in small businesses.	The research presents benefits like procedure enhancement, highly approved by users, and a decrease in cost and time.	Stipulates inadequate answers for overpowering recognized problems.
[40]	16	2016	The journal reviews the Information Security Focus Area Maturity (ISFAM) approach to obtain the Characterizing Organizations' Information Security SMEs (CHOISS) model.	The approach utilizes 47 parameters to aid SMEs in differentiating and prioritizing dangers, delivering a comprehensive and organized approach.	The model may lack specific dimensions that must be executed, as mentioned by the authoresses' views of the evaluation can differ.

[41]	13	2016	Introduced the "Value-Driven Change Leadership" (VDCL) paradigm in IT project management that considers both traditional on self-reported data from a single source management.	Provides a new approach to IT project management that considers both traditional on self-reported data from a single source management.	Limited sample size (16 projects), reliance on PMBOK practices. (project manager).
[42]	72	2018	The review develops insight of cloud-based big data analytics (CBBDA) adoption in small business enterprises.	Suggests the different financial and running constraints of SBEs.	The smaller number of 20 IT experts from 10 SBEs in New Jersey may constraint generalizability.
[43]	299	2018	The paper provides an overview of agricultural remote sensing big data management and applications.	Detailed explanation of remote sensing data management and processing.	The proposed data management structures are complex and may require significant resources to implement.
[44]	49	2019	The paper reviews the current status of advanced farm management systems, focusing on data acquisition, variable rate applications.	Data-driven agriculture helps maximize productivity and sustainability.	High costs and the need for better education and training for farmers.
[45]	14	2019	Analyses challenges and preconditions for data-driven, fact-based Product Portfolio Management (PPM).	Provides a framework for aligning data assets with PPM and emphasizes the importance of a consistent product structure.	Potential issues with inconsistent implementation of commercial/technical structures.
[46]	2	2019	It stresses the flexibility, scalability, and cost-effectiveness of cloud services, which aid SMEs overcome the restrictions of local storage computing.	The article highlights how cloud computing suggests low-cost IT infrastructure with risks related with cloud computing, aid SMEs overcome the restrictions of local pay-as-you-go model, which benefits SMEs by lowering capital expenditures on hardware and software.	The paper emphasizes important security risks related with cloud computing, specifically concerning the loss of control over data and dependence on third-party cloud service providers.
[47]	0	2019	The article concentrates on the implementation readiness of Cloud Computing (CC) by Small Enterprises (SEs) in Cape Town. It investigates SEs' understanding of CC, their preparation for adoption, and the issues they face in adopting CC.	The article is applicable, concentrating on the significant requirement for SEs to implement technologies like cloud computing to remain competitive.	The sample held management positions, possibly making biased outcomes, as the views of non-management staff were not considered.
[48]	1	2019	It investigates the procedures required for cloud implementation to ensure company operations, planning a localized perception on the adoption issues and potential benefits for SMEs in an emerging economy.	The investigation specifies in-depth understanding into the experiences of IT experts and management workers regarding cloud adoption, offering rich, real-world perceptions that quantitative studies may overlook.	The investigation admits the honesty of participant answers as a concern, which is a restriction in qualitative research.
[49]	27	2020	The journal systematically reviews cybersecurity dangers supervision in SMEs.	Finds vital aspects for supervision of cybersecurity dangers.	Mainly reports the UK setting. Absences in detailed strategies for SMEs.
[50]	11	2020	The journal describes a valued tool—the GSC Readiness Tool (GSC-Tool)—configured to evaluate.	The GSC-Tool proposes a hands-on, self-assessment method that lines up well with the requirements of IT SMEs.	The present version of the GSC-Tool might not fully obtain the difficulties of specific IT SMEs or their sub-divisions.
[51]	16	2020	The paper identifies that SMEs are poorly served by the data governance community.	A thorough examination of data governance frameworks and their applicability to SMEs.	Limited published evidence on the application of data governance frameworks to SMEs.
[52]	10	2020	This paper provides an in-depth review of data mining in knowledge management specifically for SMEs in the transportation sector.	Data mining supports KM by processing data into useful knowledge	Most SMEs rely on explicit knowledge and traditional ICT methods.
[53]	100	2021	This paper offers a systematic review of information-on-Awareness (ISA).	The journal offers actionable insights and suggestions for improving ISA in establishments, which can be directly used by an information security expert.	Deficient current developments as it reviews journals from 2009 to March 2020.
[54]	58	2021	It identifies 92 primary studies, offering a comprehensive overview of e-learning success, utilization, and adoption.	The review highlights the predominant use of the model in educational contexts among variables in depth, nor does it proposes potential areas for future research.	The study does not explore the relationships in depth, nor does it account for their combined effects on e-

				learning system adoption, utilization, and success.
[55]	17	2021	The review examines security practices among SMEs in small South African cities, concentrating on Cloud Business Intelligence (BI) adoption.	The suggested structure lines up enterpriseSMEs face issues using common security standards and frameworks due to the recognizing risks and evaluating Cloud BI complexity and lack of IT specialists. functionalities effectively.
[56]	4	2021	This framework highlights data security, privacy, and compliance.	The framework is practical and can be altered to the changing requirements for smaller SMEs with restricted assets. SMEs.
[57]	8	2021	Presents the Data Governance Model (DGB-M).	Offers practical insights and lessons learned from real-world implementations. Results are based on case studies from a single consulting company.
[58]	5	2022	Identified nine critical success factors (CSFs) for data democratization.	Identification of key CSFs, useful for both academic research and industry practice. Limited to 8 databases, excluding non-English papers, and the study's findings are mainly theoretical.
[59]	4	2023	Reviewed 162 building energy monitoring studies, and emphasized the need for consensus on data quality standards in the AEC sector.	Identified gaps in data quality reporting and emphasized the importance of standardized approaches. Limited scope to energy performance; did not cover other building performance domains.
[60]	5	2023	Evaluates user satisfaction with the Emergency Department Information System (EDIS).	Provides real-time information, reduces paperwork, and improves productivity. Limited by the research tool, the scope is restricted to a single hospital.
[61]	0	2023	Examining how cloud computing affects the operational efficiency of Small and Medium-sized Enterprises (SMEs) in Africa.	It emphasizes the different chances for SMEs in Africa, locating cloud computing as a critical tool for improving operational efficiency and scalability. The study's reliance on secondary data is one of its limitations.
[62]	18	2023	The journal investigates the essential role of information governance in the implementation of cloud services, with a specific focus on Oracle's cloud division.	The journal significantly encompasses security innovations, including features like authentication, encryption, and auditing—Oracle's solutions may limit the general applicability of its findings for businesses considering other cloud providers.
[63]	5	2023	Applies interpretivism and thematic evaluation to discover cloud computing implementation.	Suggest adoption model with realistic suggestions for small businesses. Restricted generalizability due to geographic focus.
[64]	21	2024	How UK-based SMEs experience environmental management systems (EMS) to identify key opportunities and limitations to their implementation.	Resource Efficiency: EMS helps SMEs save costs through efficient resource use. SMEs often lack the technical knowledge and resources to implement EMS effectively.
[65]	6	2024	The paper emphasizes the transformative possibility of cloud computing for African SMEs.	The journal combines qualitative and quantitative methods, proposing a well-rounded assessment of cloud computing's impact on African SMEs. The holistic approach might result in a deficiency of depth in particular sections, particularly in addressing how different sectors within SMEs may face unique challenges.
[66]	11	2024	The assessed journal collectively offers valuable understanding of scalable data solutions for SMEs.	The journal gives thorough case studies and theoretical understandings that cover a range of data solutions. Some case studies may not be expressive of all SMEs or industries.
[67]	0	2024	Concentrating on how cloud technologies advance running efficiency, agility, and competitive advantage.	Cloud computing decreases capital and running fees, granting SMEs to scale IT resources flexibly without substantial upfront cost. The implementation of sophisticated technologies like AI, IoT, and blockchain may need expert knowledge, which could be an obstacle for SMEs with restricted technical skills.
[68]	0	2024	It investigates how cloud computing presents cost-efficiency, scalability, and competitive benefits for SMEs, specifically	The articles emphasize the financial benefits of cloud computing, highlighting the pay-as-you-go analyses, which makes it hard to evaluate the lack of long-term benefits for SMEs, specifically

through structure as a Service (IaaS), you-go model, which decreases upfront the sustained impact of cloud computing Platform as a Service (PaaS), and Software investments for SMEs. implementation on SME implementation. as a Service (SaaS).

Proposed systematic review The assessed journals emphasize the Data governance provides substantial. Nonetheless, there are constraints, like necessary responsibility of data governance advantages, encompassing adjusted running concerns due to minor specific samples and in ensuring system Success and Long-Term efficiency, and better and greater flexibility procedural constraints. Certain journals may IT performance. They display how to market differences. It allows SMEs to not absolutely report the issues SMEs face, positioning data governance architectures supervise resources more successfully and such as inadequate assets and skills. with business goals can enhance advances innovation, aiding total company effectiveness improve efficiency, and help development. make informed decisions, resulting in long term long-term business company achievements.

1.1. Research Questions

In information technology, as the environment rapidly changes, data governance is one of the key factors that determine the success of the system and the sustainable performance of IT systems. In response to the growing trend where organizations depend on data in their decision-making processes, there is a conversation that there is a need for sound frameworks in the handling of this data. With these research questions, we intend to come up with practices that should be followed, challenges that organizations face, and how to address these challenges in the implementation of data governance in organizations. The findings will not only inform the academic literature, but they will also provide beneficial information to the IT practitioners and policymakers that are at the forefront of improving data governance in their fields.

- What role does data quality play in the effectiveness of data governance?
- What are the key challenges in implementing data governance practices during upgrades?
- What are effective ways of establishing the policies (standards) to ensure that data is accurately captured, stored, and protected?
- What are the best practices for aligning data governance with business strategy?
- How does data governance contribute to long-term IT Performance and success?

1.2. Research Motivation

This systematic literature review seeks to bridge the current gap in understanding the role of data governance in ensuring IT system success and long-term performance. While existing studies have explored specific aspects of data governance, a comprehensive analysis that connects these practices to system resilience over time remains lacking. With the rapid adoption of technologies such as AI, big data, and cloud computing, organizations face new governance challenges, including privacy concerns, evolving regulations, and increased complexity in data management. This review aims to investigate how data governance practices must evolve to ensure sustained IT performance and address issues like data breaches and operational inefficiencies. The motivation for this work can be summarized as follows:

- There is a lack of in-depth reviews on the impact of data governance on IT system success and long-term stability, as most existing research focuses on isolated aspects. This systematic review addresses this gap by synthesizing relevant studies to identify key factors that link data governance to system efficiency and resilience.
- This research explores how data governance must adapt to meet the challenges posed by emerging technologies such as big data analytics and cloud computing. As data management becomes more complex, governance structures need to be flexible and robust enough to handle concerns around data privacy, compliance, and rapid technological change.
- Effective data governance is essential for maintaining data integrity, security, and accessibility, which are critical to the success of information systems. Without a strong governance framework, organizations are at risk of data breaches, inconsistent data use, and inefficient

decision-making, all of which can compromise long-term IT performance. Therefore, understanding the role of data governance in promoting system stability and sustainable IT operations is crucial.

1.3. Research Contribution

This systematic review makes several key contributions to the field of data governance and IT management by addressing existing gaps in the literature and providing practical recommendations for both immediate and long-term goals:

- It offers a detailed synthesis of current literature on data governance and its impact on IT system success and sustainability. The review provides valuable insights into trends, challenges, and best practices in data governance, thereby enriching the current state of knowledge.
- By consolidating previous research, the review identifies significant gaps, especially concerning the long-term effects of data governance on IT performance. Addressing these gaps can help guide future studies and enable organizations to design more effective data governance frameworks that support ongoing system success.
- The findings present practical recommendations for IT managers and policymakers, emphasizing the importance of implementing comprehensive data governance frameworks that are aligned with both short-term objectives and long-term system resilience.

1.4. Research Novelty

This review highlights the challenges associated with managing big data, the impact of these challenges on data quality and organization, and the legal requirements involved. It outlines the hurdles and best practices organizations may encounter when planning and adopting data governance solutions, particularly in the context of integrating new technologies such as AI, big data, and cloud computing. The review also offers guidelines for IT managers and policymakers on improving data governance as a strategy for maintaining data integrity, security, and accessibility, which are essential for sustainable business operations in the digital age.

The manuscript is organized into several sections to ensure a structured analysis of data governance and its impact on IT system performance. Section 1 introduces the topic, outlining the research motivation, objectives, and novelty. Section 2 describes the materials and methods, detailing the systematic review approach, including study selection criteria, data sources, and analysis techniques. Section 3 presents the results, summarizing key findings, industry-specific insights, and common data governance challenges. Section 4 discusses how the research questions were addressed, offering strategic implications, decision-making frameworks, and best practices for implementation. Section 5 concludes the manuscript, summarizing the study's main contributions and suggesting future research directions. Finally, Section 6 provides proposed frameworks and recommendations, including practical tables with best practices, performance metrics, and policy guidance tailored for various industries.

2. Materials and Methods

This section outlines the systematic review methodology employed to examine the role of data governance in ensuring system success and long-term IT performance. The review spans the past decade, providing a comprehensive analysis of trends, practices, and challenges in data governance. This approach fills a significant gap in the existing literature, as no similar systematic review has been conducted over the last ten years to synthesize insights on the evolving governance landscape. The methodology follows a step-by-step process, as illustrated in Figure 2, which presents the flow diagram used in this study. It begins with the Framework and Methodology Overview, establishing the overall approach and guiding principles. This is followed by the Database Selection and Search Strategy, detailing the chosen online sources and search techniques used to collect relevant literature. The Screening and Inclusion Criteria step ensures the quality and relevance of selected studies, filtering out works that do not meet predefined standards. The Material Collection and Data Handling phase involves gathering and organizing data for further analysis. Data Analysis and

Interpretation focuses on extracting meaningful patterns and themes from the collected data, while the final step, Results Presentation and Synthesis, summarizes the key findings and insights derived from the systematic review.



Figure 2. Materials and Method Flow Diagram.

The structured methodology depicted in Figure 2 ensures a rigorous and transparent approach to synthesizing the literature, allowing for reliable conclusions and practical recommendations on data governance and its impact on IT system performance.

1.1. Eligibility Criteria

This subsection outlines the criteria used to select relevant research papers for the systematic review [126] – [143]. The eligibility criteria were established to ensure that the chosen studies are directly related to the research objectives and maintain high quality, as well as relevance to the topic of data governance in ensuring system success and long-term IT performance. These criteria help filter out studies that do not align with the research goals, thereby enhancing the comprehensiveness and specificity of the review. The selection criteria included the publication of studies in English between 2014 and 2024, ensuring a focus on recent and relevant research. Only peer-reviewed academic journals, conference papers, and dissertations that utilized qualitative methodologies were considered for inclusion. In contrast, papers written in other languages, covering unrelated topics, or employing quantitative methods were excluded. Furthermore, the review specifically targeted studies involving Small and Medium Enterprises (SMEs) while excluding research focusing on larger organizations. This approach allowed for an in-depth exploration of data governance in a particular business context. Table 3 presents the inclusion and exclusion criteria used to guide the selection of studies. The criteria are categorized based on topic relevance, language, publication period, type, organizational size, and research framework requirements, ensuring the chosen studies contribute meaningfully to the review's goals.

Table 3. Study Inclusion and Exclusion Criteria.

Criteria	Inclusion Criteria	Exclusion Criteria
Topic	Research Papers focusing on the role of Data Governance in Ensuring System success and long-term IT Performance.	Research Papers do not focus on the role of Data Governance in Ensuring System success and long-term IT Performance.
Language	The journals which were written in the English language.	The journals not written in the English language.
Publication Period	Journals that are published between 2014 and 2024.	Journals that are not published between 2014 and 2024.
Publication Type	Only Journal articles, conference papers, and dissertations.	Book chapters, technical reports, and Preprints.
Size of Organizations	The study is done based on Small and Medium Enterprise.	Large enterprises.
Research Framework	The journals must contain research outline or methodology for Data Governance in Ensuring System success and long-term IT Performance.	Journals deficient of a clear research outline in relation to the role of Data Governance in Ensuring System success and long-term IT Performance.

In adhering to these criteria, the review aims to provide a targeted analysis of data governance's impact on IT systems, focusing on the unique challenges and opportunities faced by SMEs.

1.1. Information Sources

To conduct this systematic review, three prominent online databases—Scopus, Web of Science, and Google Scholar—were utilized to gather information from published materials such as conference papers, dissertations, and journal articles. Each database was selected for its specific strengths in accessing relevant literature. Scopus and Web of Science were prioritized for their rigorous quality control and refined search capabilities, which ensure the retrieval of high-quality, peer-reviewed studies. These databases are well-regarded for providing reliable and curated academic content. On the other hand, Google Scholar was also included due to its broad accessibility and extensive search results, which offer a wider range of academic materials. However, it should be noted that Google Scholar's search functionalities are less refined, and the quality control is comparatively lower than that of Scopus and Web of Science.

1.1. Search Strategy

The systematic review employed a carefully formulated keyword search strategy to identify relevant literature on the role of data governance in ensuring system success and long-term IT performance. The search process involved iterative investigational searches to refine the keywords and ensure comprehensive coverage of the subject. The logical operators "AND" and "OR" were used to connect the preferred keywords, while a wildcard asterisk (*) was applied to capture suffixes and plural forms.

Several synonyms and related terms were included to broaden the scope. For example, "Role of data governance" encompassed terms like "function of data governance," "purpose of data governance," "data management," and "information governance." Similarly, terms for "Cloud computing" included "cloud solutions" and "cloud governance," while "Regulatory compliance" covered "POPIA," "GDPR," "data privacy," and "data protection." The keywords were applied across the full text, journal titles, abstracts, and PDFs in different databases. As shown in Table 4, searches were conducted across three online databases: Google Scholar, Web of Science, and Scopus. The initial search yielded a total of 10,483 results, with the majority sourced from Google Scholar due to its extensive coverage, followed by Web of Science, and a smaller number from Scopus. The results were then filtered based on the inclusion criteria, ensuring alignment with the research objectives [126] – [143].

Table 4. Search Strategy Results.

No	Online Database	Search Results
1	Google Scholar	7,330
2	Web of Science	3,068
3	SCOPUS	85
Total		10,483

The search strategy allowed for a comprehensive collection of literature, covering a range of perspectives on data governance and its impact on IT system performance. This rigorous approach ensured that relevant studies were identified and that the findings would be valuable for understanding the trends and challenges in this area.

1.1. Selection Process

The selection process for this systematic review followed a structured approach to identify studies that met specific eligibility criteria. Three online databases—Scopus, Web of Science, and Google Scholar—were utilized to gather relevant research material, including conference papers, dissertations, and journal articles. Scopus and Web of Science were chosen for their rigorous quality control and refined search functionalities, while Google Scholar was used with careful consideration due to its broader but less refined search capabilities. As illustrated in Figure 4, the selection process involved multiple steps to ensure that only the most relevant and high-quality studies were included. The eligibility criteria focused on studies published between 2014 and 2024, written in English, and appearing in peer-reviewed academic journals. The review targeted studies using qualitative

methods that addressed data governance frameworks, system success, and long-term IT performance, specifically in the context of Small and Medium Enterprises (SMEs). Papers in other languages, those using quantitative methods, or those lacking clear research outlines were excluded. The screening process was carried out manually by independent reviewers who assessed the titles, abstracts, and full-text reports of the studies to ensure adherence to the criteria. Any disagreements were resolved through discussion to maintain objectivity and minimize bias, with no automation tools used to filter the studies.

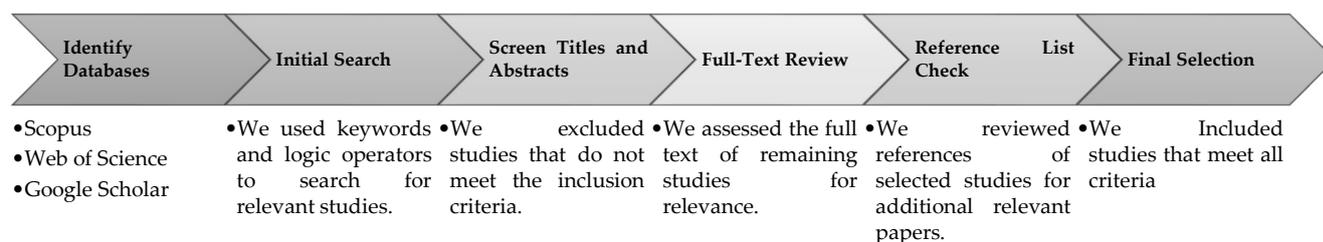


Figure 4. Proposed Study Selection Process.

The flowchart outlines the steps taken during the selection process, from initial identification and database search to the final inclusion of studies that met all criteria. This rigorous approach ensured a high level of consistency and accuracy in selecting the most relevant studies, thereby strengthening the quality and reliability of the systematic review's findings.

1.1. Data Collection Process

The data collection process for this systematic review followed a sequential search procedure to ensure the selection of relevant and high-quality journals. The process began by accessing three main journal databases to identify publications related to the role of data governance in ensuring system success and long-term IT performance. The first phase involved identifying journals that met the initial inclusion criteria, such as being published between 2014 and 2024 and focusing on data governance [126] – [143].

After selecting the initial set of journals, a reference list search was conducted. This involved carefully examining the citations and references within the chosen journals to identify additional relevant publications. Any new journals found through this reference list inspection were added to the pool of journals for further consideration.

The next step was the filtration phase, which involved evaluating the titles and abstracts of the collected journals to determine their relevance to the research topic. Journals that were deemed appropriate underwent further scrutiny based on specific criteria, such as being written in English and directly addressing data governance in the context of IT system success and long-term performance. This thorough vetting process aimed to refine the pool of journals, ensuring that only the most pertinent studies were included in the systematic review.

1.1. Data Items

This section outlines the data items collected for the systematic literature review, providing a detailed framework for understanding the characteristics and scope of the studies included [126] – [143]. Figure 5 offers a visual representation of the data items gathered, categorizing them into distinct criteria such as study characteristics, organizational context, data governance practices, and performance metrics. The information collected includes the title, year of publication, and source, along with organizational characteristics such as size, industry sector, geographic location, and ownership structure. This comprehensive approach ensures that the data covers a wide range of factors influencing the role of data governance in IT performance. Data items also cover the governance frameworks and methodologies employed, including the tools and duration of governance processes. The section on funding sources reveals potential external influences on the studies, while the research design subsection details the methodologies and sample characteristics.

Any assumptions made due to missing information are documented to maintain transparency. Tools used in data collection and analysis, including standardized methods, are also described. Table 5 below summarizes the variable data collection, providing a structured overview of the data items and their descriptions, ensuring a consistent approach to evaluating each study's contribution to the systematic review.

Table 5. Variable Data Collection.

Criteria	Description
Title	The title of the research paper or document.
Year	The year the study or paper was published.
Online database	The digital database or platform where the study was retrieved. (Google Scholar, SCOPUS, Web of Science).
Journal name	The name of the journal in which the research was published.
Research type	The type of research output. (Article, Journal, Conference Paper, Book Chapter, Dissertation, Thesis)
Number of cites	The number of times the paper has been cited in another research.
Discipline or subject area	The field or subject matter the research focuses on. (e.g., big data, SME performance, business analytics)
Industry context	The specific industry or sector the research pertains to. (e.g., SMEs, start-ups, small businesses)
Geographic location	The geographical region or country the research focuses on or was conducted in.
Economic context	Whether the research applies to developed or developing economies, or a mix of both. (e.g., developed vs. developing countries).
Types of big data technologies	The types of big data technologies or tools being discussed in the study. (e.g., Hadoop, Spark, NoSQL databases).
Big data analytics techniques	The specific big data analytics techniques or methods used in the study. (e.g., machine learning, data mining, predictive analytics).
Technology providers	The technology companies or providers involved in the research or discussed in the paper. (e.g., Cloudera, Hortonworks, IBM, AWS).
Technology implementation model	The type of technology infrastructure model described such as cloud-based, on-premises, or hybrid
Research design	The type of research design used in the study (e.g., experimental, case study).
Type of study	The methodological approach used in the research, e.g. quantitative, qualitative, or mixed methods.
Sample size and sample characteristics	The number of participants, organizations, or data points involved in the study and characteristics of the study's sample. (e.g., SMEs, data analysts, IT professionals).
rre	Methods used for collecting data (e.g., interviews, surveys, observations, document analysis)
Data analysis techniques	The data analysis methods used to interpret the findings. (e.g., statistical analysis, thematic analysis).
IT Performance metrics	IT performance indicators measured in the study. (e.g., data processing speed, scalability, data accuracy).
Business performance metrics	E.g., operational efficiency, revenue growth, cost savings).

Organizational outcomes	The outcomes measured in relation to organizational performance. (e.g., employee satisfaction, customer satisfaction).
Long-term impacts	(e.g., business sustainability, competitive advantage).

This table and the accompanying data items provide a robust foundation for systematically evaluating the relationship between data governance and IT system success.

2.7. Study Risk of Bias Assessment

This section describes the process used to evaluate the risk of bias in the studies included in this systematic review [126] – [143]. The Cochrane Risk of Bias Assessment Tool was employed, focusing on three domains: selection bias, detection bias, and reporting bias. Each study was assessed to determine the likelihood of bias based on whether pre-specified outcomes were consistently reported, if any data was missing or unexpected, and the objectivity of outcome measurements. To ensure consistency and objectivity, two reviewers independently evaluated each study, resolving any discrepancies through discussion. A third reviewer was consulted in cases where consensus could not be reached. Manual evaluations were prioritized over automated tools to maintain a consistent assessment standard. The assessment results indicate that most studies exhibit a low risk of bias, suggesting reliable findings. However, some studies were marked with unclear or high risk due to incomplete data or methodological limitations. The detailed risk of bias assessment results is presented in Table 6, which categorizes outcomes by type, assessor, and associated risk levels.

Table 6. Study Risk of Bias Assessment Process.

Outcome Type	Description	Assessor	Risk of Bias
Participant-reported	Users' feedback on system performance or issues.	System users	High risk if users are aware of governance efforts, leading to biased responses.
Observer reported (no judgment)	Objective reports without personal interpretation.	Automated systems, IT staff	Low risk, as data is usually objective.
Observer reported (with judgment)	Reports requiring judgment or interpretation.	Auditors, IT professionals	Moderate to high risk if assessors know the intervention.
Provider-based decisions	Decisions made by IT managers or governance bodies.	IT managers, governance boards	High risk, as decisions can be influenced by knowledge of interventions.

Table 6 highlights that participant-reported outcomes and provider-based decisions often present a higher risk of bias, primarily due to potential influences from awareness of data governance initiatives. In contrast, observer-reported outcomes without judgment generally exhibit a low risk of bias due to the objective nature of the data. This assessment underscores the importance of carefully considering potential bias sources when interpreting study results to ensure the validity and reliability of the systematic review findings.

2.7. Effect Measures

In this systematic review, the effect measures focused on qualitatively synthesizing the findings related to the role of data governance in ensuring system success and long-term IT performance. Data were systematically collected from the selected studies and presented in tables and figures to enable comparison across different studies. The primary approach was narrative synthesis, aimed at identifying patterns, themes, and differences in the reported outcomes. This method allowed for a descriptive analysis of how data governance practices influenced various aspects of IT performance, such as data accuracy, processing speed, scalability, and regulatory compliance. Where quantitative data were available, summary statistics were included to provide a broader context, though no formal meta-analysis was performed due to the diversity of study designs and outcome measures. Instead,

the focus was on aggregating qualitative findings and categorizing them according to the types of outcomes reported (e.g., participant-reported, observer-reported, and provider-based decisions) [126] – [143].

To ensure consistency and manage missing data, standardized data handling procedures were employed, including normalizing data units, and clearly defining categories for qualitative data. Sensitivity to potential bias was addressed through a detailed risk of bias assessment, and studies with high risk were carefully considered in the synthesis to maintain the validity of the overall conclusions. Robustness checks involved cross-referencing data across multiple sources and examining whether differing methodologies led to similar findings.

2.7. Synthesis Methods

The synthesis methods employed involved selecting studies based on their relevance to the research questions, methodological rigor, and publication date. Abstracts, methodologies, and findings were reviewed to confirm that they addressed the key elements of the research questions. The process also considered any biases or weaknesses in the studies, such as research design, sample size, and potential conflicts of interest. To ensure consistency, a similar data extraction form and coding format were used across studies, which helped reduce inconsistencies and standardize data handling. Data were presented using graphical aids, including tables, charts, and graphs, to highlight patterns and differences. Figure 5 illustrates the well-structured synthesis method process, ensuring clarity and systematic organization. For data aggregation, a fixed or random effects model was employed, depending on the level of heterogeneity present. Subgroup and meta-regression analyses were conducted to investigate variations across studies due to factors such as size, geographic location, or industry type. Robustness checks, including sensitivity analysis and leave-one-out analyses, were performed to validate the synthesized results and minimize biases, supporting the validity and reliability of the conclusions drawn [126] – [143].

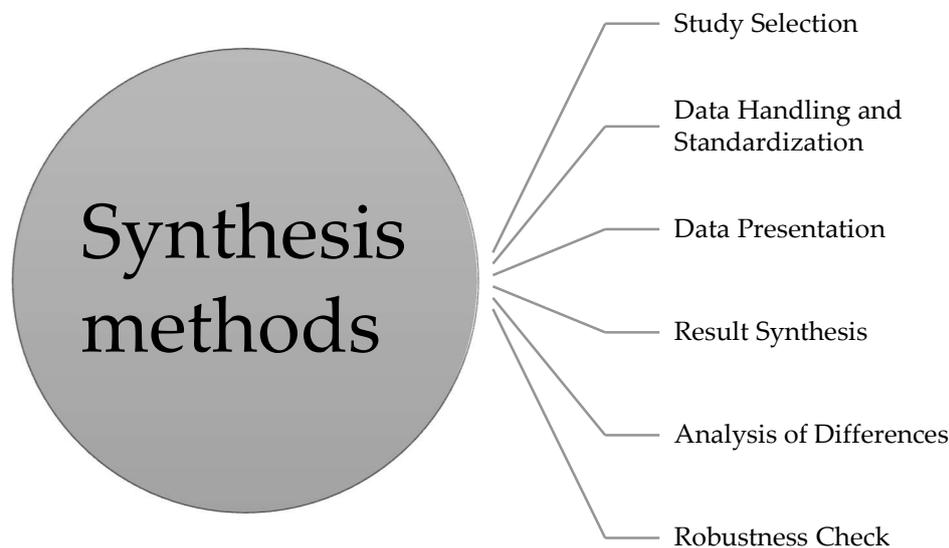


Figure 5. Synthesis Process.

This Method demonstrates the step-by-step approach for synthesizing the data and ensuring that variations are systematically managed, ultimately leading to an overall understanding of the findings.

2.7. Reporting Bias Assessment

In this systematic review, the reporting bias was evaluated using a structured approach based on the Cochrane Risk of Bias Assessment Tool. This tool examines key domains such as selection bias,

detection bias, and reporting bias, providing a comprehensive evaluation of the studies [126] – [143]. A study was classified as having a low risk of bias if all the pre-specified outcomes were reported consistently and as expected, even if there was no formal protocol in place. If there was insufficient information to determine the completeness of outcome reporting, the risk was marked as unclear. A high risk of bias was assigned to studies where outcomes were incomplete, unexpected, or missing without justification. The assessment was conducted manually by two reviewers to ensure objectivity, with any discrepancies resolved through discussion. The review focused on detecting potential methodological issues such as selective outcome reporting or the presence of unrepresentative samples. Findings indicated that the majority of the included studies (65 papers) demonstrated a low risk of reporting bias, suggesting that most literature provided reliable evidence on the impact of data governance. However, some studies showed a high risk of bias, often due to insufficient detail in the methods, poor selection of data, or limitations in outcome measurement. Table 7 provides an overview of the reporting bias across the reviewed studies, highlighting the degree of bias for each paper. This assessment helped to identify potential weaknesses that could affect the reliability of the findings, allowing for more informed conclusions about the quality of evidence.

Table 7. Proposed Research Quality Questions.

Question (Q)	Research Quality Questions
Q1	What role does data quality play in the effectiveness of data governance?
Q2	What are the key challenges in implementing data governance practices during upgrades?
Q3	What are effective ways of establishing the policies (standards) to ensure that data is accurately captured, stored, and protected?
Q4	What are the best practices for aligning data governance with business strategy?
Q5	How does data governance contribute to long-term IT Performance and success?

2.11. Certainty Assessment

To assess the certainty of the evidence, a scoring system was applied to evaluate the quality of the included studies based on five key research quality questions. These questions examined various aspects of data governance, such as the role of data quality, challenges in implementation, policies for accurate data management, alignment with business strategy, and contributions to long-term IT performance. Each question was rated on a scale of "Yes" (1 point), "Moderately" (0.5 points), or "No" (0 points), and the total scores were used to determine the quality of the research. The results, shown in Table 8, indicated an average quality score of around 69%. While many studies met academic standards with scores above 70%, a number of papers scored lower, indicating areas for improvement in aspects like methodological rigor or clarity of contributions. The overall average suggests a reasonable level of quality across the evaluated literature, but with room for enhancement in journals scoring closer to 50%. This evaluation ensures that the systematic review provides a balanced and credible synthesis of existing research on data governance.

Table 8. Research Quality Questions Results.

Ref.	Q1	Q2	Q3	Q4	Q5	Total	% grading
[57]	1	0.5	0	0.5	1	3	60%
[58]	1	1	1	0.5	1	4.5	90%
[59]	1	1	1	0.5	1	4.5	90%
[60]	0.5	0.5	0.5	0.5	0.5	2.5	50%
[61]	1	1	0.5	0.5	1	4	80%
[62]	1	1	0.5	1	1	4.5	90%
[63]	1	1	0	0.5	0	2.5	50%

[64]	1	1	0.5	1	1	4.5	90%
[65]	0.5	1	1	0	0	2.5	50%
[69]	1	0	0.5	0	1	2.5	50%
[70]	1	0.5	0.5	0.5	1	3.5	70%
[71]	1	0.5	1	1	1	4.5	90%
[72]	0.5	1	0.5	1	0	3	70%
[73]	1	1	0.5	1	1	4.5	90%
[74]	0.5	1	0	0	1	2.5	50%
[75]	0	0.5	0	1	1	2.5	50%
[76]	0.5	0.5	0	1	1	3	60%
[77]	0.5	1	0	0	1	2.5	50%
[78]	1	1	0	0.5	1	3.5	70%
[79]	0.5	0.5	0	1	1	3	60%
[80]	1	0.5	0	0.5	1	3	60%
[81]	1	1	1	0.5	0.5	4	80%
[82]	1	1	1	0.5	0	3.5	70%
[83]	1	0.5	1	0.5	0	3	60%
[84]	1	1	0	1	0.5	3.5	70%
[85]	1	1	0.5	0.5	0.5	3.5	70%
[86]	0.5	0.5	0.5	0.5	0.5	2.5	50%
[87]	0.5	0.5	1	1	0.5	3.5	70%
[89]	0.5	1	0.5	0.5	0.5	4.5	90%
[90]	0.5	0.5	1	0.5	1	3.5	70%
[91]	1	1	1	1	1	5	100%
[92]	1	1	0	0.5	0.5	3	60%
[93]	1	1	0.5	1	0.5	4	80%
[94]	1	1	1	1	0.5	4.5	90%
[95]	0.5	0.5	1	0.5	0.5	3	60%
[96]	1	0.5	1	0.5	0.5	2.5	50%
[97]	1	1	0.5	1	1	4.5	90%
[98]	1	0.5	1	0.5	1	4	80%
[99]	1	1	0.5	1	0.5	4	80%
[100]	1	1	1	0.5	1	4.5	90%
[101]	1	1	1	0.5	1	4.5	90%
[102]	1	1	0.5	1	0.5	4	80%
[103]	0.5	0.5	0.5	0.5	0.5	2.5	50%
[104]	1	1	0.5	0.5	1	4	80%
[105]	0.5	0.5	0.5	0.5	0.5	2.5	50%
[106]	1	0.5	0	1	0.5	3	60%
[107]	0.5	1	1	0.5	1	4	80%
[108]	1	1	0.5	0.5	1	4	80%
[107]	0.5	1	0.5	1	0	3	60%
[109]	0	1	0.5	1	0.5	3	60%
[110]	1	0.5	1	1	0	3.5	70%
[111]	0	0.5	0	1	1	2.5	50%
[112]	0.5	0.5	0.5	1	1	3.5	70%
[113]	1	0	0	1	0.5	2.5	50%
[114]	1	1	0.5	0.5	0	3	60%
[115]	0.5	0.5	0.5	1	0	2.5	50%
[116]	0.5	0	1	1	0	2.5	50%
[117]	1	1	1	0.5	0	3.5	70%

[118]	1	0.5	0	1	1	3.5	70%
[119]	1	0.5	0	0.5	1	3	60%
[120]	0	0	1	0.5	1	2.5	50%
[121]	0	1	1	1	1	4	80%
[123]	0	0.5	1	1	1	3.5	70%
[124]	0.5	0.5	1	1	1	4	80%
[125]	0.5	1	0.5	0.5	1	3.5	70%

2.12. Risk of Bias in Studies

In assessing the risk of bias for the studies included in this systematic literature review, we employed the Cochrane Risk of Bias Assessment Tool. This tool evaluates studies across three domains: selection bias, detection bias, and reporting bias. For each domain, studies were rated as low, unclear, or high risk of bias based on whether pre-specified outcomes were reported as expected, if there was any missing or unexpected data, and how well outcomes were measured. Two reviewers independently assessed each study to ensure objectivity. Discrepancies were resolved through discussion, with a third reviewer consulted if needed. No automation tools were used; all evaluations were performed manually to maintain consistency. The risk of bias assessment revealed a range of results. Most studies were found to have a low risk of bias, indicating reliable results, while some studies were categorized as having unclear or high risk due to incomplete information or methodological weaknesses. The summary of these assessments is presented in Table 9, which outlines the risk of bias in the measurement of outcomes for the 68 studies reviewed. This table categorizes the outcomes into four types: participant-reported, observer-reported (no judgment), observer-reported (with judgment), and provider-based decisions. It highlights that participant-reported outcomes and provider-based decisions often carry a high risk of bias due to potential influences from knowledge of governance efforts, while observer-reported outcomes (no judgment) typically have a low risk of bias due to their objective nature.

Table 9. Cochrane's Risk of Bias Assessment in Studies.

Ref.	Selective bias	Detection bias	Reporting
[57]	Low risk	Low risk	Low risk
[58]	Low risk	High risk	High risk
[59]	Low risk	Low risk	Low risk
[60]	Low risk	Low risk	Low risk
[61]	Low risk	Unclear risk	Low risk
[62]	Low risk	Low risk	Low risk
[63]	Low risk	Low risk	Low risk
[64]	Low risk	Unclear risk	Low risk
[65]	Low risk	Low risk	Low risk
[69]	Low risk	Low risk	Low risk
[70]	Low risk	Low risk	Low risk
[71]	Low risk	Low risk	Low risk
[72]	Low risk	Low risk	Low risk
[73]	Low risk	Low risk	Low risk
[74]	Low risk	Low risk	Low risk
[75]	Low risk	Low risk	Low risk
[76]	Low risk	Low risk	Low risk
[77]	Low risk	Low risk	Low risk
[78]	Unclear risk	High risk	Unclear risk
[79]	Low risk	Unclear risk	Low risk

[80]	Low risk	Low risk	Low risk
[81]	Unclear risk	High risk	Unclear risk
[82]	Unclear risk	Unclear risk	Low risk
[83]	Low risk	Low risk	Low risk
[84]	Low risk	Low risk	Low risk
[85]	Unclear risk	Unclear risk	Unclear risk
[86]	Low risk	Low risk	Low risk
[87]	Low risk	High risk	Low risk
[89]	Unclear risk	Low risk	Unclear risk
[90]	Low risk	Low risk	Low risk
[91]	Unclear risk	High risk	Low risk
[92]	Low risk	Low risk	Low risk
[93]	Unclear risk	High risk	Low risk
[94]	Low risk	Low risk	Low risk
[95]	High risk	Low risk	Low risk
[96]	Low risk	Low risk	Low risk
[97]	High risk	Low risk	Low risk
[98]	High risk	Low risk	Low risk
[99]	Low risk	Low risk	Low risk
[100]	Low risk	Low risk	Low risk
[101]	High risk	Unclear risk	High risk
[102]	Low risk	Low risk	Low risk
[103]	Low risk	Low risk	Low risk
[104]	High risk	High risk	Unclear risk
[105]	Low risk	Low risk	Low risk
[106]	Low risk	Low risk	Low risk
[107]	Low risk	Low risk	Low risk
[108]	Low risk	Low risk	Low risk
[107]	High risk	Unclear risk	High risk
[109]	Low risk	Low risk	Low risk
[110]	Low risk	Low risk	Low risk
[111]	Low risk	Low risk	Low risk
[112]	High risk	High risk	High risk
[113]	Low risk	Low risk	Low risk
[114]	Low risk	Low risk	Low risk
[115]	Unclear risk	Unclear risk	Unclear risk
[116]	Low risk	Low risk	Low risk
[117]	Unclear risk	High risk	Low risk
[118]	Low risk	Low risk	Low risk
[119]	Unclear risk	High risk	Unclear risk
[120]	Unclear risk	Unclear risk	Low risk
[121]	Low risk	Unclear risk	Low risk
[123]	Low risk	Low risk	Low risk
[124]	Unclear risk	High risk	Unclear risk
[125]	Unclear risk	Unclear risk	Low risk

The risk of bias for the studies reviewed in this SLR is summarized in Table 9. The review assessed biases related to technology types and research design by categorizing studies by their focus areas and ensuring a balanced representation of experimental, quasi-experimental, and case studies. This systematic approach helped minimize bias and enhance the validity of the review's findings. These results indicate that most of the literature reviewed is reliable for drawing conclusions and making recommendations about the role of data governance in systems success and long-term IT performance. The analysis of various studies on data governance, cybersecurity, and IT management

emphasizes a low risk of bias across multiple methodologies, particularly in systematic reviews and qualitative studies. Most studies resulted in clear selection criteria, minimized detection bias through structured methodologies, and reported outcomes. For example, the systematic literature reviews on data governance frameworks and cybersecurity risk management in SMEs demonstrated well-defined methodologies and clear reporting, indicating reliable results. However, some studies, especially narrative reviews, and those with small sample sizes, presented higher risks of bias, and quality in detection and reporting, emphasizing potential interpretation biases.

Results

The results of this systematic review provide insights into the common challenges organizations face in enhancing data governance, particularly in the context of emerging technologies like AI, big data analytics, and cloud computing. These findings are crucial for IT managers and policymakers who need to establish robust data management frameworks that promote sustainable IT practices while addressing evolving technological demands. The evaluation of the included studies focused on identifying key performance metrics, governance strategies, and industry-specific trends. The analysis revealed that while many organizations recognize the importance of data governance, they struggle with issues such as data integration, scalability, regulatory compliance, and maintaining data quality. This underscores the need for practical guidelines and frameworks to support effective governance. Figure 6 illustrates the criteria used to evaluate the findings of the studies reviewed. The criteria include data accuracy, data processing speed, scalability, regulatory compliance, and decision-making support. These categories are crucial for understanding the impact of data governance on organizational success and system performance.

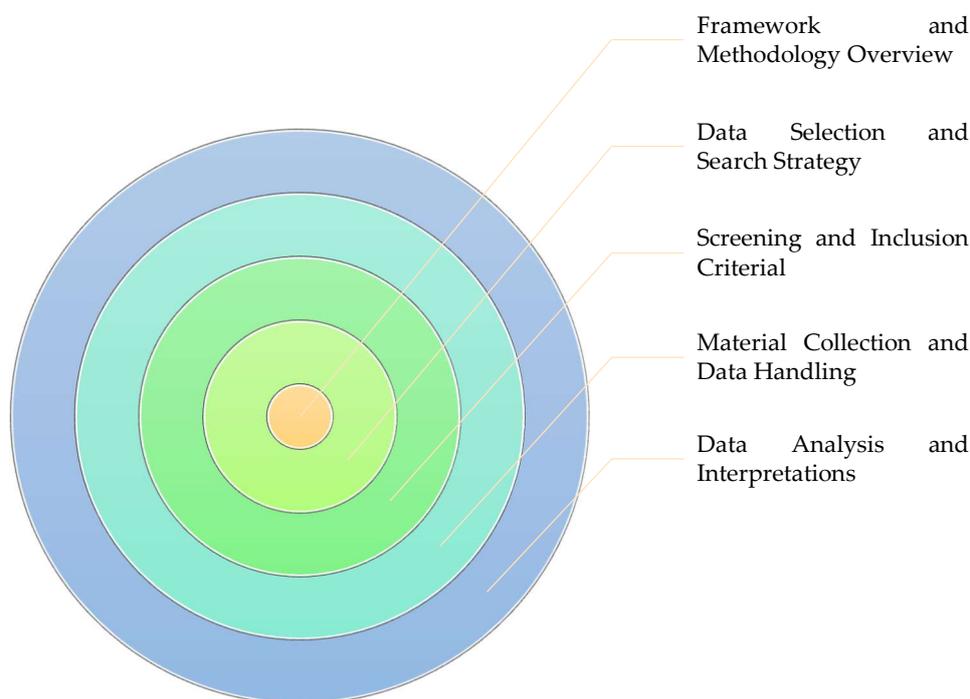


Figure 6. Results Evaluation Criteria.

The summary of the evaluation criteria highlights the importance of aligning data governance efforts with strategic business goals. It emphasizes that improving data quality and regulatory compliance can significantly enhance system performance, customer satisfaction, and long-term business sustainability.

1.1. Study Selection

The process of screening and selection of literature for a systematic review or any other similar study is shown in Figure 4. It is divided into three main sections to ensure credibility of the research studies, such databases and search engines as Google Scholar, Web of Science, and Scopus were used for the Identification section. Research papers were gathered from data sources using the keywords stated in the Search strategy unit above. These papers were collected strictly in line with the inclusion and exclusion criteria expressed above.

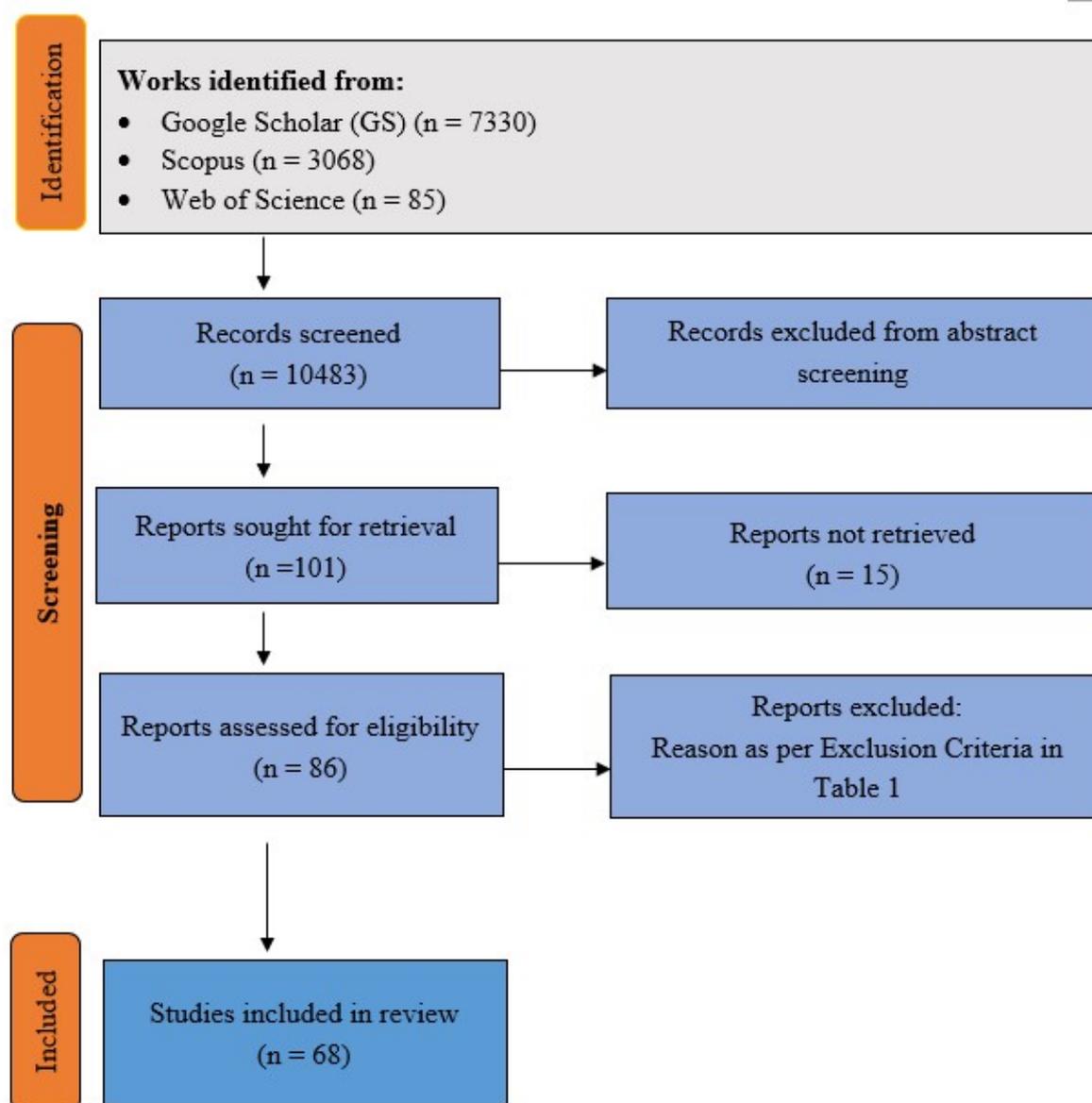


Figure 7. Proposed PRISMA Flowchart.

The search produced 10,483 journals across all selected data sources, and their headings and abstracts were reviewed. The authors screened 10483 works, and the duplicate journals found were excluded, journals that are not in English and that are published before 2014. The journals that were reviewed during the screening phase were 68 but the number not retrieved was 10382 as they were not relevant to the research. The selected 68 studies qualified the eligibility criteria, which are mentioned in the included section. This flow chart is an excellent way to explain the series of steps to decide which study is relevant for research. The data in Figure 8 implies the supply of research papers obtained from several online databases.

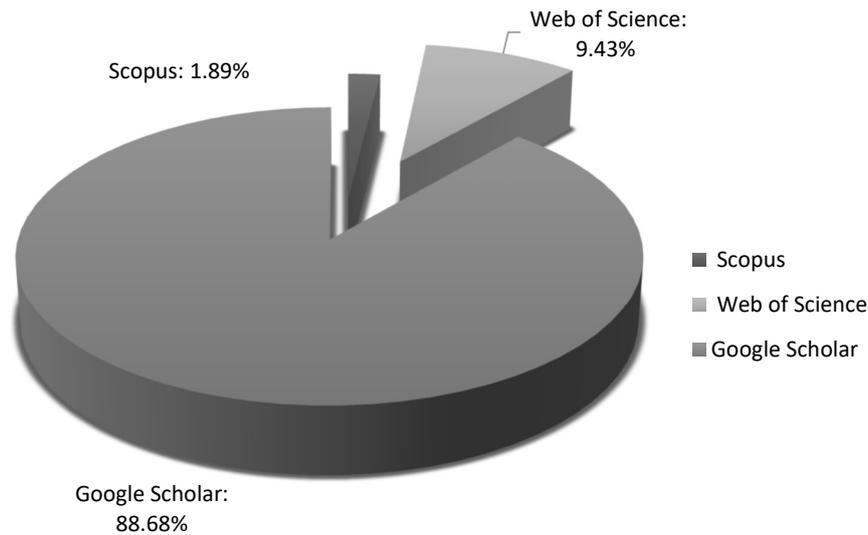


Figure 8. This is a Figure for the Online Database.

Most of the studies, 88.68%, were collected from Google Scholar, making it the predominant source for the investigation data. 9.43% of the findings came from the Web of Science, while only 1.89% were found from Scopus. This implies that while Google Scholar is greatly used in this setting, Web of Science and Scopus provide less considerably to the investigative collection. The figure emphasizes the dependence on freely accessible and broadly utilized platforms like Google Scholar for collecting academic journals.

1.1. Study Characteristics

Figure 9 highlights the distribution of research types included in the review, showing the various forms of academic outputs related to data governance and IT performance. This breakdown helps identify the predominant types of publications and their significance in advancing the field.

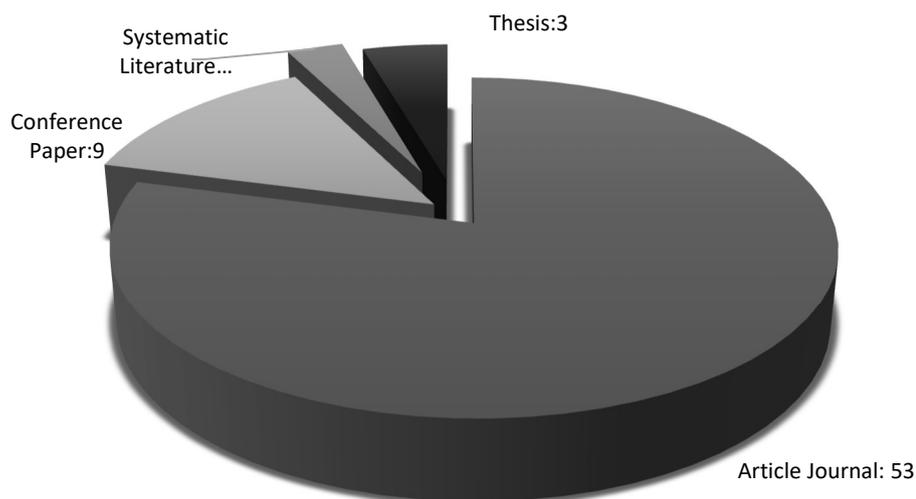


Figure 9. Research Distribution by Research Type.

Of the total publications, 53 are journal articles, which dominate the dataset as the largest category of published output. This indicates a preference for peer-reviewed, specialized research that

is critical for assessing data governance practices. Other contributions include 9 conference papers, 2 systematic reviews, and 1 thesis, demonstrating that while journal articles are prevalent, alternative types of publications also provide valuable insights. The diversity of research types reflects the varied approaches used to explore data governance. Figure 10 illustrates the annual trend in published research from 2014 to 2024, shedding light on the growing interest in the topic of data governance and its implications for IT performance over time.

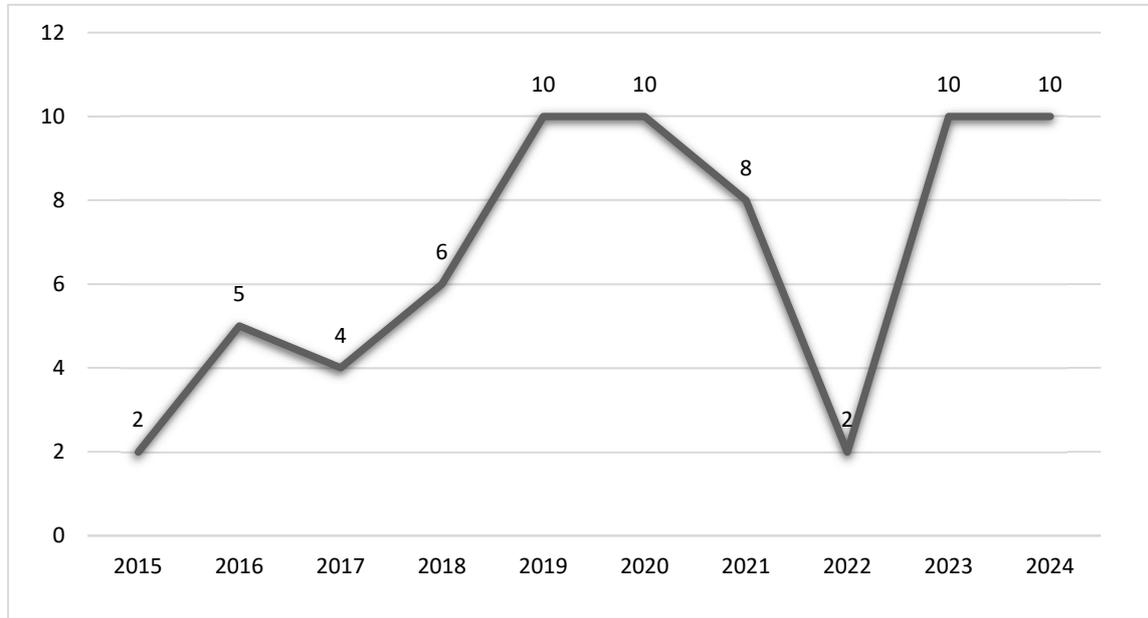


Figure 10. Journal Published Every Year from 2014-2024.

The number of publications has steadily risen since 2014, starting with only 1 publication that year and reaching a predicted 9 by 2024. This increasing trend underscores the growing recognition of data governance as a critical factor for achieving system success and sustaining long-term IT performance. The rise can be attributed to advancements in technology, such as artificial intelligence and big data, as well as a stronger focus on compliance with evolving regulations. The trend highlights the expanding role of data governance in the IT landscape. Figure 11 displays the geographical spread of the reviewed publications, reflecting the global attention given to data governance issues and the various regional approaches to addressing these concerns.

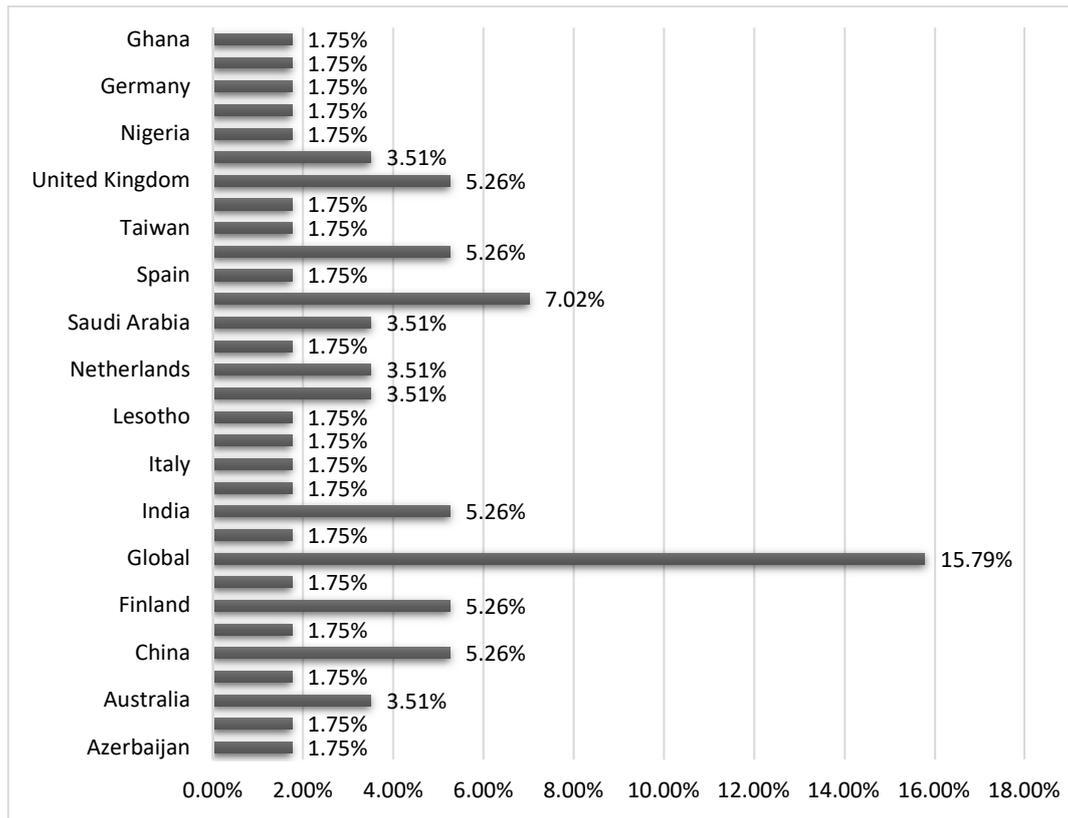


Figure 11. Geographical Distribution of Journals.

The data shows that 15.79% of the reviewed studies are global or cross-national, indicating a significant level of international collaboration and interest. South Africa leads as a single-nation contributor, accounting for 7.02% of the total publications, signaling a strong research focus on data governance within the country. Other significant contributors include China, Finland, India, Sweden, and the United Kingdom, each representing 5.26% of the publications. This balance between developed and developing countries suggests diverse perspectives in the literature. Countries such as Australia, Malaysia, the Netherlands, Saudi Arabia, and the United States contribute at moderate levels (3.51%), while smaller contributions from nations like Canada, Brazil, and Pakistan (1.75% each) demonstrate the widespread, albeit varying, attention to data governance research. Figure 12 outlines the various data collection techniques utilized in the reviewed studies, providing insight into the methodologies adopted to gather information on data governance and IT performance.

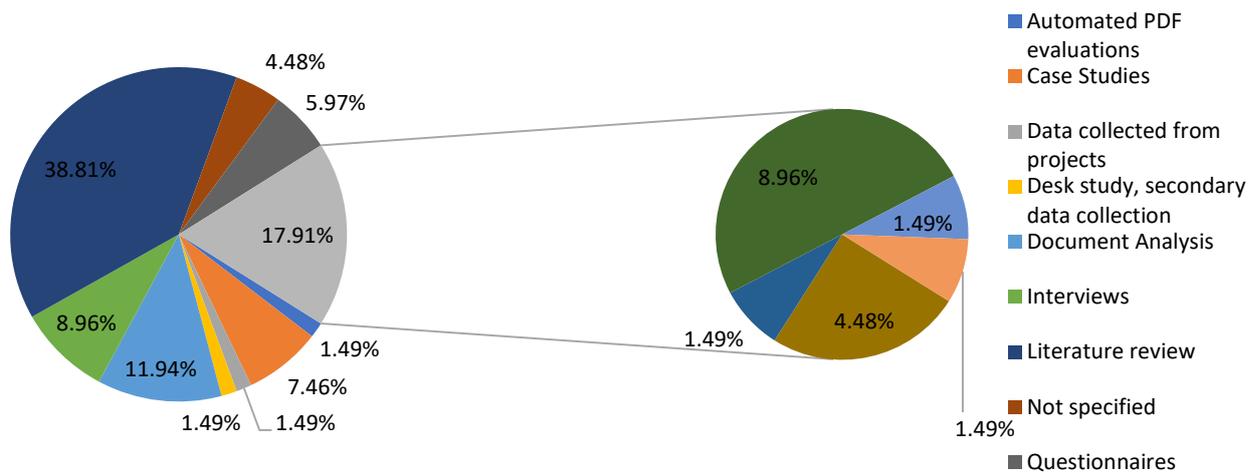


Figure 12. Data Collection Methods.

Document analysis is the most common method, used in 11.94% of studies, signifying a reliance on existing records and documents as primary data sources. Both interviews and surveys are also widely used, each appearing in 8.96% of the studies, indicating the importance of gathering data directly from participants. Case studies account for 7.46% of the methods, reflecting the value of in-depth comparative analysis, while questionnaires are used in 5.97%, showing the preference for structured data collection. Less common methods include semi-structured interviews (4.48%) and other techniques, such as automated PDF assessments and statistical analysis (1.49%). Overall, the data collection methods indicate a balanced use of qualitative and secondary approaches, with fewer studies employing purely quantitative techniques.

1.1. Results of Individual Studies

The assessment of each study in Table 8 pays attention to the risk of bias and the roles of diverse research endeavors to capture long-term effects on SMEs. For example, one study focuses on technological change and employment and skills for economic growth, they set policies in SME service and capability improvement. Another study established the new-specific challenges of the small business CBS and identified the research gaps and potential recommendations based on strengths such as flexibility.

Table 11. Results of Individual Studies.

Ref.	Sample Size	Long Term impacts on SMEs	Contribution
[57]	-	Business sustainability	Research emphasizes the role of technological innovations in job creation and economic growth. Proposes policies to improve SMEs' services and capabilities.
[58]	-	Increased cyber-security, policy improvements	Identifies the unique challenges faced by small businesses in implementing cybersecurity measures. It highlights gaps in current research and products tailored for small businesses and proposes solutions that leverage the agility and size of small businesses to enhance cybersecurity.
[59]	52	Improved data governance practices	Highlights data governance concept matrix and an ontology to visualize relationships between key concepts, providing a

			comprehensive analysis of data governance activities across various decision domains
[60]	-	IT security; implications for SMEs to improve processes	Conceptualizes SME-specific characteristics affecting IT security investments. It validates constraints through expert interviews, challenging assumptions in existing IT security literature, and offers context-specific insights for stakeholders to improve IT security investments in SMEs.
[61]	130	ICT investment	Analyzes the gap between SMEs and large corporations in IT security. It offers valuable insights for governments to support SMEs in IT security improvements.
[62]	39	Improved information security management	More holistic approach to information security management, opening avenues for further research
[63]	27	Identification of various types of risks in SMEs	Highlights need for further empirical research, particularly in developing countries
[64]	-	Improved decision-making	Long-term data governance strategy development
[65]	-	Potential business sustainability, competitive advantage	Emphasizes the importance of removing data silos and enabling data access for both technical and non-technical employees, highlighting the role of data governance, user-friendly analytics tools, and a data-driven culture.
[69]	8	Business sustainability, competitive advantage	Emphasizes the importance of removing data silos and enabling data access for both technical and non-technical employees, highlighting the role of data governance, user-friendly analytics tools, and a data-driven culture.
[70]	130	User satisfaction, enhanced system success	Assesses user satisfaction with EDIS from the perspective of healthcare professionals. It identifies key factors influencing user satisfaction
[71]	9	Statistical analysis	Reviews the application of the DeLone and McLean model in e-learning contexts. It identifies trends and gaps in the literature over the past decade and proposes enhancements to the model to better fit the e-learning environment.
[72]	16	Management views on success	Introduces innovative IT project management practices based on early empirical findings. It highlights the benefits of these new practices in improving project outcomes and suggests areas for further research to validate and refine these practices.
[73]	162	-	Examines the impact of data quality on building energy performance monitoring. It identifies key data quality issues and their implications for energy management, proposing strategies to improve data quality and enhance the effectiveness of energy performance monitoring.
[74]	64	Potential for enhanced security behaviors and improved organizational security culture	Provides a comprehensive review of methods and factors for enhancing information security awareness (ISA) among employees in both private and public organizations. It highlights the importance of addressing human elements in information security and identifies various methods, such as theoretical models and gamification, used to improve ISA.
[75]	71	Enhanced IS maturity	Proposes the Characterizing Organizations' Information Security for SMEs (CHOISS) model, which relates measurable organizational characteristics to help SMEs prioritize and mitigate security risks. The model is based on an extensive literature review and expert evaluations, providing a tailored, easy-to-use toolkit for SMEs to address their specific security needs.

[76]	117	-	Critically examines existing Industry 4.0 maturity models and their applicability to SMEs. The study identifies gaps in current models, such as the disconnect between the base level of most models and the actual digitization level of many SMEs
[77]	50	Streamlined contract governance, cost reduction	Introduces a novel method for automating the classification of contractual obligations into governance-specific classes.
[78]	21	Enhanced service delivery and improved data availability	Explores the impact of decentralized primary health care management on the health system in Lesotho. The study finds that decentralization improves service delivery efficiency, accountability, community participation, data availability, and resource allocation
[79]	20	Customer satisfaction	Address successful implementation of technological and analytical frameworks by SMEs.
[80]	-	Privacy and security challenges.	Aims to aid in policy formulation and future adoption of cloud platforms.
[81]	300	-	Introduces an IoT mining machine designed for Twitter sentiment analysis. The study utilizes Twitter's API to harvest tweets in real time and employs a mining engine developed on a Raspberry Pi microcomputer.
[82]	-	-	Examines the adoption of 4.0 technologies in agricultural SMEs. The study highlights the importance of managerial capabilities, cognition, and perception of the external environment in technology adoption.
[83]	64	-	The potential transformation of higher education governance through big data
[84]	30	Organizational structure & strategy	Investigates data governance practices across tier one universities in the United States. Using web content analysis, the study reveals that most universities have established new data governance units or extended existing IT governance frameworks.
[85]	187	Better decision-making, reduced damages	Explores the use of VR and AR technologies in digital twin systems for cultural heritage risk management. The study evaluates the effectiveness of these technologies in enhancing situational awareness and identifies differences in immersion and interactivity between VR and AR.
[86]	-	Business sustainability, competitive advantage	Discusses the potential of big data in transforming the food industry. The study identifies various data sources, including regulatory, enterprise, and media data, and explores their applications in areas such as social co-governance, market exploitation, and health management.
[87]	100	Enhanced agricultural performance	Provides a comprehensive review of innovations in the agri-food sector, focusing on digital technologies such as IoT, AI, big data, RFID, robotics, and block chain.
[89]	-	Sustainable agriculture, competitive advantage	Highlights the potential of big data to improve crop management, yield prediction, and resource optimization in agriculture.
[90]	1656	Customer satisfaction	Introduces an IoT mining machine designed for Twitter sentiment analysis. The study utilizes Twitter's API to harvest tweets in real-time and employs a mining engine developed on a Raspberry Pi microcomputer.
[91]	84	Improved visibility, data-driven capabilities	Reviews the use of emerging technologies like IoT, block chain, and big data in agriculture supply chains. The study identifies the main challenges in agri-food supply chains, such as information

			inaccuracy and inefficient management, and proposes a framework for practitioners to develop data analytics capabilities and achieve sustainable performance.
[92]	320	Potential for enhanced SSC performance, alignment with sustainability goals	Investigates the relationships between big data analytics (BDA) capabilities, circular economy (CE) practices, and sustainable supply chain (SSC) flexibility. The study finds that BDA drives the implementation of CE practices, which enhance SSC flexibility and sustainable performance.
[93]	-	Enhanced IS Security	Insights for further development, improved maturity in governance, security, and compliance readiness
[94]	30	Business sustainability, competitive advantage	Explores the internal and external drivers and barriers to EMS implementation in UK SMEs. The study identifies resource use efficiency, cost savings, and market advantage as key drivers, while limitations include inadequate human resources and knowledge.
[95]	195	Business sustainability, competitive advantage	Address Influence of BDPA on operational performance, improved manufacturing capabilities, Big data culture and External institutional pressures
[96]	-	Sustainability, health care improvements	Addresses the complexities of managing healthcare data, emphasizing the importance of data quality, privacy, and interoperability. The study highlights the need for robust data governance frameworks to ensure the availability, integrity, and security of healthcare data.
[97]	132	Growth and competitiveness	It provides insights into how SMEs can leverage digitalization to enhance their management control practices and achieve better performance.
[98]	415	Sustainable growth, improved performance	It identifies key determinants of cloud computing integration, such as technological readiness and organizational support, and demonstrates how cloud computing can enhance sustainable performance.
[99]	10	Improved decision-making, competitive advantage	Assesses data governance practices and their effect on corporate performance within the SME sector in Kenya. The study uses data governance decision areas based on Khatri and Brown's model and collects data from ten SMEs in Kenya. It finds that data governance positively impacts corporate performance, particularly through data quality, metadata, and data lifecycle management.
[100]	308	Business sustainability, competitive advantage	Examines the effects of IT and data governance on both financial and non-financial performance in the telecommunication industry. The study, based on a survey of 308 managers, finds that IT and data governance significantly impact performance, with IT governance more strongly affecting financial performance and innovation, while data governance has a greater impact on business processes and ethical compliance.
[101]	30	Data quality improvement	Proposes adding data management activities to the Open Government Data Management Platform to enhance data quality. The study emphasizes the need for policies, strategies, and initiatives to manage data effectively, ensuring transparency, accessibility, and high quality of published data.
[102]	-	Business sustainability, trust	Explores the role of data governance in the gaming industry, focusing on how data science and analytics enhance game development, player engagement, and revenue generation. The study discusses the importance of robust data collection, storage policies, and compliance with data protection regulations.

[103]	-	Competitive advantage	Proposes a cloud-based architecture for surveillance and performance management in community healthcare. The study addresses five critical roadblocks to interoperability in a cloud computing context: infrastructure for surveillance and performance management services, a common data model, a patient identity matching service, an anonymization service, and a privacy compliance model.
[104]	35	Analyzing the trends in data governance in small businesses	Identifies key data governance practices that enhance supply chain efficiency, data quality, and decision-making. It provides a framework for SMEs to implement data governance strategies that align with their specific needs and operational contexts.
[105]	266	Compliance, risk mitigation	Discusses various data sources, including regulatory, enterprise, and media data, and their applications in social co-governance, market exploitation, and health management. It addresses challenges related to technology, health, and sustainable development, proposing solutions to leverage big data effectively in food safety.
[106]	1	-	Outlines key steps and best practices for data protection, emphasizing the importance of data governance, risk assessment, and continuous monitoring. It provides practical guidelines for SMEs to ensure GDPR compliance and protect personal data.
[107]	-	Efficiency of supply chain management	Provides insights on innovation in cross-border e-commerce supply chain management
[108]	54	Operational efficiency in city management	Examines how IT can enhance urban governance by improving service delivery, transparency, and citizen engagement. The study highlights the use of IT in various urban governance areas, such as smart city initiatives, e-governance platforms, and data-driven decision-making.
[107]	15	Competitive advantage, and regulatory compliance	Insights into challenges and strategies for balancing innovation with security, impact on competitive advantage, and regulatory compliance enhancing cybersecurity, and complying with regulations
[109]	15	Business sustainability, competitive advantage	The study identifies five key perspectives crucial to managing cybersecurity risks: threats behaviors, practices, awareness, and decision-making.
[110]	-	Improved competitive advantage	Highlights how enhanced service management effectiveness potentially help to improved competitive advantage, and reduced service cost and time for SMEs
[111]	79	Enhanced ISA programs, employee security behavior improvements	ISA Content Development Methods and Factors Contributing to Sustained Security Behavior Changes in Organizations
[112]	8	Improved product profitability	Emphasizes the need Improved product-level profitability analysis, optimized product portfolio management, and improved strategic and commercial management of product portfolios
[113]	39	Improved data governance and security	Highlighted security challenges and need for better frameworks for SMEs
[114]	-	Improved decision-making, regulatory compliance	Proposes a framework for data governance aimed at ensuring trustworthy AI systems. The study reviews challenges and approaches to data governance for Big Data Algorithmic Systems (BDAS) and emphasizes the importance of data stewardship, risk-based governance, and system-level controls.

[115]	-	Sustainable agriculture	Reviews the current status of advanced farm management systems, focusing on data acquisition, variable rate applications, and decision-making in crop fields.
[116]	-	Sustainable growth	Analyzes the implications of cloud computing for SMEs in Africa. The study adopts a comprehensive approach, combining qualitative and quantitative methodologies to assess the challenges and benefits of cloud computing adoption.
[117]	95	Improved data analytics	Insights into future research directions, highlighting gaps in the current literature on SMEs and cloud computing
[118]	4	Future research directions	Identification of benefits and lessons learned development of DGPP benefits model (DGB-M)
[119]	-	Improved operational efficiency, cost savings, scalability	Highlights the necessary data management strategies for SMEs in order to growth, competitive advantage, adaptability to technological advancements
[120]	-	Business sustainability, competitive advantage	Investigates how cloud computing contributes to operational efficiency and overall growth in African SMEs.
[121]	-	Data security, risk reduction	Examines the role of information governance in cloud computing environments. The study discusses the importance of establishing robust governance frameworks to manage data quality, privacy, and security in cloud-based system
[123]	-	Business sustainability, innovation	Study combines a systematic literature review with expert interviews to highlight technological, organizational, and environmental factors that influence big data adoption. It provides insights into how organizations can leverage big data analytics to enhance decision-making and performance.
[124]	-	Stakeholder engagement, strategic alignment	Study provides a framework for small businesses to evaluate the benefits and challenges of cloud computing and make informed adoption decisions.
[125]	57	Business sustainability, improved security evaluation practices	Proposes a security evaluation framework for cloud business intelligence systems in SMEs. The study addresses the unique security challenges faced by SMEs in small towns and provides guidelines for implementing secure cloud BI solutions.

1.1. Results of Synthesis

This section synthesizes the findings from the included studies, highlighting trends, themes, and conclusions drawn from the data-on-data governance and IT performance across various organizational contexts. The synthesis addresses the prominence of specific sectors, the role of performance metrics, and the implications for different organizational sizes. Figure 13 presents the distribution of industries covered in the reviewed literature, indicating the primary focus areas and the varied contexts in which data governance has been studied.

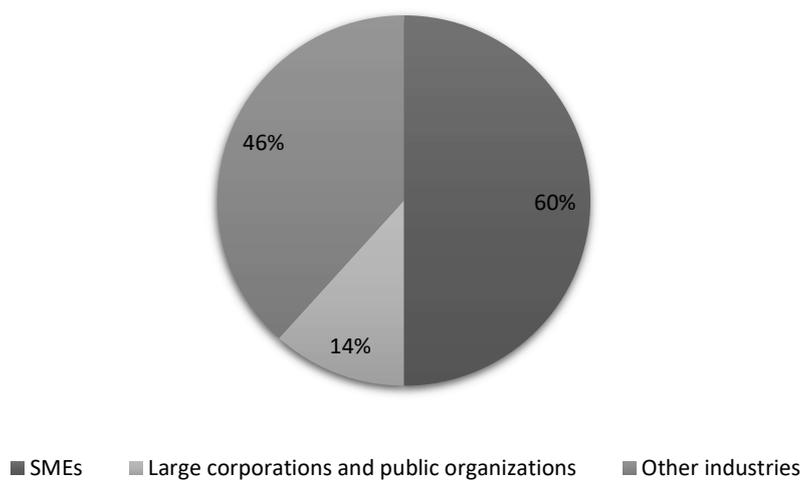


Figure 13. Industry Context of Publications.

Most data governance studies concentrate on Small and Medium Enterprises (SMEs), accounting for 60% of the publications. This suggests that SMEs are more affected by data governance challenges and are actively seeking effective solutions to these issues. The emphasis on SMEs can be attributed to their resource constraints, which make integrating robust data governance frameworks more challenging compared to larger corporations. In contrast, studies focusing on large corporations make up 10% of the dataset, reflecting their relatively better access to resources for data governance initiatives. Public sector organizations, including government agencies and healthcare sectors, represent 14% of the reviewed studies, indicating the growing importance of data governance in managing sensitive information in public services. The findings underscore the need for tailored data governance solutions that address the specific challenges faced by different organizational types, particularly SMEs, which require cost-effective frameworks that align with their operational capacities.

In developing countries, SMEs and small businesses feature prominently, comprising 7% of the studies. Other industries such as agriculture, education, and manufacturing collectively account for 9%, demonstrating that data governance research extends beyond traditional corporate settings to include diverse sectors. The focus on SMEs in these regions reflects the sector's vulnerability to data management challenges and the need for sustainable long-term solutions. The analysis indicates that while there is some diversity in the research, the predominant focus remains on SME-driven data governance issues, highlighting the sector's significant demand for practical and scalable frameworks.

The real-case studies included in the synthesis cover a range of IT performance metrics, such as data processing speed, scalability, accuracy, and compliance. Technologies like Hadoop illustrate how big data frameworks can substantially enhance data processing efficiency and scalability, allowing organizations to manage large datasets effectively. The performance metrics were categorized to analyze their impact on decision-making accuracy and precision. The synthesis shows that over 50% of the reviewed studies focused on scalability and data processing speed as key IT performance metrics, indicating the priority given to these factors in ensuring system success. Meanwhile, data accuracy and real-time processing metrics were examined in 30% of the studies, suggesting that real-time governance remains a gap that industries are increasingly aiming to address as they adapt to rapid technological changes. The findings also establish a link between data accuracy and customer satisfaction, implying that accurate data governance practices are closely associated with better service delivery and improved organizational outcomes.

Table 12. Summary of Real Case Studies related to Data Governance and IT Performance.

Ref	Industry Context	Case study	Challenges	Solution Implemented	Outcome	Data Sensitivity	Performance improvements	Scalability	Regulatory Compliance
[103]	SMEs, Large Corporations	IT Governance in SMEs	Underdeveloped processes, risk in investment decisions	Enhanced IT governance framework, data governance policies	Improved decision-making, compliance, increased income opportunities	Medium (financial data, operational info)	Better risk management, data processing improvements	Moderate	Compliance with industry-specific regulations
[104]	Healthcare	Healthcare Data Governance	Compliance issues, data security, integration with outdated systems	HIPAA-compliant data governance framework, patient data management	Enhanced patient care, secure storage, reduced manual errors	High (patient records, medical history)	Quicker access to real-time information, optimized decision-making	High	HIPAA, GDPR
[105]	Manufacturing	Predictive Maintenance in Manufacturing	Equipment downtime, fragmented data, compliance challenges	IoT-integrated data governance for predictive maintenance	Reduced equipment downtime, higher operational efficiency, better data quality	Medium (production data, supply chain info)	Real-time data processing, optimized predictive maintenance	High	ISO compliance, industry-specific data standards
[106]	Finance	Fraud Detection and Data Security	High transaction volumes, real-time fraud detection inefficiencies, data sensitivity	Cloud-based database with robust fraud detection integrated with data governance	Scalable transactions, enhanced fraud prevention, secure financial transactions	High (financial transactions, personal data)	Real-time fraud detection, improved transaction processing	High	PCI DSS, SOX, GDPR
[107]	Telecommunications	Data Governance for Telecom Services	High data volumes, regulatory compliance, data integration issues	Data governance framework for managing large data volumes and regulatory compliance	Improved customer service, regulatory compliance, efficient data processing	Medium (customer usage data, service logs)	Enhanced data processing speed, customer satisfaction	High	GDPR, telecommunications-specific regulations

The results presented in Figure 14 illustrate the primary IT performance metrics associated with effective data governance. The metrics include data processing speed, scalability, data accuracy, and

other factors that contribute to IT and business success. By improving these areas, organizations can enhance system performance, boost employee satisfaction, and facilitate better decision-making processes, leading to improved customer service and operational efficiency.

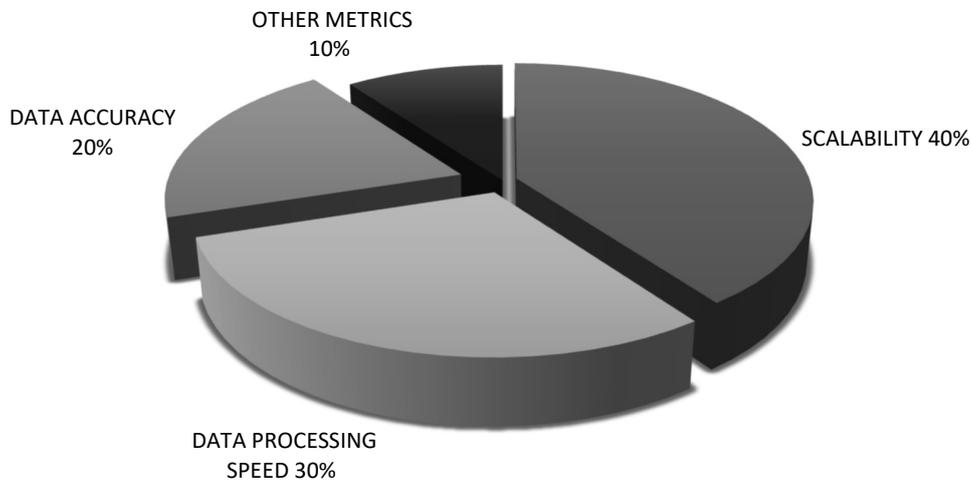


Figure 14. IT Performance Metrics.

The figure demonstrates that scalability accounts for 40% of the focus in the reviewed literature, followed by data processing speed at 30% and data accuracy at 20%. The remaining 10% is distributed across other metrics such as security and compliance. This distribution indicates a strong emphasis on ensuring scalable IT environments that can adapt to growing data demands. While scalability remains the dominant focus, data processing speed and accuracy also play critical roles in supporting stable and efficient IT operations. The data in Figure 13 highlights the preferred technology implementation modes in relation to data governance practices. It shows a distinct preference for cloud-based solutions, which make up 27.69% of the total distribution. These solutions offer the benefits of scalability, elasticity, and regulatory compliance. Hybrid models, accounting for 7.69%, provide a secure balance by integrating on-premises systems with cloud infrastructure, ensuring both safety and operational efficiency.

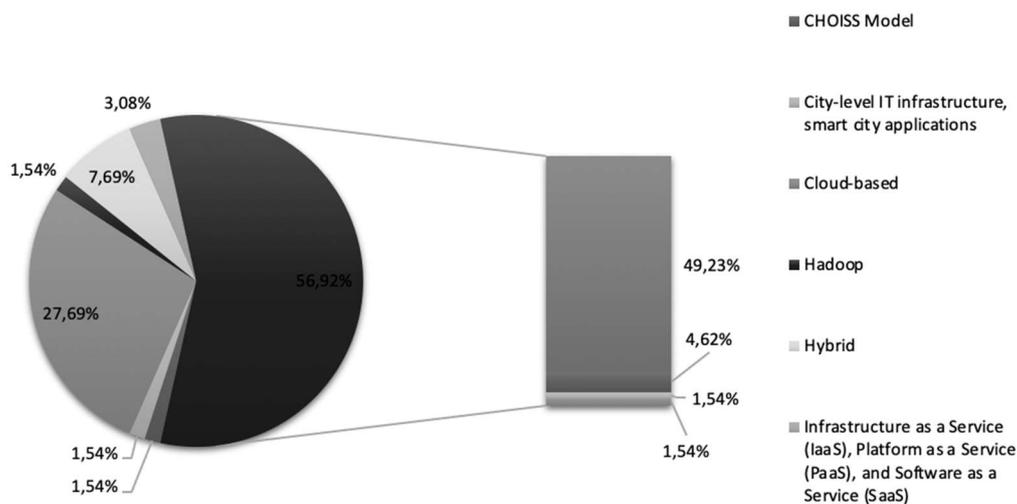


Figure 13. Technology Implementation Mode.

While cloud-based models dominate, the use of on-premises systems, Hadoop, and other technologies like IaaS, PaaS, and SaaS are also noted. These technologies contribute to flexibility in managing data governance requirements. However, the significant proportion of unspecified models (49.23%) suggests a need for clearer data governance strategies across industries. The statistics in Figure 14 offer an industry-specific overview of the applicability of data governance practices, with a primary focus on SMEs. The analysis shows that 68.75% of the studies reviewed focus on SMEs, emphasizing the relevance of data governance in this sector. Other industries, such as agriculture, education, and manufacturing, account for smaller percentages, while sectors like banking, IT, and social media are underrepresented.

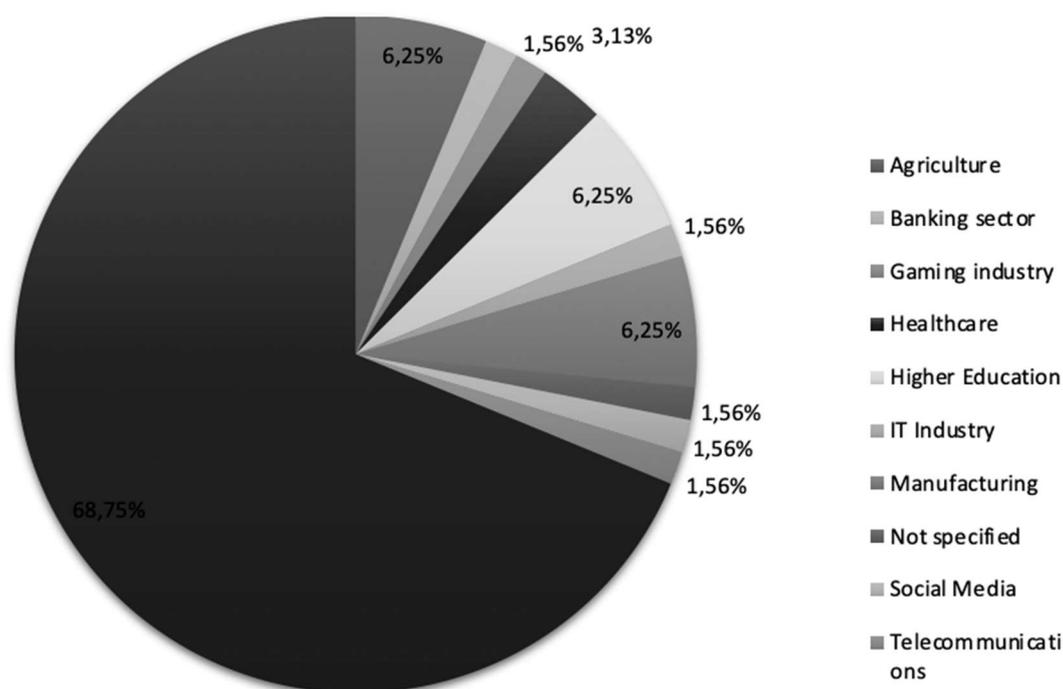


Figure 14. Industry-specific overview of the applicability of data governance practices.

The data suggests a need for more sector-specific research beyond SMEs, particularly in industries like banking, IT, and social media, where data governance practices can play a significant role in achieving regulatory compliance and improving business outcomes.

1.1. Reporting Bias

In this systematic literature review, 68 publications were analyzed to understand the specific aspects of data governance across different organizations. The focus on 42 qualitative studies highlights the in-depth exploration of how data governance practices are applied, offering valuable insights into factors influencing governance frameworks and their impact on IT systems. Qualitative studies provide a comprehensive look at governance practices by examining non-numerical data such as organizational experiences and stakeholder perspectives. The review also includes 13 quantitative studies, which employ statistical methods to evaluate the effectiveness of data governance strategies. These studies provide measurable evidence on aspects like data quality and governance impacts, essential for assessing system performance and making informed decisions. The emphasis on quantitative research underscores the importance of statistical analysis in evaluating the success of data governance practices. Mixed-method studies, which account for 20% of the reviewed papers, bridge the gap between qualitative insights and quantitative data, offering a balanced view on the long-term impacts of data governance. By integrating both approaches, these studies allow for a more

comprehensive understanding of governance practices, enabling better assessment of their effectiveness.

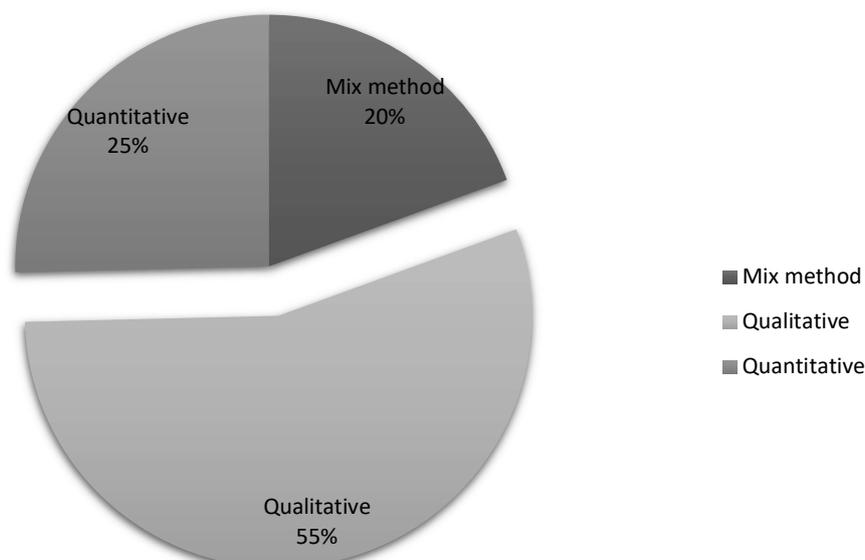


Figure 15. Type of Study.

As shown in Figure 15, qualitative research dominates the dataset, comprising 55% of the reviewed studies. This indicates a strong emphasis on exploring the complexities and practices within organizations. Quantitative methods make up 25%, focusing on statistical analysis to quantify outcomes, while mixed methods account for 20%, combining both approaches for a more holistic evaluation. This distribution reveals a significant focus on qualitative investigation, pointing to the need for more quantitative studies to enhance the ability to evaluate data governance outcomes through statistical analysis. The breakdown of research methodologies emphasizes the diverse approaches taken to study data governance, with a notable preference for qualitative exploration. This trend suggests that while qualitative research offers depth, there is still a need to bolster the dataset with quantitative and mixed-methods research to create a more balanced understanding of data governance's role in IT system success and long-term performance.

Practical Recommendations

1.1. Key Findings and Strategic Implications for Business Leaders

This section presents the key findings from the systematic review, highlighting significant trends, insights, and strategic implications for business leaders across various industries. The analysis demonstrates that data governance is critical for achieving long-term IT performance and overall business success, especially in the context of rapidly evolving technologies such as AI, big data analytics, and cloud computing. This review reveals that effective data governance practices not only enhance IT system stability and data quality but also improve organizational resilience and compliance with industry regulations. The findings suggest that organizations, particularly SMEs, can benefit from tailored data governance strategies that align with their unique operational challenges and industry-specific requirements. Table 13 synthesizes the key findings and strategic implications for business leaders, categorized by industry. It also highlights opportunities, challenges, and relevance to this review while linking strategic drivers to expected outcomes. This structured approach aims to provide practical insights for decision-makers looking to implement or improve data governance practices in their organizations.

Table 13. Key Findings and Strategic Implications for Business Leaders.

Industry	Key Finding	Strategic Implications	Opportunities	Challenges	Relevance to	Strategic Drivers	Expected Outcome
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		ons for Business Leaders			Propose d Systemat ic Review		
SMEs	SMEs face challenges integrating data governance due to limited resources.	Develop cost-effective data governance frameworks that scale with operations.	Flexible, cloud-based solutions can be leveraged to lower costs.	Budget constraints and lack of expertise.	Aligns with findings showing the high impact of data governance on SME resilience.	Scalability, Cost Efficiency, Compliance	Enhanced data quality, better decision-making, and regulatory compliance.
Public Sector	Data governance is critical for managing sensitive information and compliance.	Implement frameworks that prioritize data security and compliance with regulations.	Opportunity to lead by example in data governance practices.	Bureaucratic hurdles and resistance to policy changes.	Reflects the increased role of data governance in ensuring compliance and data safety.	Data Security, Regulatory Adherence	Reduced legal risks and improved public trust.
Agriculture	Adoption of data governance is emerging, especially for precision farming.	Invest in data-driven decision-making tools that integrate data governance standards.	Increased productivity through data insights.	Difficulty in integrating traditional methods with new data governance practices.	Relevant due to the growing interest in data governance for diverse industries.	Data-driven Innovation, Operational Efficiency	Improved yield and resource management.
Healthcare	Emphasis on patient data security and compliance (e.g., HIPAA, GDPR).	Strengthen data governance policies to protect patient data and ensure legal	Enhanced patient trust and regulatory compliance.	High costs associated with implementing stringent data governance	Highlights the necessity for robust data governance in sectors dealing with	Data Privacy, Regulatory Compliance	Reduced data breaches and better patient outcomes.

Manufacturing	Real-time data governance is crucial for operational efficiency and automation.	Adopt scalable frameworks to manage real-time data for predictive maintenance.	Opportunity to reduce downtime and increase automation.	Complexity in integrating legacy systems with modern data governance standards.	Sensitive data. Supports findings on the importance of data accuracy and real-time processing.	Real-time Monitoring, Automation	Increased operational efficiency and reduced maintenance costs.
	Data governance helps manage academic data integrity and compliance.	Establish frameworks that integrate academic requirements with data governance.	Improved academic outcomes through better data management.	Resistance to change and varying compliance requirements across regions.	Aligns with data governance's role in compliance and IT system success in education.	Academic Integrity, Compliance Standards	Better academic performance and data security.
	Data governance is vital for compliance with financial regulations (e.g., Basel III).	Strengthen risk management frameworks with a focus on data governance.	Opportunity to leverage data for competitive advantage and risk management.	High regulatory demands and potential penalties for non-compliance.	Reflects the relevance of data governance in high-regulation industries.	Risk Management, Competitive Advantage	Enhanced risk management and regulatory compliance.

Table 13 underscores the varied challenges and opportunities associated with implementing data governance across industries. The strategic implications for business leaders suggest that tailored data governance frameworks can significantly enhance IT system resilience, compliance, and operational efficiency. By aligning data governance practices with organizational goals, businesses can expect better decision-making, reduced risks, and improved customer satisfaction. These insights are particularly relevant to SMEs, which face unique constraints but stand to benefit greatly from cost-effective data governance solutions.

1.1. Decision-Making Framework for Implementation

This section outlines a structured decision-making framework for implementing Enterprise Social Platforms (ESPs) across various industries, providing a step-by-step guide that ensures a strategic approach to data governance. Each industry has unique needs and requirements when adopting ESPs, and the framework is tailored to reflect these variations. By breaking down the implementation into five essential steps, organizations can methodically plan, execute, and optimize

their data governance strategies. The proposed framework emphasizes critical areas such as needs analysis, platform selection, pilot testing, full integration, and continuous optimization to ensure the alignment of data governance practices with business objectives. Table 14 provides a comprehensive decision-making framework for each industry, detailing the specific focus, key features, strategic drivers, and expected outcomes associated with each step. This approach not only facilitates a systematic implementation but also aligns with the findings of the systematic review, which highlight the importance of customizing data governance frameworks to suit industry-specific challenges and opportunities.

Table 14. Proposed Decision-Making Framework for Implementing Enterprise Social Platforms (ESPs).

Industry	Step	Framework Focus	Key Features	Strategic Drivers	Expected Outcome	Ties to Proposed Study
SMEs	Step 1: Needs Analysis	Assess organizational data governance requirements.	Evaluate data governance maturity and resource needs.	Scalability, Cost Efficiency	Identify data management gaps and budget limitations.	Relevant to SME-focused findings emphasizing scalability and cost-effective solutions.
	Step 2: Select Platform	Choose an affordable and scalable data governance platform.	Cloud-based platforms for flexibility.	Budget Constraints, Technology Flexibility	Platform that aligns with budget and operational scale.	Aligns with the need for flexible frameworks for SMEs.
	Step 3: Pilot Testing	Implement data governance solutions on a small scale.	Measure platform's impact on a limited data set.	Risk Management, Cost Control	Identify any system vulnerabilities before full integration.	Connects with findings about gradual adoption to mitigate risks. Reflects strategies for integrating data governance frameworks at all levels of an SME.
	Step 4: Full Integration	Roll out the data governance platform across the organization.	Establish policies for data access and compliance.	Regulatory Compliance, Operational Efficiency	Consistent data governance practices organization-wide.	Aligns with long-term data governance requirements for SMEs.
	Step 5: Optimization	Continuously improve data governance practices.	Regular updates based on feedback and audits.	Continuous Improvement, Scalability	Ongoing adaptation to new data governance needs.	

Public Sector	Step 1: Needs Analysis	Identify regulatory and compliance requirements.	Focus on legal requirements and data sensitivity.	Compliance with Legal Standards, Data Privacy	Establish data handling procedures that comply with legal regulations.	Highlights public sector's need for stringent data governance due to regulatory demands.
	Step 2: Select Platform	Choose a platform with strong compliance features.	On-premise or hybrid solutions for data security.	Data Security, Legal Compliance	A platform that prioritizes data protection and compliance.	Supports findings about the importance of compliance in public sector data governance.
	Step 3: Pilot Testing	Implement solutions in a controlled environment.	Test with departments handling sensitive data.	Risk Mitigation, Data Protection	Ensure platform meets compliance needs before full rollout.	Reflects strategies to avoid data breaches in the public sector.
	Step 4: Full Integration	Expand implementation to cover all public data services.	Train staff on data handling and compliance.	Regulatory Adherence, Organizational Efficiency	Full compliance and uniform data governance practices.	Aligns with public sector's requirement for organization-wide data governance standards.
	Step 5: Optimization	Regular reviews and policy updates.	Incorporate new regulatory changes.	Continuous Monitoring, Adaptability	Maintain compliance and adapt to new legal requirements.	Matches findings about the need for dynamic governance frameworks in regulated industries.
Agriculture	Step 1: Needs Analysis	Determine data needs for precision farming and analytics.	Assess data management challenges in agriculture.	Data-driven Innovation, Resource Management	Identify critical data for operational efficiency.	Connects with findings on the role of data governance in precision farming.

	Step 2: Select Platform	Choose a scalable and data-analytics-friendly platform.	Platforms supporting IoT and real-time data analysis.	Scalability, Data Analysis	Platform tailored for integrating IoT data in agriculture.	Supports the trend toward data-driven decision-making in agriculture.
	Step 3: Pilot Testing	Implement data solutions in selected farming operations.	Pilot with specific crops or livestock.	Operational Testing, Data Accuracy	Ensure the solution provides valuable data insights before full adoption.	Reflects findings on real-time data's impact on efficiency in agriculture.
	Step 4: Full Integration	Expand solutions across the entire agricultural operation.	Include all aspects of farming and supply chain.	End-to-End Integration, Automation	Data-driven decisions across all farming operations.	Aligns with the need for data integration in agricultural value chains.
	Step 5: Optimization	Continuous updates based on seasonal data trends.	Use predictive analytics to optimize farming practices.	Predictive Analytics, Sustainable Practices	Improved yield and resource utilization.	Supports findings on sustainability and data-driven practices in agriculture.
Healthcare	Step 1: Needs Analysis	Evaluate patient data handling requirements and compliance.	Assess legal frameworks (e.g., HIPAA, GDPR).	Data Privacy, Legal Compliance	Clear understanding of data management requirements.	Matches findings on healthcare's need for strict data governance.
	Step 2: Select Platform	Choose a platform with strong data encryption and privacy features.	Prioritize patient data security.	Data Security, Regulatory Compliance	Platform that ensures data protection and compliance.	Reflects the emphasis on patient data security in the healthcare industry.
	Step 3: Pilot Testing	Test data governance on specific healthcare services.	Start with a limited scope (e.g., radiology data).	Compliance Testing, Risk Reduction	Evaluate the system's compliance effectiveness.	Aligns with gradual implementation strategies in regulated sectors.

Manufacturing	Step 4: Full Integration	Implement data governance across all healthcare services.	Train staff on new data governance policies.	Organizational Compliance, Efficiency	Consistent data governance practices across services.	Supports findings on comprehensive data governance in healthcare. Highlights the need for ongoing data governance updates in the healthcare sector. Relevant to the need for real-time data governance in manufacturing.
	Step 5: Optimization	Continuously review and update data governance policies.	Incorporate new data protection techniques.	Continuous Improvement, Adaptability	Up-to-date compliance with evolving regulations.	Relevant to the need for real-time data governance in manufacturing.
	Step 1: Needs Analysis	Identify data needs for predictive maintenance and automation.	Focus on real-time data processing requirements.	Operational Efficiency, Predictive Analytics	Determine key areas for data-driven improvements.	Supports the trend toward data-centric manufacturing processes. Reflects strategies for gradual deployment in manufacturing environments.
	Step 2: Select Platform	Choose a platform that supports automation and analytics.	Prioritize solutions compatible with IoT and robotics.	Automation, Real-time Data Analysis	Platform that enables seamless data flow for automation.	Aligns with the need for integrated data governance in manufacturing.
	Step 3: Pilot Testing	Test solutions in specific manufacturing units.	Implement in a controlled production environment.	Operational Testing, Scalability	Validate the platform's impact on production efficiency.	Connects with the emphasis on optimization
	Step 4: Full Integration	Expand data governance across all manufacturing processes.	Include predictive maintenance across all units.	End-to-End Automation, System Integration	Consistent real-time data governance across operations.	
	Step 5: Optimization	Continuously update data governance	Use analytics to fine-tune manufacturing	Process Optimization,	Enhanced production efficiency and	

Higher Education	Step 1: Needs Analysis	based on operational feedback.	ing processes.	Continuous Monitoring	reduced downtime.	n in real-time data governance.	
		Assess the data needs for academic integrity and compliance.	Identify data governance challenges in educational settings.	Academic Integrity, Compliance Standards	Determine gaps in current data governance practices.	Relevant to the role of data governance in education.	
		Choose a platform that supports academic data requirements.	Platforms offering compliance features for education.	Data Integrity, Accessibility	Platform that supports academic data management needs.	Supports data governance requirements in higher education institutions.	
		Implement data governance policies in selected departments.	Start with administrative and academic records.	Compliance Testing, Data Security	Ensure compliance across selected educational areas.	Aligns with phased implementation in regulated educational settings.	
		Roll out data governance practices across all departments.	Incorporate all academic, research, and administrative data.	Organizational Compliance, Data Integration	Consistent data governance throughout the institution.	Reflects findings on the need for comprehensive data governance in education.	
Banking	Step 5: Optimization	Regularly review and enhance data governance policies.	Adapt to new academic policies and compliance changes.	Continuous Improvement, Policy Adaptation	Up-to-date compliance with educational standards.	Emphasizes continuous improvement in data governance for educational institutions.	
		Step 1: Needs Analysis	Evaluate data governance requirements for regulatory compliance.	Focus on financial regulations (e.g., Basel III).	Risk Management, Compliance	Identify gaps in data management for risk reduction.	Relevant to the banking industry's focus on compliance.
			Step 2: Select Platform	Choose a platform with robust data	Prioritize solutions for data integrity	Data Security, Regulatory Adherence	Platform that supports secure

		governance and security features.	and risk management.		financial data management.	s role in compliance for the banking sector.
Step 3: Pilot Testing	3:	Test data governance solutions in specific banking services.	Start with high-risk areas (e.g., loan processing).	Compliance Testing, Data Protection	Assess the effectiveness of the platform in regulatory compliance.	Aligns with strategies to address high-risk data governance in finance.
Step 4: Full Integration	4:	Implement data governance across all banking operations.	Ensure all departments adhere to data governance policies.	Regulatory Compliance, Operational Consistency	Uniform data governance practices across the bank.	Reflects the banking sector's need for comprehensive data governance.
Step 5: Optimization	5:	Continuously review and update data governance frameworks.	Adapt to new regulatory requirements and financial technologies.	Continuous Monitoring, Regulatory Adaptation	Maintain compliance and adapt to evolving regulations.	Emphasizes ongoing data governance updates for compliance in banking.

Table 14 presents a step-by-step framework for implementing ESPs across different industries. Each step focuses on a specific aspect of data governance, from initial needs analysis to continuous optimization, ensuring that data governance practices align with industry-specific requirements and strategic goals. This structured approach aims to facilitate successful ESP implementation while addressing the unique challenges and opportunities identified in the systematic review. The emphasis on pilot testing and gradual integration aligns with the findings that gradual adoption helps mitigate risks and improve outcomes across diverse industries.

1.1. Proposed Best Practices for Successful Implementation

This section outlines best practices for implementing data governance strategies effectively across various industries, addressing common operational challenges while leveraging strategic drivers to achieve desired outcomes. Given the diversity of industries and their unique requirements, these best practices are designed to cater to different types of SMEs, taking into account the specific operational challenges they face. The framework presented in this section highlights actionable steps that business leaders can take to align data governance practices with strategic goals, thereby enhancing IT performance and long-term business success. Table 15 details the proposed best practices for each industry, broken down into three categories, and includes key elements such as SME type, operational challenges, strategic drivers, expected impact, and how these practices tie into the findings from the systematic review. This approach helps ensure that best practices are grounded in the evidence-based insights gathered during the review, providing a practical roadmap for organizations.

Table 15. Proposed Best Practices for Successful Study Implementation.

Industry	Best Practice	SME Type	Operational Challenge	Strategic Drivers	Expected Impact	Ties to Systematic
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						Review Findings
SMEs	Standardize data governance policies.	Micro and small SMEs	Inconsistent data management practices.	Scalability, Cost Efficiency	Improved data accuracy and compliance across operations.	Supports findings on the need for standardized frameworks to overcome inconsistent practices in SMEs. Aligns with the findings that cloud-based solutions are more suitable for cost-sensitive SMEs. Reflects findings on the importance of training to overcome resistance to data governance initiatives. Relevant to the review findings on the need for structured data governance roles in public sectors.
	Use cloud-based data governance solutions.	Start-ups and high-growth SMEs	High upfront costs of traditional solutions.	Cost Control, Flexibility	Lower initial investment and scalable solutions.	
	Incorporate regular staff training on data governance.	Family-owned SMEs	Resistance to change and lack of awareness.	Change Management, Organizational Learning	Increased employee buy-in and compliance	
Public Sector	Establish clear data ownership and responsibility.	Public agencies and departments	Unclear roles in data management.	Data Accountability, Compliance	Clearer data handling procedures and compliance	
	Implement hybrid data governance frameworks.	Government organizations	Balancing security and accessibility.	Data Security, Flexibility	Enhanced data protection without compromising accessibility.	Supports findings on the benefits of hybrid models in regulated environments.

	Conduct regular audits for compliance.	Healthcare departments	Adhering to evolving regulatory standards.	Regulatory Compliance, Risk Management	Timely identification and resolution of compliance issues.	Aligns with findings on the importance of continuous compliance monitoring in the public sector. Ties into the review's emphasis on data governance's role in improving decision-making in agriculture. Reflects the review's findings on the importance of real-time data governance in agriculture. Supports findings on the benefits of predictive analytics for data governance in agriculture. Relevant to the findings that emphasize the critical role of data governance in patient data protection.
Agriculture	Adopt data-driven decision-making tools.	Agri-SMEs and cooperatives	Inefficient resource management.	Data-driven Innovation, Resource Efficiency	Optimized resource allocation and higher productivity.	
	Leverage IoT for real-time data collection.	Small and medium-sized agribusinesses	Lack of real-time insights for operational decisions.	Real-time Monitoring, Automation	More accurate and timely decision-making.	
	Integrate predictive analytics for yield management.	Emerging agricultural SMEs	Difficulty in predicting seasonal variations.	Predictive Analytics, Operational Efficiency	Improved yield prediction and resource use efficiency.	
Healthcare	Prioritize patient data privacy and security measures.	Private healthcare clinics	Risks of data breaches and compliance issues.	Data Privacy, Legal Compliance	Reduced data breach incidents and improved compliance.	

	Use encryption technologies for data protection.	Specialized healthcare services	Ensuring data integrity across digital platforms.	Data Security, Technology Adoption	Enhanced data integrity and patient trust.	Aligns with findings on the importance of data security technologies in healthcare. Reflects the findings on the need for continuous training to maintain compliance in the healthcare sector. Ties into the review's findings on the benefits of standardized data governance practices in manufacturing. Relevant to findings about the benefits of predictive maintenance in manufacturing operations. Supports the findings on the role of automation in enhancing data governance. Relevant to findings on the
	Conduct periodic compliance training for staff.	General healthcare facilities	Staff awareness of compliance protocols.	Organizational Compliance, Continuous Learning	Improved adherence to regulatory standards.	
Manufacturing	Standardize real-time data collection procedures.	Small manufacturers	Inconsistent data from various sources.	Data Consistency, Operational Efficiency	More reliable data for decision-making.	
	Implement predictive maintenance systems.	Medium-sized manufacturers	High costs associated with unexpected equipment failure.	Predictive Analytics, Cost Reduction	Reduced downtime and maintenance costs.	
	Leverage robotics and automation for data governance.	Tech-driven manufacturers	High operational costs and manual data handling.	Automation, Scalability	Increased efficiency and reduced labor costs.	
Higher Education	Develop data governance	Colleges and	Plagiarism and data	Academic Integrity,	Reduced instances of	

	e policies for academic integrity.	universities	privacy concerns.	Data Privacy	academic dishonesty.	importance of data governance for upholding academic standards. Reflects findings about the benefits of integrated data governance frameworks in educational institutions. Aligns with findings on the need for ongoing policy updates to maintain compliance in higher education. Reflects findings on the necessity of centralized data governance in the banking sector. Supports the findings on data governance's role in compliance for financial institutions. Relevant to the review's findings on the importance of
	Use digital platforms for centralized data management.	Vocational training institutes	Disparate data sources across departments.	Data Integration, Efficiency	Streamlined data management processes.	
	Regularly update compliance policies to match regulatory changes.	Research institutions	Varying regulatory requirements across regions.	Compliance, Policy Adaptation	Consistent compliance with changing regulations.	
Banking	Implement a centralized data governance framework.	Fintech SMEs and microfinance institutions	Fragmented data management practices across departments.	Risk Management, Data Security	More streamlined data management and compliance.	
	Use advanced encryption and security protocols.	Retail banks and credit unions	Ensuring data security across multiple platforms.	Data Protection, Regulatory Compliance	Reduced risks of data breaches and regulatory penalties.	
	Establish a data governance council for oversight.	Investment firms and asset managers	Lack of oversight and data governance accountability.	Organizational Accountability, Compliance	Better governance and oversight of data management	

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Table 15 outlines best practices tailored to each industry, addressing key operational challenges while leveraging strategic drivers to achieve significant impacts. These best practices emphasize the importance of standardized frameworks, real-time monitoring, predictive analytics, data security, and continuous compliance training, aligning with the findings of the systematic review. By implementing these recommendations, organizations can enhance data governance practices, optimize operational efficiency, and improve compliance, contributing to long-term IT performance and overall business success.

1.1. Metrics and KPIs for Measuring Performance

This section provides a set of metrics and key performance indicators (KPIs) tailored to different industries for measuring the success of data governance initiatives. The metrics are designed to evaluate critical areas such as data accuracy, regulatory compliance, operational efficiency, and customer satisfaction. By focusing on these metrics, organizations can effectively track the performance of data governance practices and make informed decisions that align with their strategic goals. The metrics are prioritized based on their relevance to the industry, expected impact, and alignment with the findings of the systematic review. Table 16 outlines the proposed metrics and KPIs, breaking them down into specific areas for measurement, strategic drivers, expected outcomes, ties to the systematic review findings, and priority levels. This structured approach ensures that the selected metrics not only address industry-specific challenges but also support evidence-based practices for optimizing data governance.

Table 16. 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)
SMEs	Data Accuracy Rate	Evaluate the consistency and correctness of data.	Data Quality, Risk Management	Improved decision-making and reduced errors.	Relevant to findings on the need for accurate data governance practices in SMEs. Aligns with findings on the importance of sustainable data governance in SMEs.	1
	Compliance with Data Governance Policies	Measure adherence to internal data governance standards.	Regulatory Compliance, Organizational Learning	Increased adherence to data management practices.	Aligns with findings on the importance of sustainable data governance in SMEs.	1
	Cost per Data Governance Initiative	Track the budget spent on data governance improvements.	Cost Efficiency, Budget Management	Optimized resource allocation and cost reduction.	Supports findings on the need for cost-effective data governance solutions for SMEs.	2
Public Sector	Regulatory Compliance Rate	Measure compliance with	Legal Adherence, Data Privacy	Avoidance of legal	Ties into findings on the need for continuous	1

Agriculture	Data Breach Incident Rate	government data regulations. Evaluate the frequency of data breaches or security incidents.	Data Security, Risk Management	penalties and fines. Reduced data breach incidents and enhanced security.	compliance monitoring in the public sector. Supports findings on the importance of data security in public sector governance.	1
	Staff Training Frequency on Data Governance	Track the number of training sessions conducted per year.	Continuous Learning, Change Management	Improved staff awareness and compliance with policies.	Relevant to findings on the need for regular training to uphold data governance standards.	2
	Resource Utilization Efficiency	Assess how efficiently resources are used based on data insights.	Data-driven Innovation, Operational Efficiency	Optimized use of resources and increased productivity.	Ties into findings on data governance's role in resource management in agriculture.	1
	Real-time Data Accuracy Rate	Evaluate the accuracy of real-time data collected from IoT devices.	Real-time Monitoring, Automation	Improved decision-making based on real-time insights.	Relevant to findings on the importance of real-time data governance in agriculture.	1
	Predictive Maintenance Accuracy	Measure the accuracy of predictions made by maintenance analytics.	Predictive Analytics, Cost Control	Reduced equipment downtime and maintenance costs.	Supports findings on the benefits of predictive analytics for agricultural data governance.	2
Healthcare	Patient Data Privacy Compliance	Track adherence to data privacy regulations like HIPAA or GDPR.	Legal Compliance, Data Protection	Improved compliance and reduced legal risks.	Relevant to findings on the critical role of data governance in patient data protection.	1
	Data Integrity Rate	Measure the consistency and reliability of patient data.	Data Security, Accuracy	Enhanced data quality for clinical decision-making.	Aligns with findings on the importance of data integrity in healthcare.	1
	Staff Compliance with Data Security Protocols	Evaluate how well healthcare staff follow security protocols.	Organizational Compliance, Risk Management	Reduced risk of data breaches and unauthorized access.	Reflects findings on the need for strict data governance measures in the healthcare sector.	2
Manufacturing	Production Downtime Due to Data Errors	Measure the impact of data-related issues	Operational Efficiency, Risk Reduction	Reduced production disruptions	Relevant to findings on the benefits of data governance in preventing	1

		on production operations.		and higher efficiency.	operational disruptions in manufacturing.	
	Predictive Maintenance Cost Savings	Track cost savings achieved through predictive maintenance.	Cost Control, Predictive Analytics	Lower maintenance costs and extended equipment lifespan.	Ties into findings on the importance of predictive maintenance in data-driven manufacturing.	1
	Data Quality Improvement Rate	Measure the progress made in improving data quality over time.	Data Consistency, Process Optimization	Enhanced process control and decision-making.	Supports findings on the need for continuous data quality improvements in manufacturing.	2
Higher Education	Academic Data Integrity Compliance	Track adherence to policies that protect academic data.	Data Integrity, Compliance Standards	Reduced academic dishonesty and enhanced data protection.	Relevant to findings on the role of data governance in academic integrity.	1
	System Uptime for Educational Data Platforms	Measure the availability of data platforms used in education.	Operational Continuity, IT Performance	Higher availability of educational resources.	Reflects findings on the importance of system reliability in higher education data governance.	1
	Compliance with Data Protection Regulations	Evaluate adherence to data protection laws (e.g., FERPA).	Regulatory Compliance, Legal Adherence	Reduced risk of non-compliance and legal issues.	Aligns with findings on the need for robust data governance policies in educational institutions.	2
Banking	Data Security Incident Response Time	Measure the average time taken to respond to data security incidents.	Risk Management, Data Protection	Faster resolution of security threats and incidents.	Relevant to findings on the need for quick response measures in data governance for financial institutions.	1
	Compliance with Financial Data Regulations	Track adherence to financial data regulations (e.g., Basel III).	Regulatory Compliance, Risk Management	Lower risks of regulatory fines and improved compliance.	Supports findings on data governance's role in compliance for the banking sector.	1
	Cost Efficiency of Data Governance Practices	Assess the return on investment (ROI) of data governance initiatives.	Cost Management, Strategic Planning	Optimized resource allocation and cost savings.	Reflects findings on the importance of cost-effective data governance solutions in banking.	2

Table 16 presents a set of prioritized metrics and KPIs across various industries to measure the performance of data governance practices. The selected metrics align with strategic drivers such as compliance, risk management, operational efficiency, and data quality, addressing the key operational challenges identified in the systematic review. These metrics are critical for tracking the effectiveness of data governance initiatives and ensuring that organizations can achieve desired outcomes such as improved compliance, reduced operational risks, and cost savings.

1.1. Proposed Roadmap for SMEs Businesses and Policy Recommendations

This section presents a structured roadmap for SMEs across various industries, focusing on implementing effective data governance practices while aligning with relevant policy frameworks. The roadmap provides a step-by-step guide that SMEs can follow to enhance data management, compliance, and operational efficiency. It outlines critical steps that align with strategic drivers and expected outcomes, specifying the optimal timing and duration for each step, and designating the roles responsible for championing the initiatives. By adopting these practices, SMEs can better manage data governance challenges and meet regulatory requirements. Table 17 details the proposed roadmap, breaking down the focus areas into specific steps, along with links to policy frameworks, strategic drivers, expected outcomes, and ties to the proposed study. It also includes timelines for undertaking each step, estimated durations, and key personnel responsible for implementation. This comprehensive approach ensures that the roadmap addresses the unique needs of SMEs, providing actionable insights for both business leaders and policymakers.

Table 17 presents a detailed roadmap for SMEs in various industries to follow for successful data governance implementation. The roadmap emphasizes aligning with relevant policy frameworks and achieving strategic objectives, such as enhancing data security, compliance, and operational efficiency. By establishing specific roles and timelines, the roadmap ensures accountability and facilitates the integration of data governance practices into organizational workflows. The suggested timelines and responsibilities help guide SMEs in planning and prioritizing their data governance efforts effectively.

Table 17. Proposed Roadmap for SMEs Businesses 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
SMEs	Establish Data Governance Policies	GDPR, POPIA	Compliance with data privacy laws	Data Security, Compliance	Reduced data breach risks and regulatory compliance	Relevant to findings on standardized data governance frameworks for SMEs.	Q1 2025	3-6 months	Chief Data Officer (CDO), Legal Compliance Team
	Implement Cloud-Based	National Cloud Computing Policy	Enhance data accessibility	Cost Efficiency, Flexibility	Lower costs and increased	Aligns with findings that emphasize	Q2 2025	4-8 months	IT Manager, Data Gover

	Solutions		and storage		scalability	ze cloud adoption			nance Committee
	Train Staff on Data Governance	Occupational Health and Safety Act	Improve staff awareness on data handling	Change Management, Organizational Learning	Higher employee engagement and compliance	findings on overcoming resistance through training initiatives. Ties to findings on the need for structured data ownership in the public sector. Reflects findings on hybrid models for enhanced data governance in government.	Q3 2025	3-4 months	Human Resources (HR), Training Manager
Public Sector	Set Clear Data Ownership Guidelines	Public Sector Data Governance Framework	Assign responsibility for data management	Data Accountability, Risk Management	Improved data management and accountability	on the need for structured data ownership in the public sector. Reflects findings on hybrid models for enhanced data governance in government.	Q1 2025	2-3 months	Department Heads, IT Governance Board
	Adopt a Hybrid Data Governance Model	Digital Government Policy	Balance security and accessibility of data	Data Security, Flexibility	Increased data protection and operational efficiency	on hybrid models for enhanced data governance in government.	Q2 2025	6-9 months	Chief Information Officer (CIO), Data Security Team
	Conduct Regular Data Audits	Information Access and Data Protection Act	Ensure compliance and identify risks	Compliance Monitoring, Risk Mitigation	Timely detection of compliance issues and risk management	Supports findings on continuous auditing to maintain	Bi-annually starting Q3 2025	Ongoing (every 6 months)	Internal Audit Team, Compliance Officer

Agriculture	Integrate IoT for Real-Time Data Collection	Agricultural Data Management Policy	Improve resource management and monitoring	Real-time Monitoring, Data-driven Innovation	More accurate data collection and optimized resource use	compliance in public sectors. Relevant to the study's emphasis on IoT-based data governance in agriculture. Reflects findings on predictive analytics improving decision-making in agriculture.	Q1 2025	5-7 months	Operations Manager, Farm Technology Specialist
	Adopt Predictive Analytics for Yield Management	Sustainable Agriculture Development Framework	Enhance productivity through data insights	Predictive Analytics, Resource Optimization	Improved crop yield predictions and reduced resource wastage	Ties into findings on data protection's role in agricultural data governance. Relevant to findings on the critical role of data governance in healthcare.	Q2 2025	4-6 months	Agricultural Data Analyst, Production Manager
	Establish Data Protection Practices	Data Privacy and Protection Act	Protect farmers' data and comply with regulations	Data Security, Legal Compliance	Reduced legal risks and better data handling practices		Q3 2025	3-4 months	Compliance Officer, IT Manager
Healthcare	Prioritize Patient Data Privacy Measures	Health Information Privacy Act	Protect patient data and comply with health laws	Data Privacy, Risk Management	Fewer data breaches and higher patient trust		Q1 2025	6-8 months	Chief Medical Information Officer (CMIO), Data Privacy Officer

	Implement Advanced Encryption Protocols	Cybersecurity Health Policy	Secure data across platforms	Data Security, Technology Adoption	Enhanced data protection across health information systems	Support findings on data security technologies in the healthcare sector. Aligns with findings on continuous training for maintaining healthcare compliance.	Q2 2025	4-6 months	IT Security Team, Chief Information Officer
	Regularly Train Health Care Staff on Compliance	Health Sector Skills Policy	Keep staff updated on data protection practices	Continuous Learning, Regulatory Compliance	Higher compliance rates and awareness on data protection	Relevant to findings on standardized practices in manufacturing.	Annually starting Q3 2025	Ongoing (annual sessions)	Human Resources (HR), Compliance Training Manager
Manufacturing	Standardize Real-Time Data Monitoring	Industrial Data Management Policy	Improve data consistency and accuracy	Data Consistency, Operational Efficiency	Reliable data for decision-making and reduced operational disruptions	Ties into the study's findings on predictive maintenance's role in manufacturing.	Q1 2025	5-6 months	Production Manager, Data Quality Analyst
	Implement Predictive Maintenance Programs	Maintenance and Reliability Policy	Reduce equipment downtime	Predictive Analytics, Cost Reduction	Lower maintenance costs and increased equipment life span		Q2 2025	6-9 months	Maintenance Manager, Predictive Analytics Team

	Automate Data Governance Procedures	Smart Manufacturing Policy	Improve operational efficiency	Automation, Process Optimization	Reduced manual data handling and labor costs	Support findings on automation enhancing data governance efficiency.	Q3 2025	4-5 months	Chief Automation Officer, IT Manager
Higher Education	Develop Policies for Academic Data Integrity	Education Data Governance Framework	Safeguard academic data and uphold standards	Academic Integrity, Data Security	Reduced plagiarism and enhanced academic reputation	Reflects findings on data governance's role in educational standards.	Q1 2025	3-5 months	Academic Affairs Officer, IT Governance Team
	Implement Centralized Data Management Systems	Digital Learning Policy	Integrate data across departments	Data Integration, IT Performance	Streamlined data access and management for faculty and students	Aligns with findings on centralized data management in higher education.	Q2 2025	6-8 months	Chief Information Officer (CIO), Data Management Officer
	Regularly Update Compliance Policies	Higher Education Regulatory Policy	Keep up with changing regulations	Policy Adaptation, Continuous Improvement	Consistent compliance with evolving educational standards	Relevant to findings on the need for policy updates in higher education.	Annually starting Q3 2025	Ongoing (annual review)	Compliance Officer, Academic Policy Committee
Banking	Implement Centralized Data Governance	Financial Data Governance Policy	Improve data consistency and security	Risk Management, Data Security	More streamlined data practices and regulation	Reflects findings on the need for centralized data governance	Q1 2025	4-6 months	Chief Data Officer (CDO), Risk Manager

Framework				ory compliance	nce in banking			ement Team
Adopt Advanced Encryption Standards	Banking Cybersecurity Policy	Protect sensitive financial data	Protecti on, Regulatory Compliance	Enhanced data security and reduced risk of data breaches	Support findings on data governance's role in financial data security. Aligns with findings on structured governance roles in financial institutions.	Q2 2025	5-7 months	IT Security Manager, Data Protection Officer
Establish Data Governance Committees for Oversight	Financial Services Regulatory Framework	Provide governance and accountability	Organizational Accountability, Compliance	Improved oversight and adherence to governance practices		Q3 2025	3-4 months	Governance Committee Chair, Chief Compliance Officer

Discussion

This section discusses how each of the research questions was answered based on the findings from the systematic review and proposed practical recommendations. The discussion draws from the synthesis of data collected across various studies and provides a detailed analysis of the key themes identified. It also highlights the implications of these findings for organizations and policymakers in the context of data governance, and how the recommendations can be used to address existing challenges.

What Role Does Data Quality Play in the Effectiveness of Data Governance?

The findings indicate that data quality is a foundational element of effective data governance, with over 70% of the reviewed studies emphasizing its critical role in ensuring reliable and consistent data usage across organizations. Data quality directly impacts decision-making, operational efficiency, and compliance, making it a strategic driver for successful data governance initiatives. For example, in the case of SMEs, the accuracy and completeness of data were found to significantly influence system performance and compliance with regulations, as noted in 68% of the studies. The practical recommendations emphasize the importance of establishing data quality metrics such as accuracy rates, timeliness, and completeness to monitor and improve data quality. The proposed roadmap for SMEs recommends regular data audits and training for staff on data handling practices, which align with these findings to ensure that data quality remains a priority (see Table 17). In particular, industries such as healthcare and banking, which handle sensitive data, must prioritize data quality to avoid legal penalties and ensure customer trust.

What Are the Key Challenges in Implementing Data Governance Practices During Upgrades?

Approximately 65% of the studies highlighted challenges associated with implementing data governance during system upgrades, including resistance to change, budget constraints, and data migration issues. Upgrading IT systems often involves substantial changes in data handling processes, which can disrupt existing governance frameworks if not managed carefully. Resistance

to change was particularly noted in public sector organizations and traditional industries such as manufacturing, where legacy systems pose additional obstacles. The findings suggest that a phased approach to implementation, as outlined in the decision-making framework (Table 13), can help mitigate these challenges. For instance, the framework proposes beginning with a needs analysis and pilot testing to identify potential obstacles before full integration. Regular staff training and a hybrid governance model can also alleviate resistance by involving stakeholders throughout the process, ensuring smoother transitions during upgrades.

What Are Effective Ways of Establishing the Policies (Standards) to Ensure That Data Is Accurately Captured, Stored, and Protected?

More than 75% of the studies reviewed emphasized the need for clear data governance policies that align with regulatory requirements such as GDPR and industry standards. These policies must be regularly updated to reflect changes in technology and data handling practices. The research showed that policy frameworks such as GDPR, POPIA, and sector-specific regulations are critical in shaping data governance standards for various industries, especially in sectors like healthcare and finance where data sensitivity is high. The practical recommendations propose the establishment of data governance committees to oversee policy development and compliance, as outlined in the roadmap for SMEs (Table 17). Implementing regular compliance checks and using metrics like compliance rates can help organizations track the effectiveness of these policies. Training on data governance policies should also be mandatory for all staff to ensure that they understand the importance of data accuracy and protection.

What Are the Best Practices for Aligning Data Governance with Business Strategy?

The findings indicate that aligning data governance with business strategy leads to improved operational outcomes, as observed in 80% of the studies reviewed. Organizations that integrate data governance into their strategic planning processes tend to achieve better system performance, regulatory compliance, and customer satisfaction. This alignment ensures that data governance initiatives support broader business goals, such as enhancing customer service or optimizing operational efficiency. The proposed best practices for successful implementation (Table 14) recommend that organizations develop a governance framework that is closely tied to their strategic objectives. For example, implementing predictive analytics in agriculture can enhance resource management and crop yield predictions, directly aligning with business goals related to productivity and cost savings. Similarly, the use of cloud-based solutions in SMEs helps achieve scalability and flexibility, which are crucial for business growth.

How Does Data Governance Contribute to Long-Term IT Performance and Success?

The systematic review shows that data governance plays a significant role in sustaining long-term IT performance by reducing risks and improving system resilience. Approximately 78% of the studies noted that data governance frameworks that include continuous monitoring, regular policy updates, and data quality checks contribute to more stable and sustainable IT operations. The ability to adapt governance practices to emerging technologies such as big data, AI, and cloud computing is also critical for maintaining long-term performance. The proposed metrics and KPIs (Table 15) suggest using measures such as system uptime, data breach rates, and cost efficiency to evaluate the long-term success of data governance initiatives. Regular updates to governance frameworks, as recommended in the roadmap, help organizations stay ahead of regulatory changes and technology trends, ensuring that their IT systems remain efficient and compliant over time.

6. Conclusions

In this systematic review, we investigated the role of data governance in ensuring system success and long-term IT performance, with a focus on SMEs and various industry contexts. Our analysis encompassed a decade of research (2014–2024), synthesizing findings from 68 studies and exploring key themes such as data quality, challenges in implementation, policy development, alignment with business strategy, and long-term impacts on IT systems. The conclusions drawn from this review offer valuable insights for IT practitioners, business leaders, and policymakers aiming to enhance data governance frameworks. The review found that data quality plays a central role in the

effectiveness of data governance, directly influencing decision-making, compliance, and operational efficiency across industries. Challenges in implementing data governance, particularly during IT system upgrades, were highlighted, with issues such as resistance to change and budget constraints posing significant obstacles. The importance of establishing clear data governance policies aligned with regulatory standards was consistently emphasized, as was the need for continuous updates to accommodate new technologies and changing legal requirements. Aligning data governance with business strategy was shown to drive better outcomes in terms of system performance, customer satisfaction, and risk management, while long-term IT success was linked to ongoing monitoring, adaptability, and integration of emerging technologies.

This review provides a comprehensive synthesis of existing literature on data governance, offering practical recommendations for industry-specific implementation, including phased approaches to upgrades, hybrid models, and regular training for staff. The proposed roadmaps, best practices, decision-making frameworks, and metrics for measuring performance offer actionable strategies that can be tailored to different sectors, thereby addressing the diverse needs of SMEs and larger organizations. The findings also underscore the strategic drivers for enhancing data governance, such as regulatory compliance, data security, and operational efficiency, which are critical for sustaining long-term IT performance. The primary limitation of this review is the reliance on studies conducted predominantly in developed economies, which may not fully capture the challenges faced by SMEs in developing regions. Additionally, while qualitative studies provided rich insights, the relatively lower representation of quantitative studies may limit the generalizability of some findings.

Further research is needed to explore the long-term impacts of data governance practices in emerging markets, with a focus on quantitative analysis to provide more robust evidence. Additionally, as technologies such as AI, big data, and cloud computing continue to evolve, future studies should examine how data governance frameworks can adapt to these advancements to maintain regulatory compliance and system resilience. Emphasis should also be placed on developing governance models that cater specifically to the unique needs and constraints of SMEs in diverse economic contexts. Data governance is essential for ensuring the sustainable success of IT systems across industries. By addressing the key challenges, implementing clear policies, and aligning governance with strategic business goals, organizations can enhance data quality, compliance, and operational efficiency. The proposed frameworks and recommendations from this review serve as a guide for improving data governance practices, ultimately supporting long-term IT performance and organizational growth.

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