

Data Governance Frameworks for Enabling Responsible AI in Small, Medium, and Micro Enterprises: A Systematic Literature Review

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Abstract. Disruptive technologies such as Artificial Intelligence (AI) have brought about changes in how organisations function. The adoption of AI has been applied in various industries, ranging from smart energy, smart transportation, smart health such as cancer treatment to managing automated cybersecurity threats and responding to sophisticated cyber threats. This presents opportunities and challenges as small, medium and micro enterprises (SMMEs) are also adopting AI to drive innovation, efficiency, and competitiveness. When compared to large organisations, SMMEs often lack the resources, expertise, and infrastructure necessary to implement comprehensive data governance frameworks, which are essential for responsible AI deployment. This study aims to investigate how data governance frameworks can enable responsible AI practices, specifically within the context of SMMEs. This study adopts a systematic literature review where the PRISMA framework is used to extract information on the data governance principles, challenges and opportunities that SMMEs can use for responsible AI. This study's findings reveal that effective governance plays a critical role in the adoption of AI within SMMEs. Existing data governance frameworks provide guidance, even though they are complex, which is a limitation for SMMEs. This study highlights opportunities for SMMEs in the data governance frameworks in enabling responsible AI. This study also reveals the need for a universal data governance framework.

Keywords: Data governance, Data governance frameworks, Artificial intelligence, SMMEs, Responsible AI

1. Introduction

Data is the new oil, where organisations have realized the importance of ensuring data is kept safe (Stach, 2023). The emergence of Artificial Intelligence (AI) has called for organisations to use AI responsibly. Organisations, be it large or small, medium, and micro enterprises (SMMEs), are tasked with the responsibility of ensuring that they follow data governance frameworks. SMMEs play a crucial role in the economy, from creating jobs to partnering with public sector organisations. The adoption of AI in SMMEs presents both opportunities and challenges. AI has been used by large and small enterprises to improve efficiency, improve customer engagement, and for innovation (Weilbach, 2025).

SMMEs are faced with challenges due to restricted access to technology and limited resources (Muzuva, Zhou, and Zondo, 2024). Therefore, the introduction and adoption of AI technologies such as predictive analytics present SMMEs with the opportunity to make informed data-driven decisions (Weilbach, 2025). AI tools can be used to automate routine tasks through the use of machine learning (ML), natural language processing (NLP), and predictive analytics (Muzuva, Zhou and Zondo, 2024; Tyson and Zysman, 2022; Singh, 2024). NLP can be used to automate customer services and ML can be used to predict customer behavior. This is important as organisations can save time and be productive by spending more time making better decisions. AI has also been used to customize recommendations to improve customers' experiences, for language translation, and for text and image generation (Muzuva, Zhou and Zondo, 2024). SMMEs are adopting AI-powered chatbots to improve customer support and handle inquiries, thereby improving customer satisfaction. Customers are able to personalize their experiences and have access to 24/7 customer support. SMMEs can also streamline workflow processes, thereby improving operational efficiency, enhancing innovation, and reducing operational costs (Ali, 2024; Iyelolu *et al.*, 2024).

The main challenge with the adoption of AI for SMMEs is the lack of resources, talent, and skills to implement AI solutions (Ali, 2024). In addition, there are challenges associated with data privacy and security (Ali, 2024; Iyelolu *et al.*, 2024). While the adoption of AI presents many benefits and challenges, there is a growing need for responsible use of AI. Responsible AI is "about choosing solutions that do not unintentionally exclude, mislead or discriminate" (Van Barneveld *et al.*, 2025, p. 7). In addition, responsible AI focuses on ethical, legal and governance processes that should be followed when using AI (Mikalef *et al.*, 2022). AI should be used ethically, and all data should be protected by design. Responsible AI is not only about legal compliance but caring for the people, business and plant while earning people's trust (Van Barneveld *et al.*, 2025).

Regulations such as the European AI Act focus on ensuring individuals and organizations use AI responsibly (Madiaga, 2021). These regulations set guidelines and laws that should be followed when using and developing systems using AI. While large organisations are using AI for automation and predictive analytics, they are also

developing AI policies and guidelines on how AI should be used. Responsible AI ensures that there is ethical consideration when using AI to reduce bias or cause social inequality ((Taryono *et al.*, 2024) AI systems must be used to ensure that the privacy and security of user data is prioritized ((Taryono *et al.*, 2024; Akhtar, Kumar and Nayyar, 2024) AI should be used in a fair, transparent manner.

Therefore, this calls for SMMEs to also develop guidelines on acceptable use of AI, which in turn ensures they comply with standards and regulations. There is a lack of appropriate data governance frameworks for enabling the responsible use of AI for SMMEs. Most frameworks focus on large enterprises; limited insight into SMME-relevant models

1.1 Research Objectives

- To review existing data governance frameworks
- To assess their applicability to responsible AI in SMMEs
- To propose tailored governance considerations

The remainder of the paper will be structured as follows: the methodology will be explained in detail in Section 2, and the Literature Review will be discussed in Section 3. The Discussion will be provided in detail in section 4. Section 5 will present the Conclusion and Future Work.

2. Literature Review

2.1 AI Principles

Responsible AI also known as ethical AI or trustworthy AI is concerned about people and organisations being responsible in the decisions and actions of AI applications when making decisions (Dignum, 2023; Puchakayala, 2022; Radanliev *et al.*, 2024). A responsible AI system ensures that during the design, development and usage of the system, the system ensures auditability and accountability (Díaz-Rodríguez *et al.*, 2023). For a system to be auditable, it should ensure that a system can account for all the actions occurring and there is transparency. For a system to be accountable, it should ensure that there is accountability of all the AI system output should there be compliance challenges. With the rapid growth of AI, organisations are tasked with the responsibility of adapting to the new AI demands by ensuring they use AI responsibly (Wang, Xiong and Olya, 2020; Rakova *et al.*, 2021; Cannarsa, 2021).

UNESCO recommends organisations to use AI proportionally and do no harm, preserve the rights to privacy and data protection, and use AI safely by ensuring safety and security risks are avoided (Dignum, 2023). In addition, AI systems should be fair, where there is no bias based on specific groups (Feuerriegel, Dolata and Schwabe, 2020; Varona and Suárez, 2022) This is done through training of data and ensuring the trained data does not create any biases or misrepresentations of specific groups. Transparency is critical where a system has to have an “explainability” element, where the AI system’s decisions and outputs are understandable by humans (Balasubramaniam *et al.*, 2022; Ehsan *et al.*, 2021). An AI system should be trained in a way that there is accountability on the AI’s outputs, should there be any errors or biases (Ganesan, 2020; Díaz-Rodríguez *et al.*, 2023; Varona and Suárez, 2022).

Telefónica’s 5 principles of responsible AI by design in practice include: fair AI, human-centered AI, extend them to any party, transparent and explainable AI, privacy and security by design (Telefónica, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024) Fair AI deals with ensuring that AI systems produce fair results where there is no discrimination of people based on their race, gender, sexual orientation, religion and ethnic origin (Telefónica, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024; de Laat, 2021) Transparent and explainable AI aims to ensure that when people interact with the AI systems, there are transparent results and the system ensures that the decisions made do not impact people’s lives (Telefónica, 2021; de Laat, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024). For an AI system to be human-centric, it should ensure that humans have control in that it is used as a service by humans and can be driven by value-based considerations (Telefónica, 2021; de Laat, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024). AI systems have to respect people’s rights to privacy and their personal data; therefore, it should abide by privacy and security by design (Telefónica, 2021; de Laat, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024). The AI systems should be designed in a way that privacy is considered from the development stage, not as an afterthought, and people’s privacy is kept.

While it can be argued that different studies have different AI principles, and for the purpose of this study, the following principles will be the focus: transparency, privacy, accountability and fairness.

2.2 Data Governance Frameworks

Data governance refers to the process of making decisions, taking control over the management of data and having authority over the data (Ekundayo, Bhaumik and Chinoperekweyi, 2023; Marcucci *et al.*, 2023). Data governance refers to the policies, procedures, roles and responsibilities that are used to ensure that data is organized and managed effectively (Osu and Navarra, 2022; Taryono *et al.*, 2024). Data management is important for organisations as it ensures there is control over all data assets through plans, policies and practices that ensure control over data. A data governance framework is a logical framework for categorizing, arranging, and conveying the many processes involved in deciding on and acting upon company data (Osu and Navarra, 2022; Taryono *et al.*, 2024; Acev *et al.*, 2025; Zhou, Yi and Chen, 2023). The following data governance frameworks are discussed:

2.2.1 Data governance institute framework

The Data Governance Institute (DGI), founded in 20003 guides data governance matters through the framework that ensures there is authority, and proper decisions are made regarding data (Chen, 2021; Ekundayo, Bhaumik and Chinoperekweyi, 2023). The DGI framework provides organisations with a structure to classify and communicate the activities that use data for decision-making based on the data (Matos, 2023; Osu and Navarra, 2022). This framework provides free information on data governance best practices.

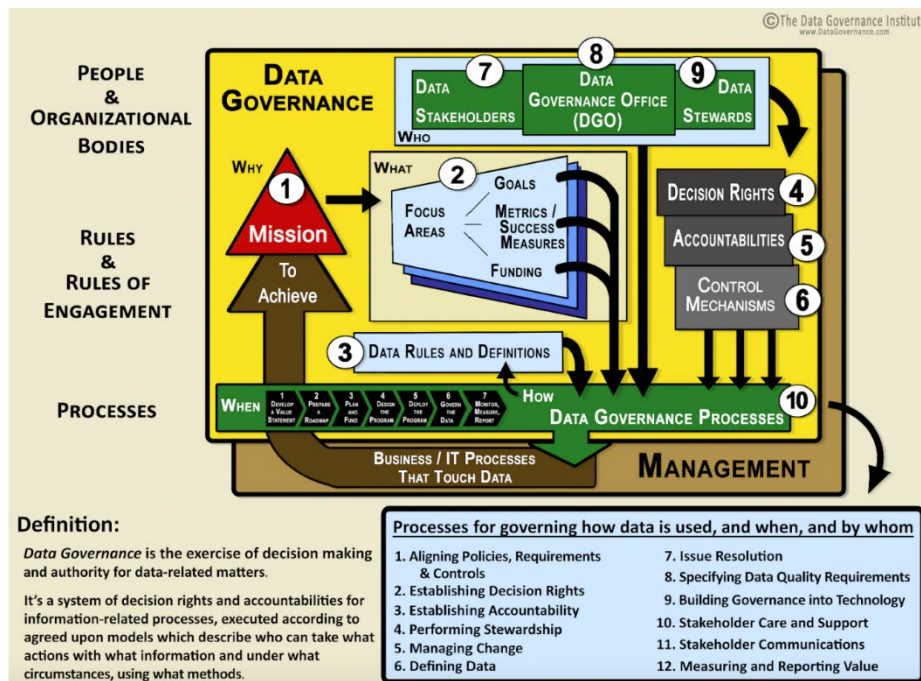


Figure 1: The DGI Data Governance Framework (Osu and Navarra, 2022)

Figure 1 depicts the ten components of the framework, which provide actionable mechanisms organisations can use to better manage the data (Osu and Navarra, 2022). This framework is valuable for organisations with complex data systems that are complex. It focuses on people, organizational bodies, and the rules and processes used for governing data (Osu and Navarra, 2022; Ekundayo, Bhaumik and Chinoperekweyi, 2023; Zhou, Yi and Chen, 2023; Acev *et al.*, 2025). These processes ensure there are clear outlines on how, when, and by whom the data is used, such as defining data, managing change, establishing accountability, and decision rights (Osu and Navarra, 2022; Ekundayo, Bhaumik and Chinoperekweyi, 2023; Zhou, Yi and Chen, 2023; Acev *et al.*, 2025). The DGI framework is based on the 5W1H (who, when, what, why, where, and how) principles.

2.2.2 DAMA DMBOK2 framework

The Data Management Body of Knowledge (DAMA-DMBOK2) is a second edition of the DAMA framework that provides a detailed view of the value, challenges and complexities when managing data (Osu and Navarra, 2022; Matos, 2023). This framework has 11 data management functional areas, which are important for data implementation, as depicted in Figure 2 (Ruslan, Alby and Lubis, 2022; Osu and Navarra, 2022). It outlines challenges of data management and recommends defining guiding principles, implementation of best practices,

techniques, methods, roles, and deliverables used for data management and the establishment of vocabulary for better understanding of the flow of data (Osu and Navarra, 2022; Taryono *et al.*, 2024).

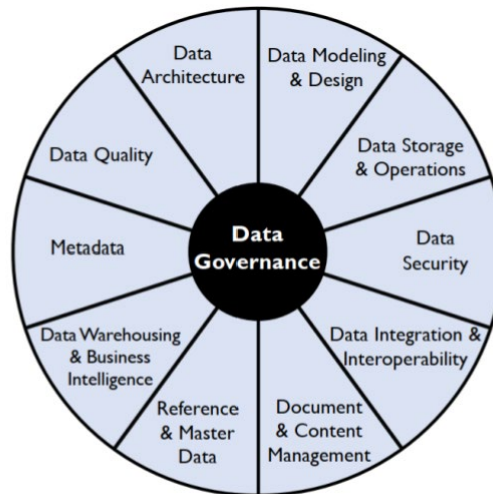


Figure 2: DAMA-DMBOK2 Framework (Osu and Navarra, 2022; Taryono *et al.*, 2024).

2.3 Challenges of Applying Data Governance Frameworks

The vast amount of data being generated by organisations has led to organisations having the need to manage the data. Data governance ensures that data is effectively managed to ensure that the data can be used for decision-making purposes (Adepoju *et al.*, 2023; Alabi, 2023). This presents challenges for organisations when adopting data governance frameworks. Organisations face a challenge with complying with regulatory requirements such as the General Data Protection Regulation (GDPR) when implementing data governance frameworks (Ahmad, 2024; Julakanti, Kiranmayee Sattiraju, and Julakanti, 2025). GDPR requires organisations to collect, process, store, use and share personal data in a manner that ensures confidentiality and security of the data (Ahmad, 2024). Should organisations not comply with this regulation, they may face penalties for non-compliance.

The lack of standardized data governance practices is a challenge for organisations to ensure compliance (Marcucci *et al.*, 2023). This results in a fragmented ecology as different frameworks have different components, thus posing a challenge to the creation of a common framework. Many data governance frameworks exist; therefore, this poses a challenge due to the different nomenclature (Marcucci *et al.*, 2023; Noor, Baharom, and Mohd, 2025). For example, data governance frameworks have similar principles, but some principles are implied under other principles, such as the principle of equity, which seems to be addressed under the principle of fairness.

Data silos pose a challenge for organisations adopting data governance frameworks (Nookala, 2024; Nai, Rifai and Sadiq, 2025). Data tends to reside in one department, which prevents data from being shared across different departments. When data is in silos, proper decisions are not made, and this affects the data quality. Cultural resistance is also a challenge, where employees will resist the implementation of data governance frameworks (Nai, Rifai and Sadiq, 2025). This may be due to employees lacking the required skills and knowledge. Another challenge is platform barriers, where organisations lack the right infrastructure or platform to ensure they implement the data governance frameworks (Marcucci *et al.*, 2023; Ahmad, 2024; Nai, Rifai, and Sadiq, 2025). Technological barriers make it difficult for organisations to implement data governance frameworks.

3. Research Methodology

This research study followed an extensive systematic literature review of published studies. A Preferred Reporting Items for Systematic Reviews (PRISMA) framework guided the study to evaluate published academic sources and preserved a quality reporting style through following a peer review process (Page, McKenzie *et al.*, 2021; Page, Moher *et al.*, 2021; Ahmad, 2024; Nazir and Das, 2025). Identification, screening, eligibility, and inclusion are the four main phases that guide how the PRISMA framework is conducted, as shown in Figure 3 below. These phases will be discussed in detail below:

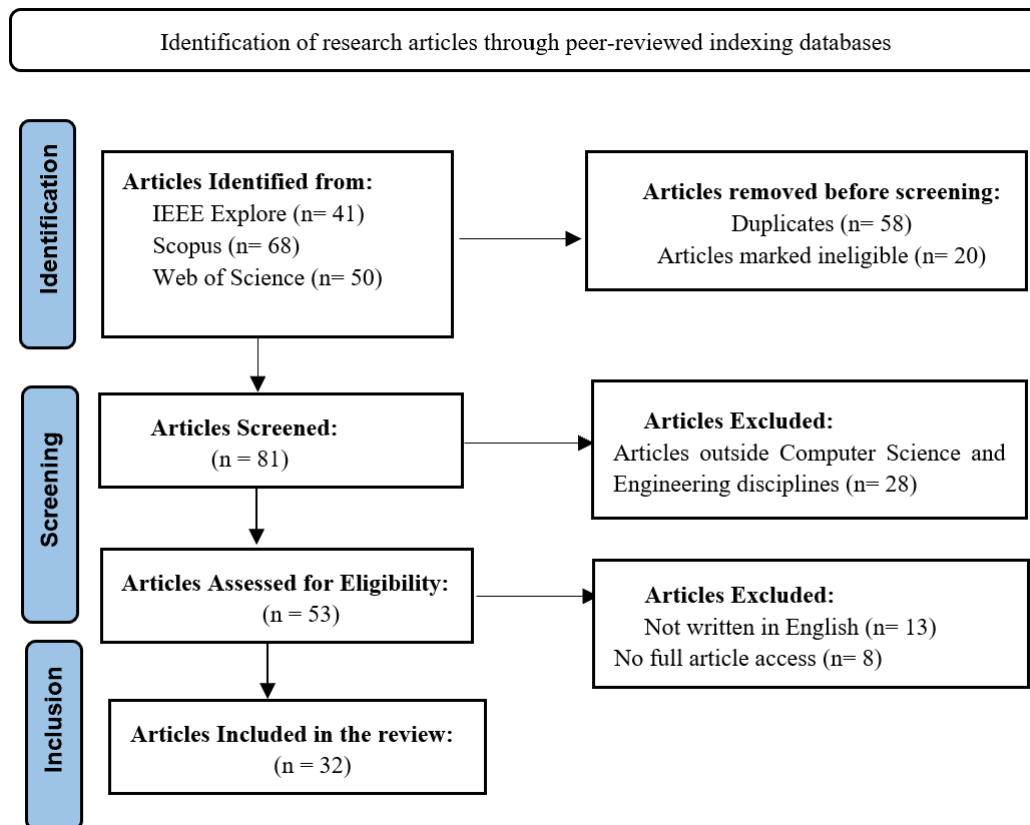


Figure 3: A representation of the PRISMA framework

A. Identification

This phase details how records are identified through filtering our academic sources from databases such as Web of Science, IEEE Xplore, Scopus, Google Scholar, etc. These records include peer-reviewed journal articles and conference papers from indexed databases. Research papers that were written in English from the years 2021 to 2025 were included in the study. Boolean operators “OR and AND” were employed to get specific academic sources, where AND is used to get specific and targeted results, while OR allows for flexibility in terms of retrieving one of the specified search terms.

The following search terms were used: “Data governance” OR “Data govern” OR “Data governance frameworks” AND “Artificial Intelligence” OR “AI” AND “Small, Medium and Micro Enterprises” OR “SMMEs” and a combination of these phrases.

B. Screening

This phase includes screening articles that will not be included in the analysis based on the keywords used. As part of the screening process, titles and abstracts were used to screen articles that could not be used in the final review. Articles that did not present results on data governance frameworks for enabling AI for SMMEs were excluded. In addition, articles that were not in English and those that were inaccessible were excluded.

C. Eligibility

Articles that required a subscription were excluded, and non-academic reports and only full-text articles formed part of the inclusion criteria. These articles were based on whether they answered the research question and were part of the peer-review process.

D. Inclusion

This phase included articles that were available in full text from the years 2021 to 2025. These full-text articles were used to analyse themes, which were synthesized to be presented as part of the data governance frameworks that can be used by SMMEs. Duplicate articles and articles that did not meet the peer review process were excluded from the inclusion criteria.

4. Findings

This literature study on the data governance frameworks that can be adopted by SMMEs for responsible AI was based on the (n =32) publications that were included in the final review. The publication count shows that (4%) of the publications were in 2021, and in 2021, they increased to (15%). However, in 2023, there was a decline to (8%), and there was an increase in 2024, where there was a slight increase of (1%) to (9%) of the articles being published in 2024. In 2025, there was a (30%) of the number of articles being published in 2025. Figure 4 depicts the distribution of publications included in this review.

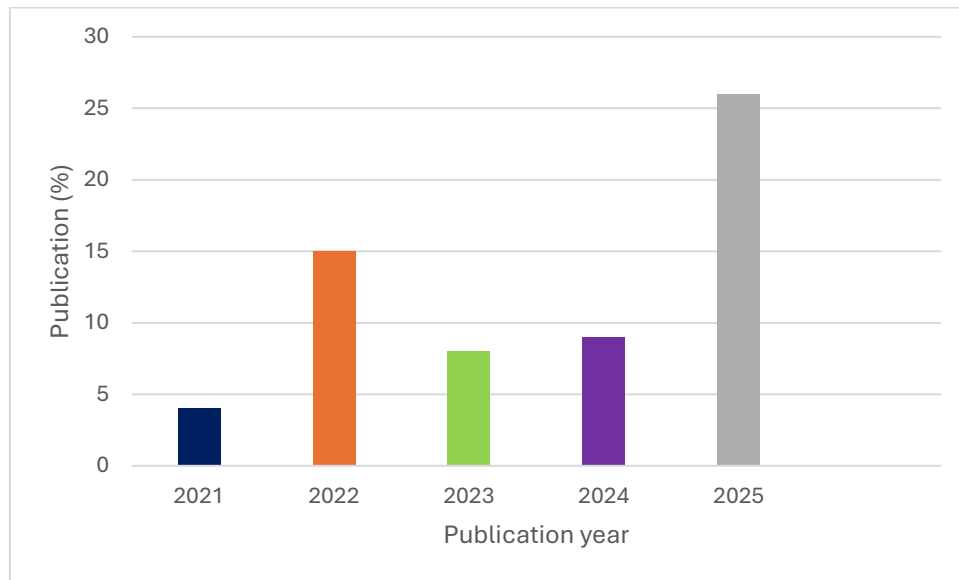


Figure 4: Shows the distribution of publications included in the SLR

The findings also revealed that most of the articles were articles with a distribution of 99.9 % and conference papers with a distribution of 8.1% as depicted in the below.

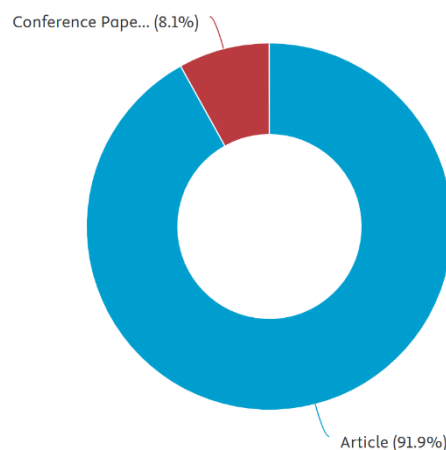


Figure 5: Document type

These findings revealed that Africa contributed more to the data governance frameworks that can be adopted for responsible AI by SMMEs. Africa has (n= 3), where n = number of countries contribution in this data governance framework. The Asian countries have (n=2), and Europe has (n=2). While South America, North America and Oceania have contributed (n=1) each, as depicted below

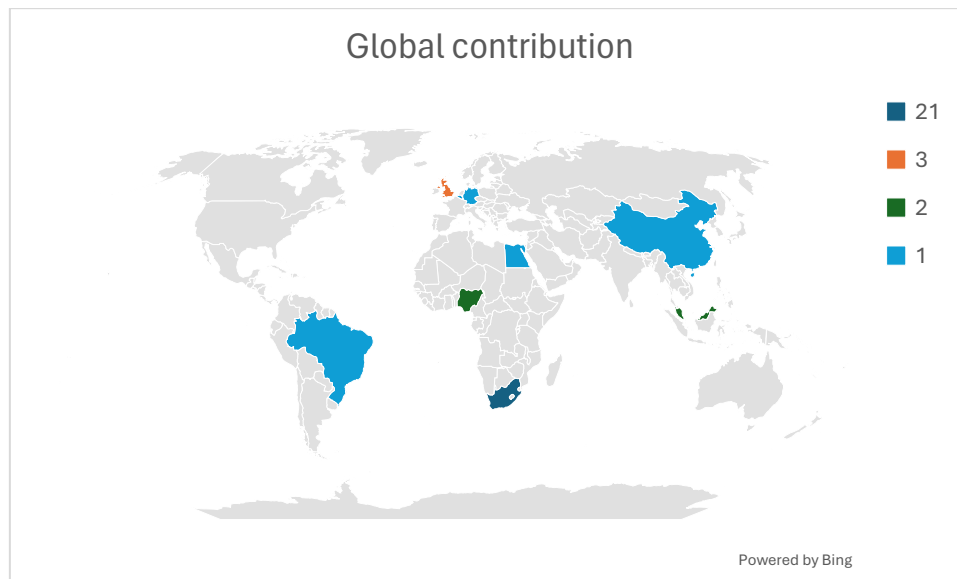


Figure 6: Shows global contribution

5. Discussion

This review reveals a misalignment between existing data governance frameworks and how SMMEs operate. It is evident that most data governance frameworks are designed for large organisations, as this creates barriers for SMMEs. SMMEs face challenges with the adoption of these frameworks, such as the lack of a standardised governance framework. Researchers have proposed numerous data governance frameworks that can be used to manage data, which have different principles. While the frameworks focus on different aspects, they tend to emphasise the importance of properly managing data.

Responsible AI aims to ensure that organisations can make responsible decisions regarding any AI application (Dignum, 2023). Some researchers suggest that transparency, accountability, Telefonica has five principles: fair AI, human-centered AI, extend them to any party, transparent and explainable AI, privacy and security by design (de Laat, 2021; Telefónica, 2021; Díaz-Rodríguez *et al.*, 2023; Madduru and Bhosale, 2024). For organisations to properly manage their data, there is a need to adopt the right framework. Data governance frameworks such as the DAMA DBOK focus on data security and support the responsible AI principles by ensuring that there is security of data while ensuring fairness and transparency. These frameworks tend to provide mechanisms organisations should use, but do not focus on how organisations may face challenges when implementing these frameworks.

SMMEs struggle to adopt these frameworks for enabling responsible AI due to a lack of skills and resources. Budget constraints are also a challenge as SMMEs have limited budgets, thereby unable to extend that to the implementation of the frameworks. SMMEs may find it difficult to interpret what is expected of them in terms of the frameworks. Thereby, there is a need to redesign the governance frameworks to cater to SMMEs and for scalability. In addition, there is a need to develop a universal framework that caters to both large organisations and SMMEs. Most of the frameworks are designed to cater to organisations with governance maturity, while SMMEs operate in an environment where governance is a challenge.

6. Conclusion and Future Work

Data governance ensures that proper decisions are made when data is properly managed and ensures that organisations have authority over their data. Data governance frameworks come in handy, as they ensure that they set out how data is managed. Many data governance frameworks exist, such as the Data Governance Institute Framework and the DAMA DMBOK2 Framework, that SMMEs can use to manage their data. Findings of this study reveal how SMMEs face challenges when adopting these frameworks due to platform complexities, data silos, technological barriers, etc. This study provides insight into how data governance frameworks can be used to enable responsible AI in SMMEs. Future work can include a deep dive into developing a universal framework that will enable responsible AI for SMMEs.

Ethics Declaration: No ethical clearance was required as this study did not involve any humans/animals.

AI Declaration: The authors acknowledge the use of content generated by Artificial Intelligence (AI) (including but not limited to text, figures, images, and code) in making this paper more readable.

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