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USE OF DATA GOVERNANCE TO BOOST CORPORATE PERFORMANCE IN KENYA'S SME MARKET

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A research project report submitted in partial fulfilment of the requirement for the degree of Master of Science in Information Technology Management, School of Computing and Informatics, University of Nairobi.

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DECLARATION

This project, as presented in this report, is my original work and has not been presented for any award in any other university.

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This project report has been submitted in partial fulfilment of the degree of Master of Science in Information Technology Management of the University of Nairobi with my approval as the University supervisor.

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ABSTRACT

This study aimed to assess data governance practices and their effect on corporate performance within the SME sector in Kenya. This study used data governance decision areas based on Khatri and Brown, 2010 as a guiding model. Data was collected using questionnaires with participants derived from ten SMEs in Kenya. This research shows that data governance has an effect on corporate performance. It also shows that data quality, metadata and data lifecycle had a positive impact on data governance whereas data principles and data access did not. The study identified that customer satisfaction, operational efficiency, data quality and data security are some of the drivers for data governance with the SMEs. Consequently, barriers to data governance were identified as knowledge and experience, data ownership, culture, IT systems and unknown value of data governance. They should adopt initiatives that strengthen data governance such as clearly defining data roles and responsibilities, allocating resources to data projects and creating awareness through training. Data governance program for SMEs is necessary and proposed data governance framework can be used by practitioners to develop a data governance strategy and approach for managing data as an organizational asset. The finding of this study can be used to establish a data governance program for SMEs in Kenya. The suggested model can be tested and validated to determine its impact.

Key Words: Data Governance, Information Governance, SME, Data Management, Data Quality, Corporate Performance

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CHAPTER ONE: INTRODUCTION

1.1. Background

Small and Medium Enterprise (SME) sector offers 18% of the employment opportunities in Kenya (https://www.knbs.or.ke). Their huge contribution to the country's GDP is core to the growth of the economy. An annual survey (http://eastafricatop100.com)undertaken by the audit firm KPMG and the leading news media Nation Media Group find that SMEs in the Kenyan marketplaces are often under strain to operate in a competitive digital market leading them to the need to effectively manage their data. There is therefore a need to implement a formal data governance system for value extraction and operational efficiency. SMEs need to implement data governance practices for them to thrive and succeed in the market (Begg & Ciara, 2012). Considering that data is a vital source of insight to drive value creation in an organization (Lillie & Eybers, 2019), hugely affects the decision-making process, is integral to understanding organizations' financial key performance indicators (KPIs) (Friedman & Smith, 2011), it needs to be governed carefully (DalleMule & Davenport, 2017; Gregory, 2011).

Data is a vital source of insight to drive good governance and value creation in an organisation (Lillie & Sunet, 2019). It is a critical asset to be considered for an organisation to achieve its goals. It hugely affects the decision-making process of an organisation and is viewed as a value-creating asset that needs to be governed carefully (DalleMule & Davenport, 2017). The amount of data used in companies has significantly increased in recent years and plays a vital role in business operations. (Alhassan, Sammon& Daly, 2018)

Data is integral to understanding organisations' financial key performance indicators (KPIs) such as revenue growth, cost efficiency, credit performance and return on invested capital (Friedman & Smith, 2011). Data helps an organisation to understand customer KPIs such as customer acquisition, retention, maintenance, customer loyalty index and customer satisfaction. One of the ways to understand people KPIs in an organisation is through data management (Jonker, Tegelaar, & Geurtsen, 2013). Data aids in understanding KPIs such as employee engagement, satisfaction, turnover rate, training hours among others. These KPIs will ensure an organisation meets its strategic goals (Jonker, Tegelaar, & Geurtsen, 2013).

Data Governance (DG) is the development, implementation and monitoring of data and information plans, policies, programs, procedures and instruments that deliver, monitor, safeguard and improve data and information value throughout their lifecycles (Khatri & Brown,

2010; Abraham et al. 2019). DG details how authority and responsibility for organizational data are shared among the board of directors, senior management, business owners, the technology function and users (Otto, 2011). There are many best practices that must be adopted and adhered in order to attain strong data governance in an organization (Demarquet, 2016; Cave, 2017). Data governance requires a broader perspective that takes into consideration the dynamics outside a single organization in ecosystems (Lis & Otto, 2020).

Organizations are beginning to recognize that data is an asset and that a governance structure is required to ensure that this asset is protected. Data governance warrants organisational data is managed which leads to risk reduction and improved processes within organisations (Otto, 2011). Data governance is the development, implementation and monitoring of data and information plans, policies, programs, procedures and instruments that deliver, monitor, safeguard and improve data and information value throughout their lifecycles (Khatri & Brown, 2010). The main advantages the data governance brings are as follows: increased data quality increases efficiency and leads to savings; data governance reduces security risks and enables to achieve regulatory compliance good; provides clarity in data which assures accurate metrics including insight into what metrics may be most important and greater trust in analytics.

This research aims to examine the effects data governance has on organisation performance for SMEs in Kenya and to explore the factors that affect data governance.

1.2. Problem Statement

There is a wide gap between big and small organizations that must be filled if Kenya must grow and compete with other developed countries. One such gap is the practice of data governance in the SME sector in Kenya. This study has presented the need for this and describes the background of data governance in Kenyan SMEs. The drivers, and barriers to data governance within the SME sector in Kenya and the effect data governance has on corporate performance within these SMEs and proposing a data governance implementation model

SMEs in Kenya have a fast-growing use and demand for quality and timely data; however, they are often faced with data management challenges that tend to hinder business agility and their competitive advantage. The demand to use data to deliver accurate information in real-time is crucial but challenging in these organisations. Poor data governance affects operational efficiency, risk mitigation and agility by compromising the decisions made in each of these areas (Friedman & Smith, 2011). Consequently, data governance must be clearly defined,

repeatable and auditable, enabling the quantification and mitigation of risks. Current literature indicates that data processing works better (Earley, 2014), but the difficulty and effect of data governance on the SME sector is illustrated in limited research.

1.3. Research Objectives

The research objectives were:

i. To assess data governance practices in selected SMEs.
ii. To explore the factors that affect data governance in SME sector.
iii. To determine the degree to which data governance efficiency affects corporate output of enterprises in the SME market.
iv. To propose a data governance implementation model for SMEs.

1.4. Research Questions

i. What are the data governance practices?
ii. Which factors influence data governance in organisations within the SME sector?
iii. What are the barriers and drivers of data governance in SMEs in Kenya?
iv. To what extent does quality data governance influence companies' organizational performance in the SME sector?
v. What is the best data governance implementation model for SMEs in Kenya?

1.5. Justification for the Study

This research will contribute to the understanding of data governance and management as it explores alternatives that might be used to implement data governance initiatives within an organisation and in turn improve business agility and intelligence. The findings of this research are expected to assist SMEs, data practitioners and data specialists in Kenya explore alternatives that might be used to implement data governance initiatives, improve their data governance, formalise data governance structures in practice, save on costs, and in turn, improve business agility and intelligence. The insights from this research will assist the management of different organisations in understanding the aspect of agile capabilities of data governance, implementation strategies, best practices and general data management phenomenon.

CHAPTER 2 - LITERATURE REVIEW

This chapter summarizes recent work on data management and data governance. It provides an overview, operational issues, benefits, challenges and implementation of data governance. It also reviews data governance frameworks from which a conceptual framework is derived.

2.1 Data Governance Overview

Data governance is the production, implementation and monitoring of data and information strategies, policies, programs, procedures and instruments that provide, track, safeguard and enhance the value of data over their life cycles (Khatri & Brown, 2010). Data governance is also characterized as a methodological, philosophical, organizational and technical law, aligned with policy and ethos of the company, responsibilities, expectations and procedures (Otto, 2011).

Data governance ensures organisational data is managed which leads to risk reduction and improved processes within organisations (Otto, 2011). The main advantages the data governance brings are as follows: increased data quality increases efficiency and leads to savings; data governance reduces security risks and enables to achieve regulatory compliance good; provides clarity in data which assures accurate metrics including insight into what metrics may be most important and greater trust in analytics. On the other hand, data governance helps an organisation avoid issues such as No clear positioning of data in the overall business model; No data roadmap or not aligned with other strategic milestones; No shared decision-making on data; data management depends on department, time or purpose; A lot of independent information sources within the organisation with scattered management and lack of ownership (Otto, 2011).The below figure depicts fundamental concepts and dependencies in data governance:

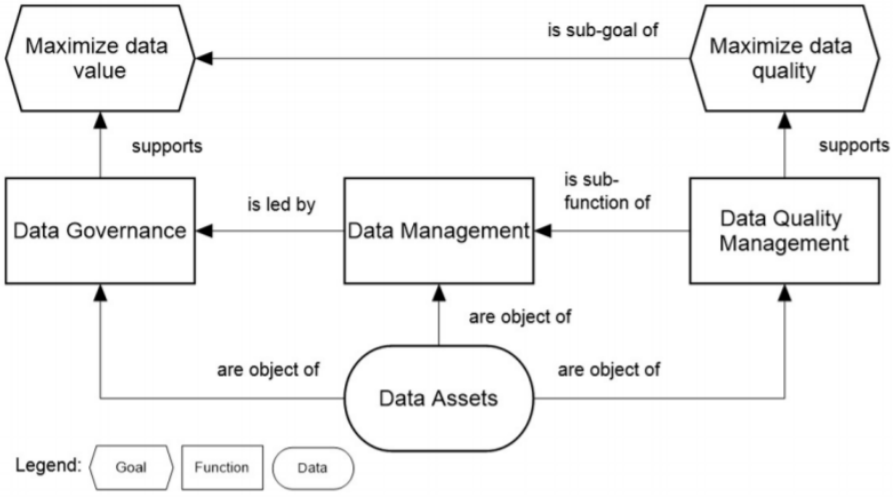


Figure 1: Data governance and data quality management by Otto (2011)

Gartner (2013) states that goal of data governance is to enable organisations to manage their data as an asset, to define and implement principles, tools and other appropriate measures for data management and to monitor these measures and the management activities. It is mandatory to control the management of data assets and putting the right structure and policies into place in an organisation. It is designed to focus on the development, strengthening and enhancement of the overall data management activities within the organisation. It crosses various organisational levels, from strategic to operational, to ensure that ownership and accountability are in place and standardized processes are available to achieve data value.

Data governance programs require the development of practices of stewardship within the organisation to accomplish the goals in its focus areas:

a) Strategy - defining, communicating, and driving execution of data Strategy and data governance Strategy.
b) Policy - setting and enforcing policies related to data and Metadata management, access, usage, security and quality.
c) Standards and quality - setting and enforcing data Quality and data Architecture standards.
d) Oversight - providing hands-on observation and correction in areas of quality, policy, and data management (stewardship).
e) Compliance - ensuring the data-related regulatory compliance requirements are met.
f) Issue management - identifying, defining, escalating, and resolving issues related to data security, data access, data quality, data governance procedures and other key data

related areas.

g) Data management projects - Sponsoring initiatives to strengthen data governance practices.
h) Data asset valuation - Establishing standards and procedures to reliably identify the integrity of the data properties.

2.2 Why SMEs Need Data Governance

Striking a balance between financial performance and social responsibility requires effective corporate governance frameworks that incorporate the organizational and communal goals (Zabri et al., 2016). Different corporate governance frameworks exist to instigate the efficient use of resources and equally necessitates accountability for the stewardship of those resources. Good SME governance promotes economic growth in many ways, including investment attraction, job creation and prosperity, especially in a developing country such as Kenya, and is necessary to safeguard the long-term development, competitiveness and meaningful business sustainability of a SME. Companies require a strategic edge to achieve market dominance and perform above industry average in the current demanding corporate environment (Rompho, 2011) An organization's effective performance can be calculated by its ability to use limited resources and efficiently transform them into meaningful outputs. In a balanced scorecard, for example, the four critical key perspectives that can be used to measure corporate performance are customer, financial, internal business processes and learning and growth (Rompho, 2011).

Data governance is the development, implementation and monitoring of data and information plans, policies, programs, procedures and instruments that deliver, monitor, safeguard and improve data and information value throughout their lifecycles (Khatri & Brown, 2010). Data Governance helps an organization avoid issues such as no clear positioning of data in the overall business model; No data roadmap or not aligned with other strategic milestones; No shared decision-making on data; data management depends on department, time or purpose; A lot of independent information sources within the organization with scattered management and lack of ownership (Otto, 2011). Compliance, decision taking, enhancing customer satisfaction, increasing operational performance and fostering business development are the most critical drivers of data governance initiatives (Alhassan et al., 2018). Without good data governance, companies will struggle to achieve successful corporate governance and compliance, which will expose the company to substantial risk of failure in both (Gregory, 2011).

Small and medium-sized businesses operate in an increasingly digital business climate that needs them to be able to make efficient use of data in internal business processes and when engaging with external stakeholders like customers, suppliers and regulatory authorities (Rompho, 2011; Begg & Caira, 2012). A data-driven approach is required to inform decision making with SMEs (Khatri & Brown, 2010). SMEs will have to implement data governance practices which will enable them to succeed in the competitive market. Research indicate that small and medium-sized companies do not understand their data's inherent value or consider their data distinct from the processes that underlie their business operation.

2.3 Corporate Performance

Management is always required to achieve certain performance standards as outlined in the performance contract. Business competition requires management to achieve performance above the industry average, therefore competitive advantage is needed to enable companies to compete in a demanding business environment (Salisi, 2020). Organisations are a lot of resources on IT and there needs to be a clear output on these investments. Return on IT investment is very difficult to demonstrate, because the return is more correlated with improved profitability than with financial impacts such as asset returns and equity returns (Swoyer, 2016). There are four critical key perspectives in a balanced scorecard that can be used to measure corporate performance. These are customer, financial, internal business processes and learning and growth (Rompho, 2011).

When assessing the degree to which data governance impacts corporate performance the critical key perspectives can be used Otto (2013). The popular business drivers of data governance initiatives are: guarantee compliance, enable decision making, improve customer satisfaction, increase operational efficiency and support business integration Otto (2013)..

Corporate performance includes an organization's actual output or results as measured against its intended outputs, targets and objectives. to use scarce resources and efficiently turn them into relevant outputs. A balanced scorecard includes four main viewpoints, which can be used to assess organizational success. These are customer, financial, internal business processes and learning and growth (Rompho, 2011). The key drivers of data governance initiatives are compliance, decision-making, improving customer service, improving operational efficiency and promoting integration of businesses (Otto, 2013). So, a balanced scorecard is a fair indicator of the effect of data management on organizational efficiency.

2.4 Benefits of Data Governance

(Gregory, 2011) maintained that excellent data management advantages include the capacity to cross-sell and up-sell to clients while maximising the organisation's IT data assets. Big data management realises the following advantages: heterogeneous information integration, enhanced safety and privacy, enhanced information validity and information protection, and quicker distribution (Mohanapriya, K.Bharathi, Aravinth, Gowrishankar, & Ramkumar, 2014). Big data governance 's strategic, policy and process components are crucial for achieving Big data Initiatives (Kemp, 2014). (Ping-Ju, Straub, & Liang, 2015) and (Karel, 2007) agreed that better data governance can result in improved decision-making and greater quality risk reporting.

Further, improved data governance delivers the following advantages:

Operations Excellence: Without data governance, there is no central coordination and responsibility for the most shared data elements within an organisation. This leads to duplication in creating, storing, interpreting and deleting data which will result in complexities reporting one single version of the truth for effective steering and decision making. Decentralised data coordination and ownership distorts data quality and may lead to business disruption. This risk cannot be neglected, and organisations need proper data Quality Management as a long-term solution. The central data governance function will also provide a common language that represents the organisation as a single unit.

Risk Reduction: There are several fraud scenarios and poor credit risk rating scenarios that can be prevented if good data is available and managed correctly to gain the required insights. Think of the example of a new customer who requires a loan, with proper Master data Management, it is possible to understand if the customer is new or already exists in the system. With proper data Quality Management, the data entry in the CRM or loan application system is enforced leading to a better view of the customer which could help to improve the credit risk rating and will reduce the risk of having yet another non-performing loan on the balance sheet.

Customer Engagement and Financial Performance: New business models arise with the availability of high-quality data that reflects customer patterns, market trends, and demographic developments among others. Organisations that have proper data governance in place to monitor and manage this data will adapt to these external changes and realise improved financial performance. Next to new business models, a proper data governance function will

improve customer engagement especially in the know your customer strategies in an organisation. A lack of a proper Master data Management solution will cause multiple versions of the customer which does not support the overall service delivery and overall customer satisfaction level. The risk of loss of customers is another good reason for a mature data governance competency.

Legal: One of the key goals of data governance is to meet regulatory and compliance requirements (Tallon P. , 2013). A survey done by (PwC, 2016) indicated that data governance is the fulfilment of regulatory requirements and corporate governance policies.

2.5 Challenges of Data Governance

The structure of an organisation can be a driver or an inhibitor to achieving an effective data governance strategy (Tallon P. , 2013). The culture of an organisation can also hinder the successful implementation of a data governance policy (Morabito, 2015). In most organisations, data governance and Management has always considered an Information Systems function problem and lacks clearly mapped roles and responsibilities in the organisation. (Gregory, 2011). Data governance should be viewed as a business driving tool. Data needs to be aligned to the business need and should be ensured fit for use (Otto, 2011). A combination of the best data governance frameworks will ensure the quality of data and that data is utilised from all the systems. The biggest challenge in most organisations is not knowing where to start, (Power, 2012) proposes 'to start where you are'.

Data monetisation: It's always not easy to demonstrate the ROI of data governance to management, and this remains a huge challenge especially when presenting a business proposal for data governance to the management. Data governance is an extra cost factor to the business, additionally, it's not easy to estimate the cost projections involved in a data governance project and this is a great inhibitor to the success of proper data governance implementation. Data monetisation ranks fifth in the number of projects associated with big data in 2016 when 54.8 % of companies have already launched such activities and 32.8 % considered them successful. (PwC, 2016).

Data ownership: relationships are not well-defined in most organisations, and this does not work well for data governance. This scenario leads to data being stored in silos hence hindering proper data analytics and business intelligence. (Protiviti, 2016).

Master data/data quality: The amount of data generated within an organisation increases daily, their lack of accuracy, quality and appropriate integration is a major hindrance to the successful implementation of data governance. Without a clear understanding of data management and knowledge of the link to the corporate data environment , data management and the resulting data quality cannot be achieved. (NewVantage Partners LLC, 2017).

Organisational and cultural: In general, the organizational structure has been described as significant inhibitors of successful data management policies (Tallon P, 2013). In certain situations, it's not the lack of ambition but the lack of structure. Cultural differences are sometimes cited as a common reason for possible failure in data governance.

IT systems: Most organizations core business process run on relatively old systems. These hinders data integration resulting to data being stored in data silos.

Knowledge and experience: Strong technical expertise, good understanding of systems for data processing, strong understanding of data quality issues can influence the implementation of data governance (Brous, Janssen, & Heikkinen, 2016)

A high standard of data governance will lead to better data analytics hence good business intelligence. Poor data management can contribute to the risk of data theft and loss, breaches of data privacy and/or compliance with regulations and damage to data quality (Gregory, 2011). Organizations will provide a clearer understanding of the market complexities and the amount of research involved in data governance programs and a fast monitoring of the state of the enterprise from zero data management to organizational data management.
The figure below shows factors that can either hinder or facilitate data governance implementations as established by (Tallon P. , 2013). Inhibitors of data governance can lead to unsuccessful implementation strategies.

Data Governance Enablers and Inhibitors

Enablers	Inhibitors
Organizational factors	
Highly focused business strategy	Complex mix of products and services
Aligned IT and business strategy	Strategic misalignment
Centralized IT and organization structure	Decentralized IT and organization structure
Industry factors	
Regulations	Regulations vary by region (US, EU, and so on)
Predictable rate of data growth	Absence of industry-wide data standards
Technological factors	
Culture of promoting strategic use of IT	Packrat culture (data hoarding)
IT standardization	Legacy IT systems (weak integration)

Figure 2: Factors inhibiting or enabling data governance Tallon (2013).

2.6 Data Governance Frameworks.

There is a diverse selection of theories and studies on the impact of data governance on different companies.Governance within an organisation includes internal processes and policies that facilitate t he quality of human capital, legal and regulatory compliance and organisational alignment (Avery & Cheek, 2015). There is no "one-size-fits-all" standard for how a company can execute and maximise data management (Otto & Weber, 2015). Nonetheless, business-critical information must be readily available, reliable, and optimised for companies to remain competitive and comply with regulatory requirements (Cupoli, Earley, & Henderson, 2014).

DAMA - DMBOK2 Framework

The Data Management Association (DAMA) International has identified and defined data governance domains as : Data governance, data architecture, data modelling and design, data security, data storage and operations, data integration and interoperability, documents and content, reference and master data, data warehousing and business intelligence, metadata, and data quality. For a successful implementation of a data governance strategy, an organisation would need to employ different frameworks as can be seen from different already existing literature. The data Management Body of Knowledge (DMBOK), gives some of the best guidelines in the information management and data governance field. (Cupoli, Earley, & Henderson, 2014). DMBOK was first published in 2008 with a revised edition coming out in 2014.

Figure 3: Data Management Body of Knowledge (DMBOK)

Data Governance Contingency Approach Model- Weber et al (2009)

Weber et al (2009) developed contingency approach model used to design a data governance framework for organizations. The model identifies three components: namely data quality roles, decision areas, and responsibilities which form a responsibility assignment matrix. It further defines the different roles each component plays in the exiting organization structure.

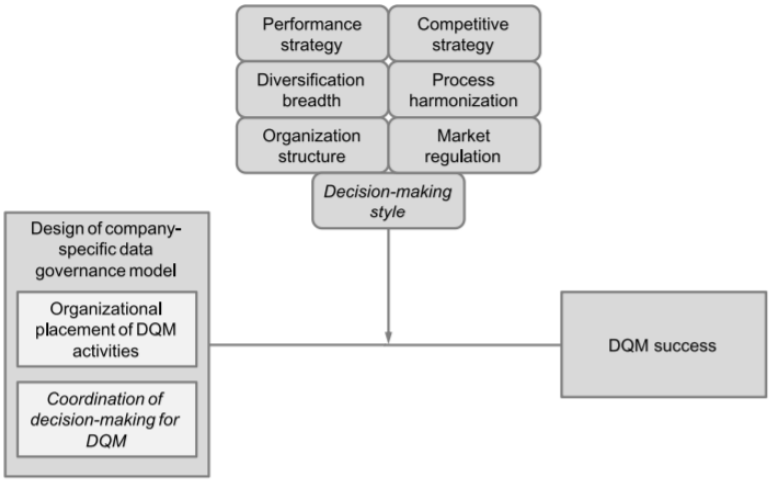


Figure 4: Data governance contingency model

Decision domains for data governance

A five-dimensional structure given by (Khatri & Brown, 2010) can be used as an organizational tool to establish a Data Governance strategy and approach. This includes data principles ,data quality , data access and data. Data is the driving force for increasing decision field, and therefore strongly supports the business strategy of the organization (Khatri & Brown, 2010).

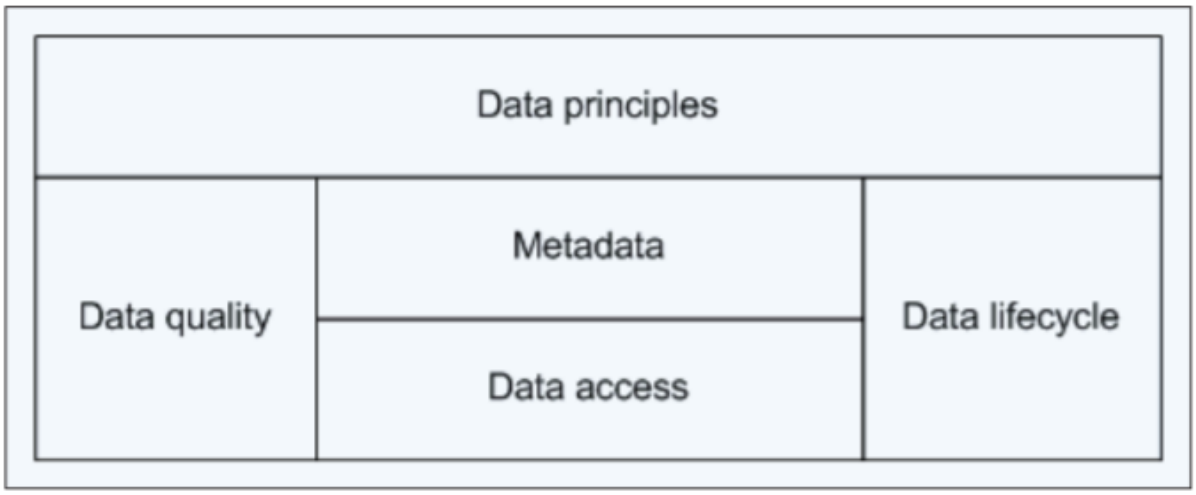


Figure 5: DG framework by Khatri and Brown (Were & Moturi, 2017)

IBM data governance Council Maturity Model

IBM and other companies established IBM Data Governance Council to develop best data governance practices. The outcome of this was a framework known as the Maturity Model for Data Governance (IBM 2007), which proposes to evaluate and quantify an enterprise's data governance maturity. Like any CMMI-based maturity model, the model enables organizations to define their current maturity in data governance, define their priorities and provide the activities that will take them to the next stage (Smith, 2015).

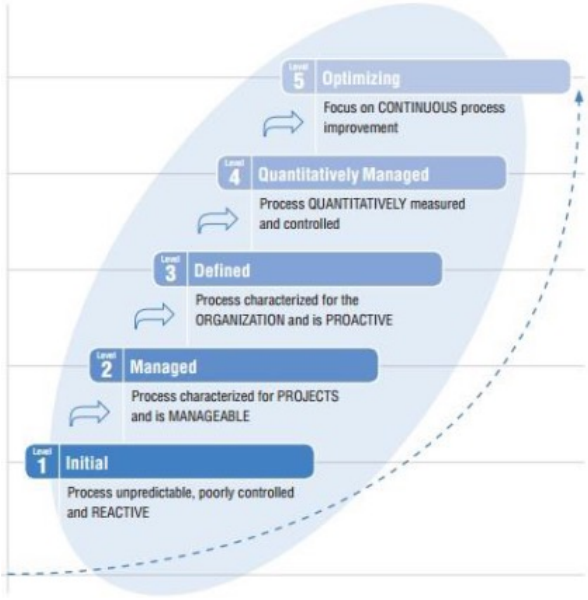


Figure 6: IBM data governance Council Maturity Model

The Data Governance Institute (DGI) Data Governance Framework

This framework has three components: people and organisational bodies, rules and rules of engagement, and processes. The DGI data governance framework was developed to help organisations achieve clarity, ensure value from efforts, create a clear mission, maintain focus and scope, establish accountabilities and define measurable success. The key focus areas in this framework are Policy, Standards, Strategy; data Quality; Privacy\Compliance\Security; Architecture\Integration; data Warehouses and BI; Management Support. The data governance Institute provides a single framework that can deal with data governance practices and focuses.

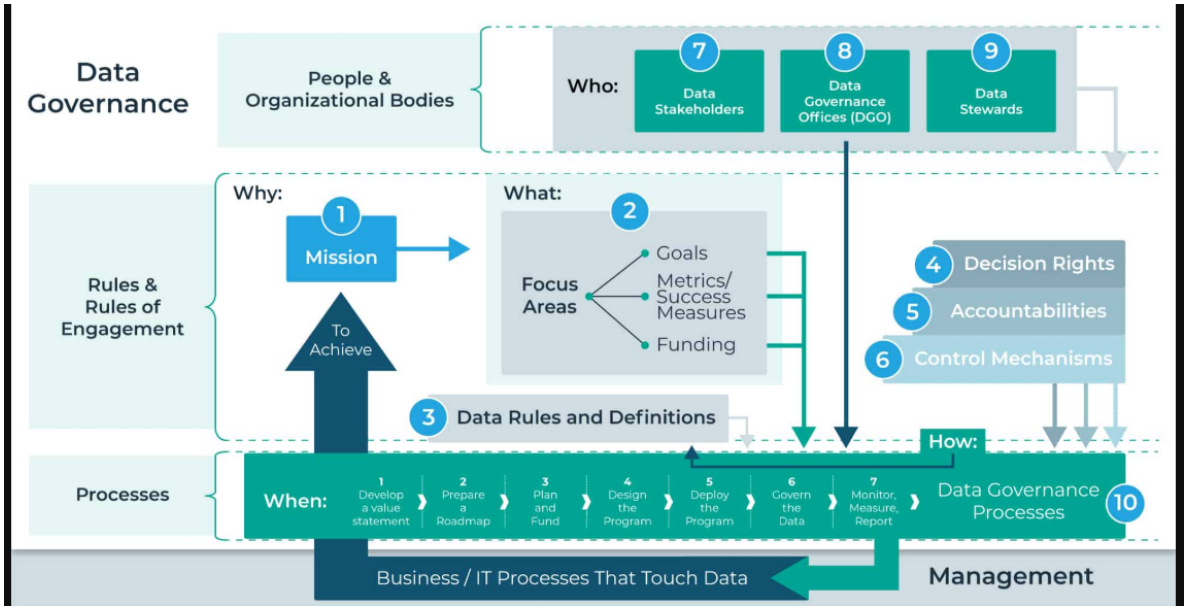


Figure 7: DGI data governance Framework

2.7 Comparison of the Frameworks

Table 1 below shows a comparative analysis of the frameworks studied:

Table 1: Comparison of frameworks studied

Framework	Source	Key Dimensions
DAMA - DMBOK2	https://dama.org/ DAMA International	Provides a framework for the definition and function of each of the data Management disciplines including data governance. The dimensions promote the identification of guiding principles for data management and often provide techniques for researching maturity or common organizational and cultural problems
Data Governance Contingency Approach Model-	Weber et al (2009)	It proposes that IT governance contingency factors (such as organizational structure and decision-making style) affect data governance model design in order to achieve effective data quality management.
Khatri & Brown Designing Data Governance	Khatri & Brown, 2010	Identifies five data governance decision areas : Data principles, data quality, metadata, data access, and data lifecycle.
IBM Data Governance Council Maturity Model	[2] IBM {website}	The model proposes to evaluate and quantify an enterprise's data governance maturity.

DGI Framework	[3] Data Governance Institute (DGI)	The key focus areas in this framework are Policy, Standards, Strategy; data Quality; privacy\Compliance\Security; Architecture\Integration; data Warehouses and BI; Management Support.

2.8 Proposed Framework for Study and Justification

Based on the study objectives and the review of literature, the framework adopted is the Khatri & Brown (2010) framework. This is well applicable to SMEs with fewer employees and a smaller IT department.

Khatri & Brown (2010) propose a framework that adapted Weill & Ross (2004) existing IT governance framework. This approach supports the concept of data assets being controlled and managed, which should be closely associated with IT asset control and management (IT governance). This framework has five data decision domains : Data principles , data quality, metadata, data access and data lifecycle. The aim of each domain in exploring data-related issues is described in accordance with the definition of ' the locus of accountability for decision-making 'in each domain.

2.8.1 Data Principles

The first domain of the Khatri and Brown (2010) framework is the data principle. It clarifies the role of data as an asset within an organisation and establishes the direction for all other data decisions. By outlining the business uses of data, data principle establishes the degree to which data is an enterprise-wide asset and what policies, standards and guidelines are appropriate.

2.8.2 Data Quality

Data quality is the necessity of the quality observed on the user's needs and the ability to meet the user's needs. (Otto, data governance, 2011). Data quality ensures that data is fit for the intended purpose, or that there is a managed mechanism for problem management.Data Quality has six dimensions used to determine it ‘fit for use’. These are reliability, timeliness, accuracy, relevance, completeness, currency and consistency (Demarquet, 2015). This domain establishes underlying standards about the different dimensions of data quality, defines mechanisms for the ongoing communication of business uses of data and outlines procedures for assessing data quality.

2.8.3 Metadata

Metadata helps in interpreting the meaning of data by describing what data is about and providing mechanisms for precise description of the representation of data (Khatri & Brown, 2010). Metadata provides definitions of interpretation data to get information out of it. The Metadata used in an enterprise depends on its intended use and access to the data as well as the management of its lifecycle. This domain focuses on defining data characteristics in a business context by focusing on an organisation's ability to allow data content to be translated from storage to business concepts to create a language and standard data understanding (Khatri & Brown, 2010).

2.8.4 Data Access

Data access is dependent on the ability of data recipients to assign value to different categories of data. Khatri and Brown (2010) explain data access the ability of data beneficiaries to assign value to different categories of data. Data access decisions also provide standards at the physical and logical level. The standards for physical data integrity ensure that the data is immune to physical harm such as power failure; the standards for logical data integrity ensure that the structure of a database is preserved.

2.8.5 Data Lifecycle

This domain focuses on the various stages data goes through by addressing processes and mechanisms to optimise the management of data throughout its lifecycle (Khatri & Brown, 2010). It aims at understanding how data is used, maintained, deleted or archived and how long it must be retained. Organisations can develop approaches to map usage patterns to the optimal storage media, thereby minimising the total cost of storing data over its lifecycle (Khatri & Brown, 2010).

2.9 Conceptual framework and Research Hypothesis

This study adopted the Khatri and Brown (2010) framework that identifies the decision domains for data governance. The decision domains are data principles, data quality, data access, metadata and data lifecycle.

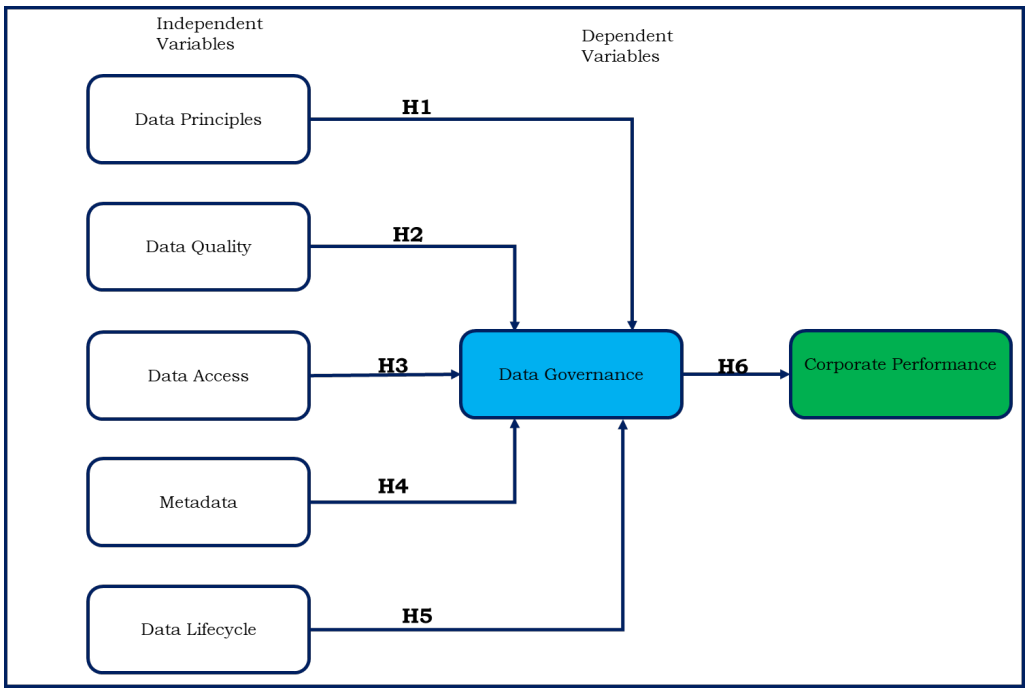


Figure 8: Conceptual Framework

The study formulated the following hypotheses:

Hypothesis 1: Data principles play an important role in data governance in SMEs.

Hypothesis 2: Data quality plays an important part in data governance in SMEs

Hypothesis 3: Data access has a significant role to play in data governance in SMEs

Hypothesis 4: Metadata information is an important part of data governance in SMEs

Hypothesis 5: Data lifecycle management plays significant role in data governance in SMEs

Hypothesis 6: Perceived adoption of Data governance has a major effect on corporate performance within SMEs

CHAPTER 3 – RESEARCH METHODOLOGY

This section provides insights into how this study will be conducted. It will seek to ensure quality study results are achieved.

3.1. Research Philosophy

Research philosophy shows how the researcher identifies the relationship between knowledge and its method of development. This study employed positivist philosophy since it utilizes the quantitative method which lies on data collection that can be statistically analysed to draw conclusions. As this philosophy relies on scientific methods to draw relationship on the variables under study.

3.2. Research Design

A research design is the plan of action for answering the research questions. It allows a researcher to carefully consider their research and even plan how they will approach their research (Kombo & Tromp, 2006). The design will entail selecting the study population, the appropriate sampling procedure, the sample size for data collection and the analysis of the key data relevant to the study. The study will adopt descriptive research to study the status of data governance in Kenya organisations and explanatory research design was used to determine the effects of data governance in the organisations.

3.3. Target Population Data Source

A population refers to different elements that meet the minimum requirement to be included in the sample study. (Burns and Grove, 1993). This was carried out in 10 SMEs in Kenya as shown in table 1. These SMEs were selected from 2018 top 100 mid-sized companies in Kenya listed by KPMG. The Top 100 Mid-Sized companies in Kenya survey was ideal for this study as they have gone through the challenges most SMEs in Kenya face and have a good understanding to the importance of data.

Table: Summary of companies interviewed.

Sector	No
Supplies	3
Logistics	1
Manufacturing	1
Information technology	3
Health	2
Total	**10**

3.4. Sampling Frame and Technique

Kumar & Phrommathed (2005) defines sampling as the procedure of choosing a few elements from bigger population elements. This becomes a basis of estimating the characteristic of the bigger population elements. The study utilized a purposeful random sampling to target only respondents who deal with data and have data governance knowledge of the organizations. A questionnaire was administered to 125 respondents whose composition is shown in table 2.

Table 2: Sampling frame for the Questionnaire.

Category	No.
Chief Executive Officer	10
ICT Managers	10
IT Officers and Analysts	20
Finance Managers	10
HR Managers	10
Marketing and advertising leads	12
Sales and Retail leads	12
Product Managers	6
Quality Assurance Managers	5
Customer Support	15
Users	15
Total	**125**

3.5. Data Collection

Data collection is a process by which information is collected to answer the research question. Both primary and secondary data will be used in this study. Primary data is the data observed and collected directly through first-hand experience (Mugenda & A.G, 2003). This data that is in its original state is then analysed and manipulated to give information. Questioners were formulated based on research objectives and the conceptual framework. Permission to carry out the research was obtained in advance through a letter from the university.

3.6. Data Analysis

A deductive analysis approach was employed (Kothari, 2004). The data collected was grouped according to the conceptual framework. This data was then analysed to give the status of data governance in the SME sector and to answer the hypothesis of the conceptual framework.

The analysis was performed using the SPSS software from IBM and Microsoft Excel. Using SPSS, quantitative data was analysed using descriptive statistics; tables, percentages, frequency counts and building a test for the hypothesis and relationship between dependent and independent variables.

3.7. Pilot Testing

A pilot research was carried out to eliminate bias and check the questionnaire 's validity. The researcher pretested the questionnaire with 10 study group people working with data in the selected firms. This assisted to helped to explore pertinence and wording issues. Sample question asked in the pilot phase included: the duration it took to complete the questionnaire, questions clarity, any ambiguous questions and the clarity and precision of the questionnaire layout.

3.8. Validity and Reliability Testing

Reliability is defined as the error in measurement and is useful in indicating the precision of the research instrument. Cronbach's alpha coefficient α was used to measure the chosen instruments fit for use. Validity is defined as the accuracy of inferences based on research results. Factor analysis was used to analyse the interrelationship between the variables. This was provided by a correlation matrix. (Bhattacherjee, 2012).

3.9. Ethical Considerations

The purpose of the research was communicated to those responding to the questionnaires. Anonymity was maintained and consent was sought from the target respondents before carrying out the research.

CHAPTER FOUR – RESULTS AND DISCUSSION

This Chapter presents the results of the study.

4.1 Response rate

The table below shows the completion and response rate from the respondents grouped according to their roles in the organisations

Table 3: Response Rate

Category	Target	Response	Return
Chief Executive Officer	10	5	50%
ICT Managers	10	8	80%
IT Officers and Analysts	20	19	95%
Finance Managers	10	10	100%
HR Managers	10	9	90%
Marketing and advertising leads	12	12	100%
Sales and Retail leads	12	12	100%
Product Managers	6	5	83%
Quality Assurance Managers	5	5	100%
Customer Support	15	15	100%
Users	15	13	87%
Total	**125**	**113**	**90%**

Source: Research data, 2020

4.2 Demographic Analysis

Majority of respondents had tertiary education with 63.7% with a bachelor's degree and 29.2% with a master's degree. 5.3% of the respondents had vocational training or a diploma, whilst 1.8% had high school level education.

85% of the respondents had worked in their organizations for more than 2 years. This could mean that most respondents had an in-depth knowledge of data governance.

4.3 Data governance within SMEs

Respondents were asked whether they had knowledge of data governance in their organisations, 74.2% responded with a yes. 68% indicated that data is very important to their organisations.

Table 4: Experience with data governance.

Experience with data governance		
	Frequency	**Percent**
Yes	92	74.2%
No	21	25.8%
Total	**113**	**100**

Source: Research data, 2020

Respondents were asked to choose an option that best described their organisation's data governance position and 51.6% agreed that they had small pilot project concerning data governance running, while 20.2% indicated that they did not have data governance projects yet and 28.2 agreed that data governance projects are running with the participation of different departments within our organisation. This could be due to the fact most SME companies have the knowledge of data governance and are in the process of adopting it.

Table 5: Level of experience with data governance.

Level of data governance		
	Frequency	**Percent**
We have a small pilot project concerning data governance running	59	51.6%
Data governance projects are running with the participation of different departments within our organisation	35	28.2%
We do not have a data governance project yet	19	20.2%
Total	**113**	**100%**

Source: Research data, 2020

Respondents were asked to provide feedback on whether their organisations performed data audits and how often. 53.1% agreed that audits are performed once a year.

Table 6: Frequency of data audits.

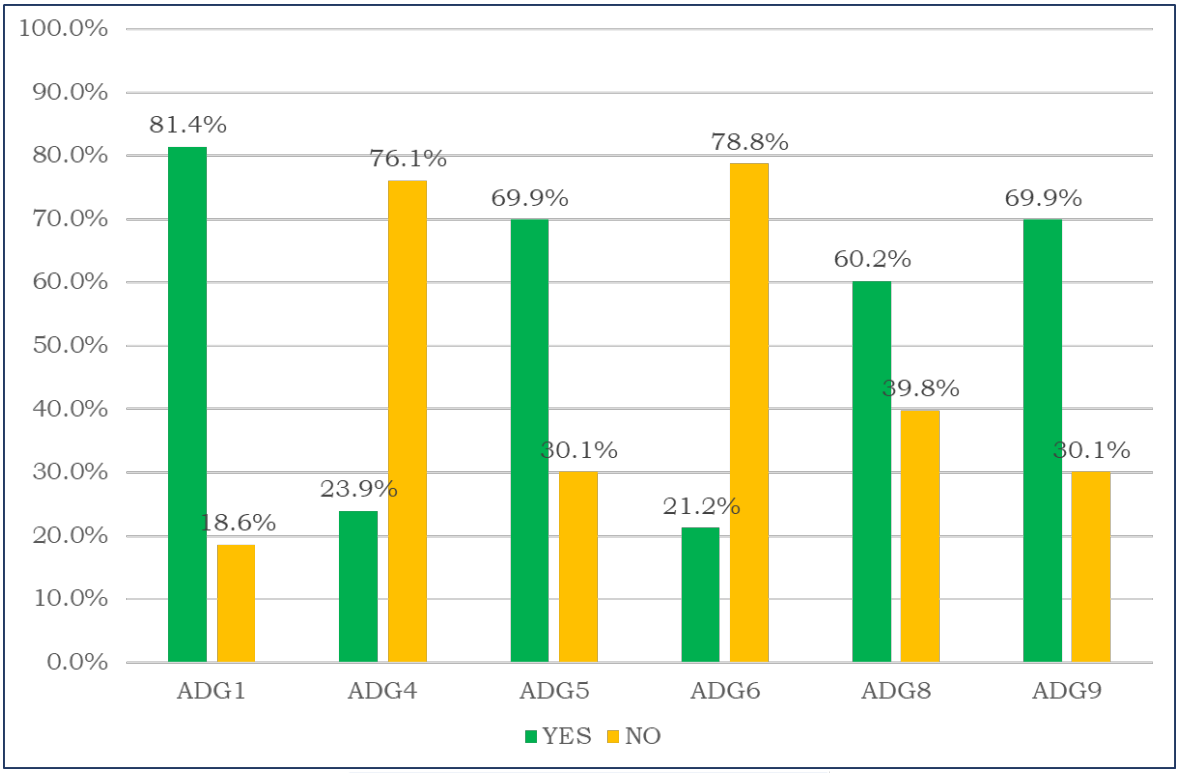
How often are data audits performed?		
	Frequency	**Percent**
Never	24	20.7%
Once a year	60	53.7%
Twice a year	19	15.9%
Quarterly	8	7.3%

Monthly	2	2.4%
Total	**113**	**100%**

Source: Research data, 2020

76.1% of the respondents disagreed that they did not have data governance departments in their organisations. This could be because most organisations have a data governance project under their IT department. 78.8% of the respondents indicated that they did not have a formal data governance policy in place, this might be due to data governance not being fully implemented in most of the organisations.

69.9% agreed that data was used to make policy changes in their organisations while 60.2% agreed that data stewards were fully in charge of data quality. 69.9% of the respondents agreed that external data requests analysed to protect personal identification information mostly by the use of security groups.



Key	
ADG1	Experience with DG
ADG4	DG department
ADG5	Data to make policy related decisions
ADG6	Formal data governance policy?
ADG8	Data stewards who are in charge of data quality
ADG9	external data requests scrutinized

Figure 9: Status of data governance within SMEs. Source: Research data, 2020

4.4 Constructs Analysis

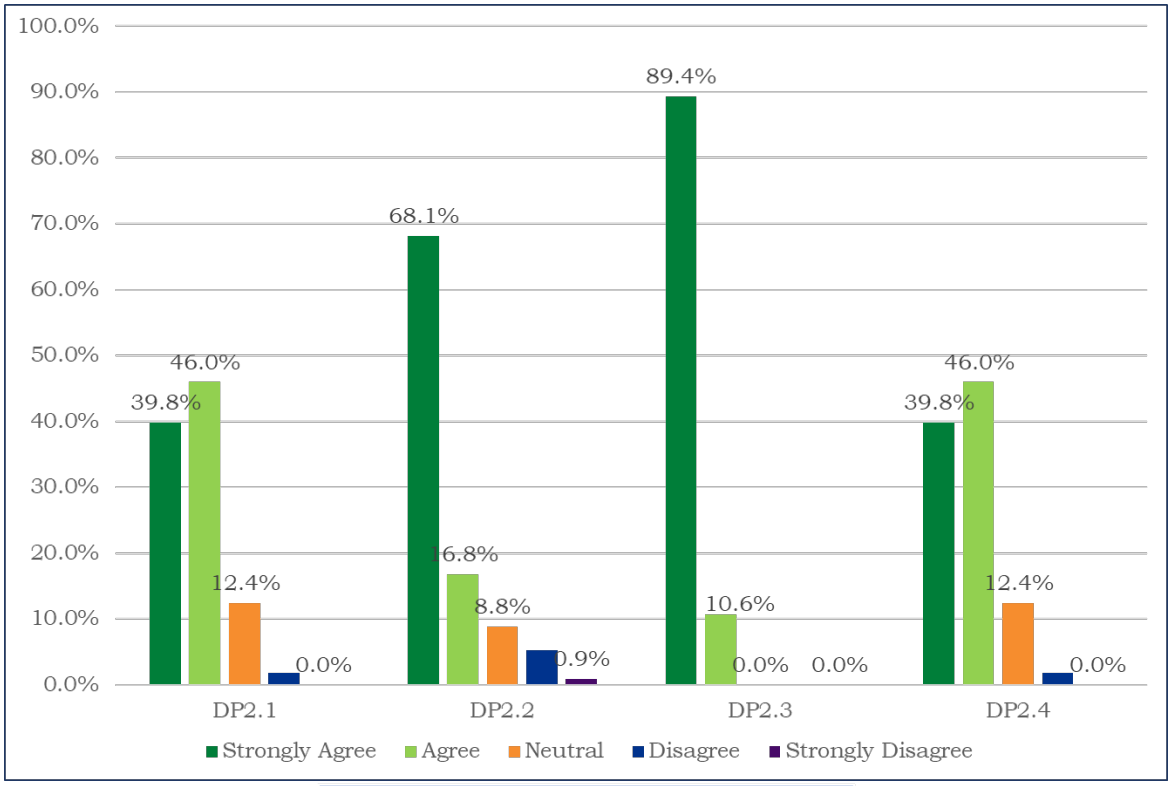
This is the results of each construct variable.

4.4.1 Data Principles

The respondents were asked to provide feedback on where data stewards reside in their organisations. The result shows that in most organisations, stewards reside in the IT department (59%) as opposed to in the business units (41%).

39.8% of the respondents strongly agreed that data is an important asset in their organisations while 46% agreed to this. 68.1% agreed that data should be shared among different systems, encouraging systems to talk to each other. 89.4% of the respondents strongly agreed that

internal and external data sources should be identified in their organisation. A further 83% agreed or strongly agreed that the value of data is an essential element of operational efficiency within their organisations.



Key	
DP2.1	Data is an important asset in your organization
DP2.2	Data should be shared between different systems
DP2.3	Internal & external data sources should be considered as data assets
DP2.4	Value of data and essential element of operational efficiency

Figure 10: Data Principles. Source: Research data, 2020

4.4.2 Data Quality

Respondents were requested to provide feedback on what triggered an alarm for data quality and the top two triggers were identified as user complaints and Audits and rarely business strategy. 78.8% also indicated that data stewards were present

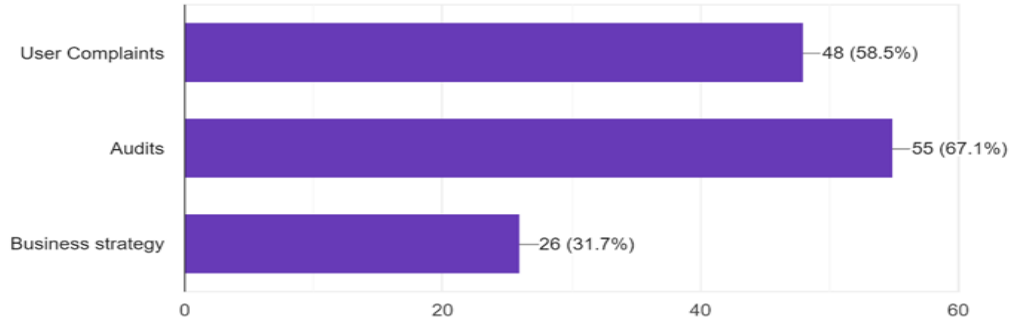


Figure 11: Data quality. Source: Research data, 2020

Respondents were further asked to give their feedback on four data quality dimensions accuracy, consistency, completeness and timeliness. The accuracy, completeness and significance of data can only be accomplished by continuous monitoring of current data and regular updating of the data. The respondents agreed that all four dimensions were met by their organisations

Table 7 : Data quality dimensions.

	Yes		No	
	Frequency	**Percent**	**Frequency**	**Percent**
Data is Accurate: data item is close to its true value in terms of meaning and truthfulness	106	93.8%	7	6.2%
Data is Consistent: data unit is specified the same throughout the organisation	101	89.4%	12	10.6%
Data is Complete: completeness of columns of a table containing data	102	90.3%	11	9.7%
Timeliness of data: promptness freshness and frequency of updates of data	101	89.4%	12	10.6%

Source: Research data, 2020

Respondents were requested to rank data quality problems experienced in their organisations. Extra time to reconcile data, loss of credibility in a system, delay in deploying a new system and compliance problems were the top three problems indicated to be caused by poor data quality.

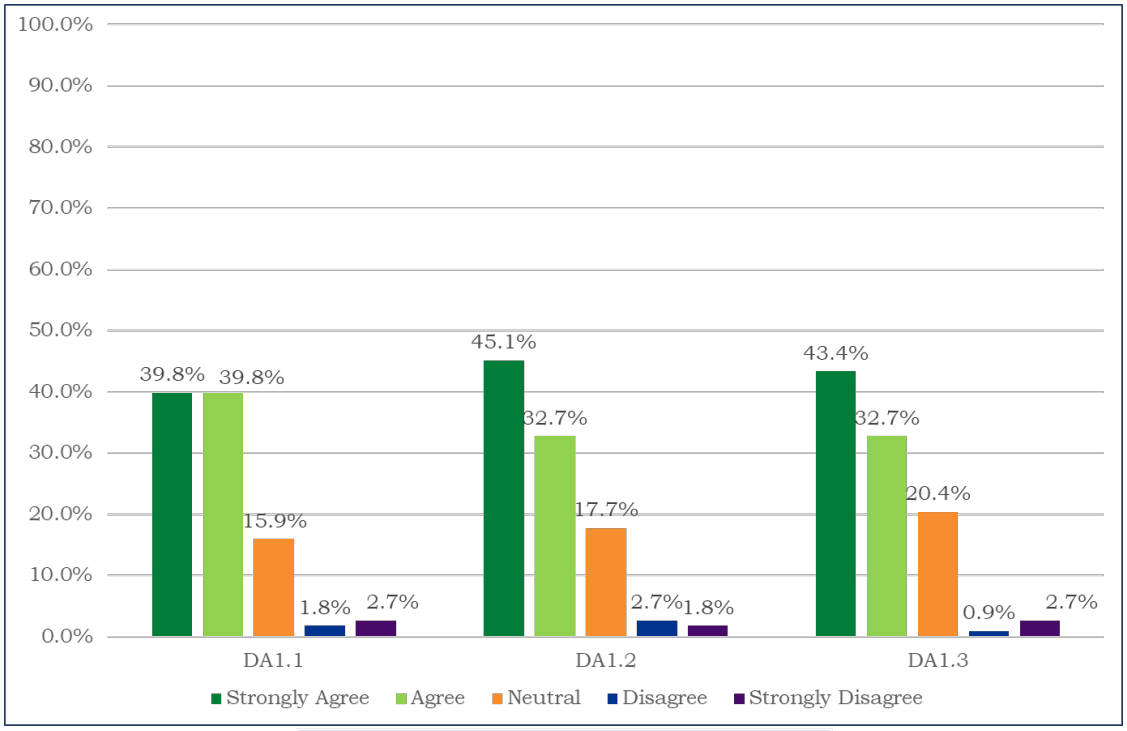
Table 8 : Data quality problems.

Which of these problems are caused by poor data Quality and often experienced by your organisation? Please rank from 1-6 where number 1 is most commonly experienced and number 6 is least experienced.						
	1	**2**	**3**	**4**	**5**	**6**
Extra time to reconcile data	25.9%	32.0%	14.6%	13.4%	13.1%	1.0%
Delay in deploying a new system	25.6%	9.8%	20.7%	28.3%	7.1%	8.5%
Loss of credibility in a system	34.6%	19.8%	23.2%	9.8%	6.7%	5.9%
Lost revenue	8.5%	8.5%	19.5%	15.9%	25.6%	22.0%
Customer dissatisfaction	9.8%	14.6%	17.1%	11.0%	30.4%	17.1%
Compliance problems	37.1%	11.0%	20.7%	17.1%	12.0%	2.1%

Source: Research data, 2020

4.4.3 Data Access

Respondents agreed that organisations data should be tagged and should have restricted access to prevent unauthorised access and changes. Most respondents indicated that most data handling systems are restricted in functionality, and they were aware that this limitation could lead to an organisation being vulnerable to malicious attacks. Respondents further indicated that they had back up procedures in place. In as much as backup procedures are in place and can reactively resolve any potential data loss, the organisations should further proactively establish appropriate data security.

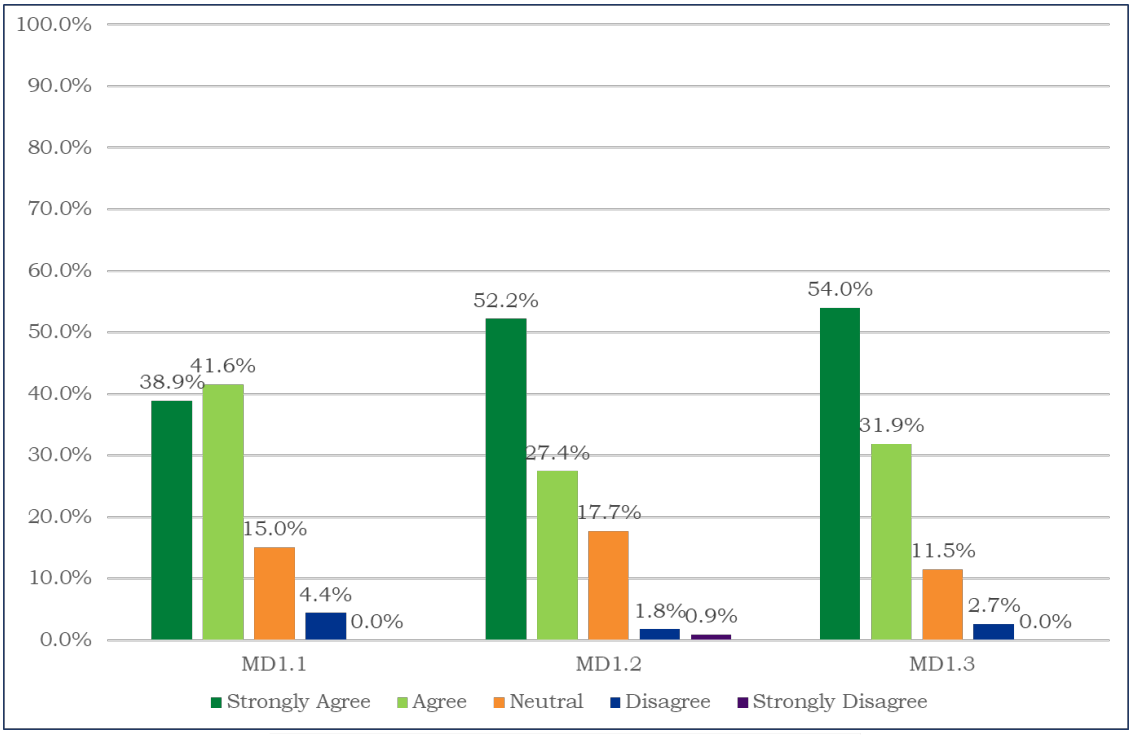


Key	
DA1.1	Your organizations data access should be restricted
DA1.2	Data handling systems open to abuse in your organization?
DA1.3	Data back up procedures that can reactively resolve any potential data loss are in place

Figure 12 : Data access. Source: Research data, 2020

4.4.4 Metadata

Most respondents understood the meaning of metadata and 52.2% confirmed that corporate data was being documented in their organisations. Normally the meaning of the data is passed on to new employees through training, personal communication thus creating data view. 54% indicated that a data dictionary is essential for an organisations data interpretation. There is a need to formalise metadata and communicate to the parties involved in accessing and manipulating data in an organisation.

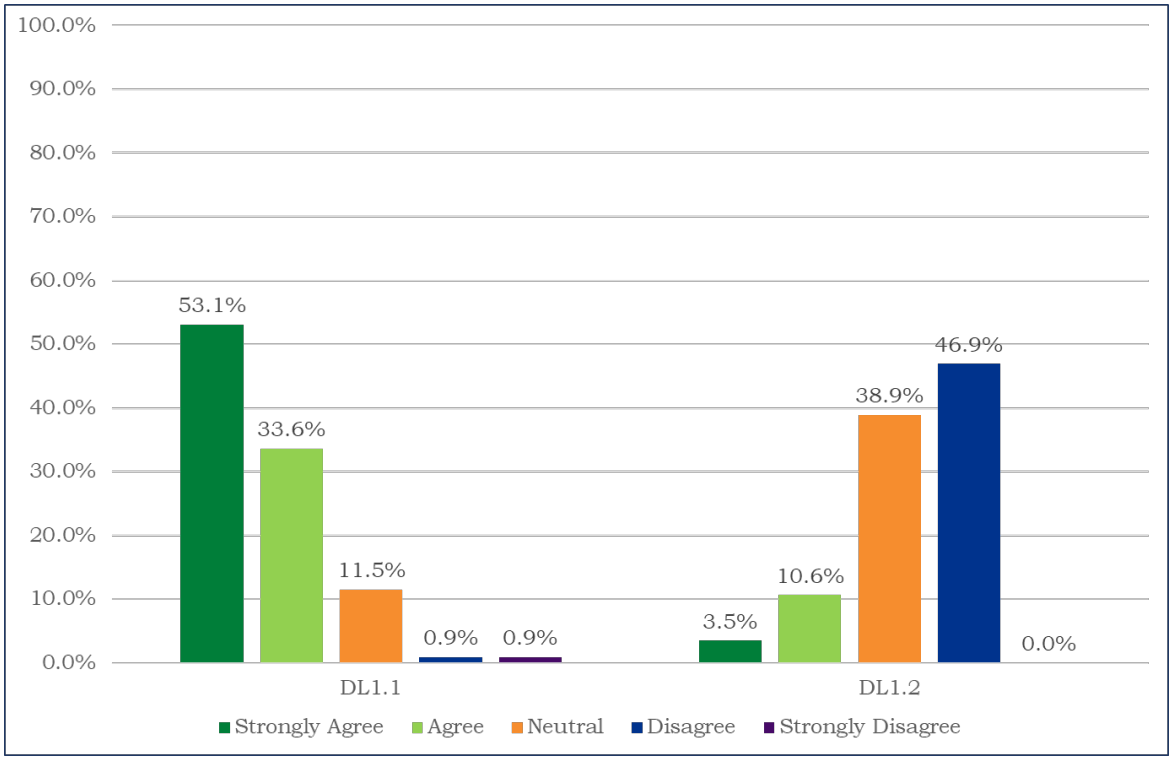


Key	
MD1.1	You are conversant with the term metadata
MD1.2	Corporate data is being documented in your organization
MD1.3	Data dictionary is important for your organization's data interpretation

Figure 13: Metadata. Source: Research data, 2020

4.4.5 Data Lifecycle

53.3% of the respondents strongly agreed that their organisations data has a life span and should be monitored throughout the lifecycle. 46.9% of the respondents indicated data retention policy was not present in their organizations. There is a need to have a policy in place to guide the use of data throughout its life and to define responsibilities for data destruction.

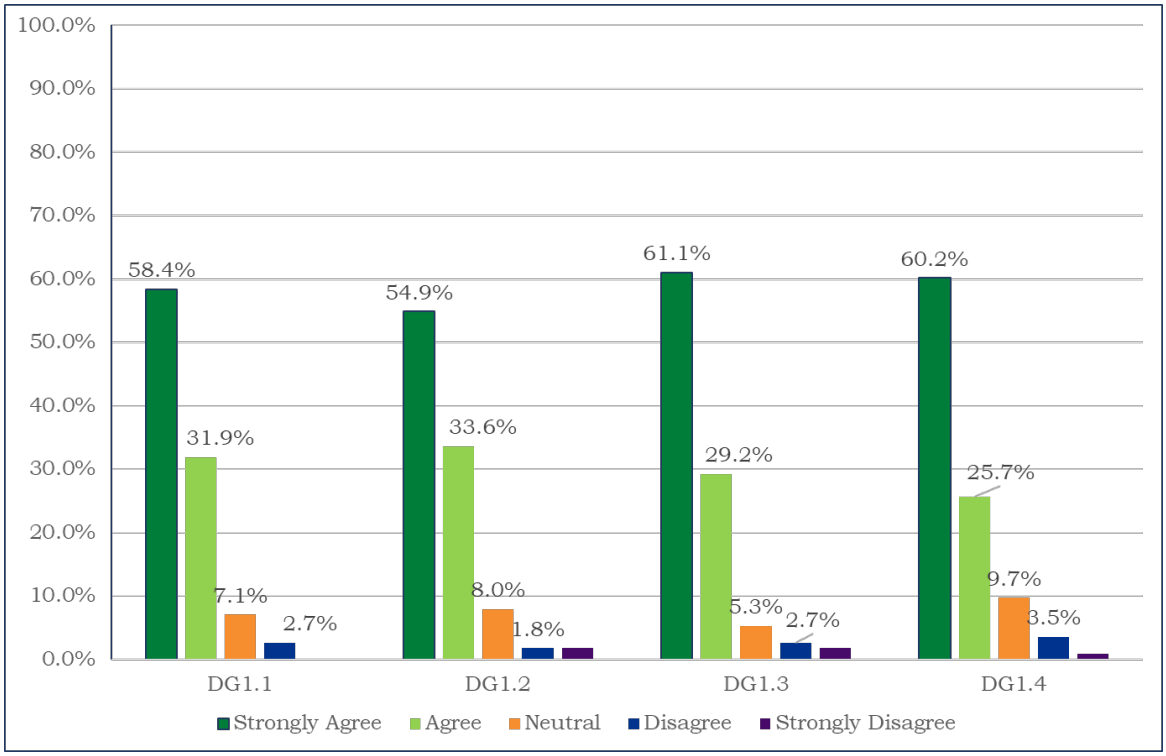


Key	
DL1.1	Your organizations data has a life span
DL1.2	There is a data retention policy in place

Figure 14 : Data lifecycle. Source: Research data, 2020

4.4.6 Data Governance

58.4% of respondents either agreed or strongly agreed that it is critical to adopt a data framework while 54.9% of the respondents either agreed or strongly agreed proper accountability framework can improve data value. 61.1% and 60.2% of the respondents strongly agreed that data governance is essential to both IT strategy and business strategy respectively.

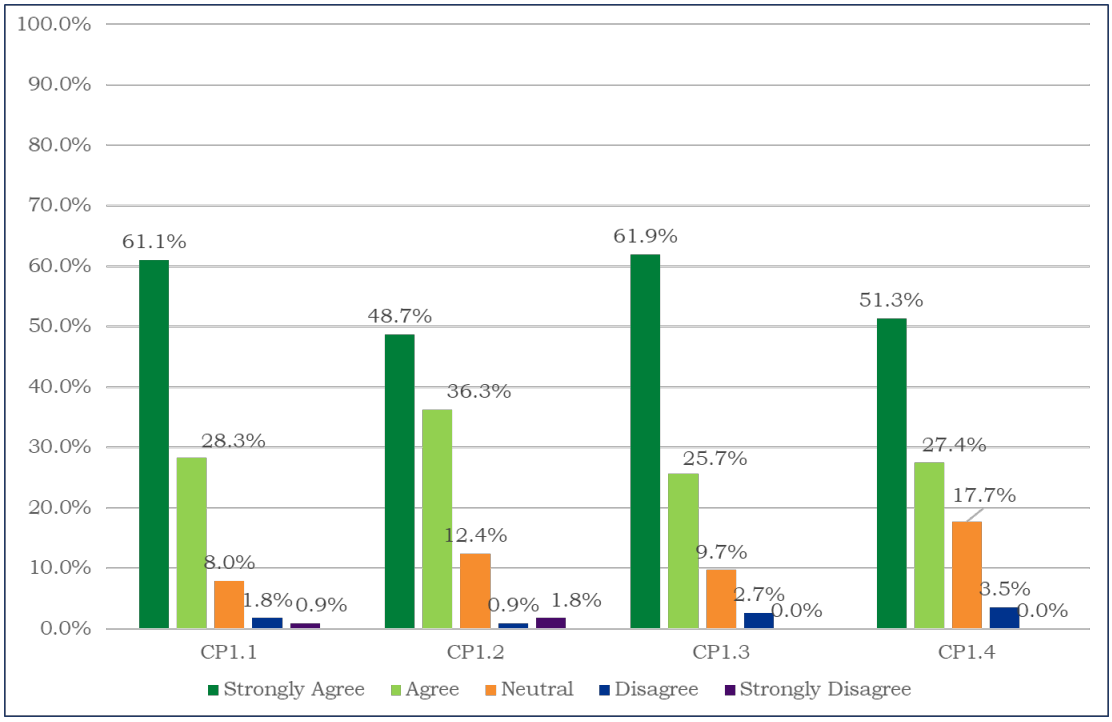


Key	
DG1.1	In order to derive more value on data, a data framework should be established
DG1.2	Data value can be improved through proper accountability framework
DG1.3	Data governance to IT strategy
DG1.4	Data governance to Business strategy

Figure 15 : Data governance. Source: research data, 2020

4.4.7 Corporate Performance

There are four critical key perspectives in a balanced scorecard that can be used to measure corporate performance. These are customer, financial, internal business processes and learning and growth (Rompho, 2011). The respondents were asked about their organisations' performance around these key perspectives of balance balance score card relating to data governance. The respondents agreed that the is an improvement that is influenced by the data governance initiatives. These improvements would be better felt when effective data governance policies and solutions are put in place (Rand secure data, 2013).



Key	
CP1.1	Customer related measure
CP1.2	Financial measure
CP1.3	Internal business processes
CP1.4	Learning and growth measure

Figure 16: Corporate governance. Source: Research data, 2020

4.5 Factors that Affect Data Governance in the SME Sector.

Respondents were asked to assess the reasons for implementing data governance by scoring statements derived from existing literature. The results shown in table 8 indicate that most respondents agreed that compliance with regulatory requirements, improved data quality, improved data security, improved operational efficiency and improved customer engagement and financial performance are the most common drivers to implementation of data governance in most institutions.

Table 9: Drivers of data governance within the SME sector.

	Description	Mean	Mode	Population
FDG1.1	Compliance with an existing regulatory framework	0.44	1	113
FDG1.2	Improved quality of data	1.31	1	113
FDG1.3	Improved data security	0.64	1	113
FDG1.4	Improved operational efficiency	0.72	1	113
FDG1.5	Improved customer engagement and financial performance	1.34	1	113

Respondents were asked to assess the factors hindering the successful implementation of data governance by scoring statements derived from existing literature. Table 9 shows that most respondents agreed that lack of knowledge and experience, lack of data ownership, poor organisation culture and not able to monetise the value of data as the main factors hindering the successful implementation of data.

Table 10: Barriers of data governance within the SME sector.

	Description	Mean	Mode	Population
FDG2.1	Lack of knowledge and experience with data governance	1.08	1	113
FDG2.2	Lack of ownership with data	1.53	1	113
FDG2.3	Poor organisational data culture	1.62	1	113
FDG2.4	Not easy to monetise the value of data	1.64	1	113
FDG2.5	Old IT systems	1.45	1	113

4.6 Reliability and Validity Testing

4.6.1 Reliability Testing

This study adopted a deductive approach as the research method. To establish the convergent and discriminant validity of the test instrument, factor analysis was done. Internal consistency reliability measures the consistency between different items of the same construct. Cronbach's alpha test is used to determine the reliability of variables. A threshold value of 0.7 is normally used when computing the Cronbach alpha test (Field, 2009). Although there are some workers viz. Moss et al. (1998) who have also supported the view that Cronbach's alpha value above 0.6 is generally acceptable. Hair (1998) has also supported the view that in a study with a small

sample size, low Cronbach's alpha scores such as 0.6 can be taken as the measure of acceptability. This study will adopt a 0.7 threshold.

Table 11: Cronbach's alpha test.

Construct	Number of Items	Mean	Std. Variation	Cronbach's Alpha Index
Data Principles	5	10.63	1.728	0.753
Data Quality	11	22.16	6.805	0.863
Metadata	3	5.19	2.21	0.852
data Access	3	5.58	2.58	0.908
Data Lifecycle	3	4.53	1.57	0.740
Data Governance	3	6.30	2.85	0.880
Corporate Performance	4	6.50	2.86	0.897

4.7 Hypothesis Testing

Below are the hypotheses that informed this study:

Hypothesis 1 : Data principles play an important role in data governance in SMEs.
Hypothesis 2 : Data quality plays an important part in data governance in SMEs
Hypothesis 3 : Data access has a significant role to play in data governance in SMEs
Hypothesis 4 Metadata information is an important part of data governance in SMEs
Hypothesis 5 : Data lifecycle management plays significant role in data governance in SMEs
Hypothesis 6: Perceived adoption of Data governance has a major effect on corporate performance within SMEs

This study's main objective was to gain insight into the factors affecting data governance and to evaluate the impact of effective data governance has on corporate performance of SMEs. There were five factors were identified in the conceptual framework, and these were, data principle, data quality, metadata, data access and data lifecycle. The research question one below addresses this.

Research Question 1: Which factors influence data governance in organisations within the SME sector?

Hypothesis one to five will help to answer this research question. Multiple regression analysis was carried out to test these hypotheses. Table 11 below shows a summary and overall fit statistic. The adjusted R^2 for the model is 0.522.

Table 12: Research question 1 - model summary.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737	0.544	0.522	0.49298
a. Predictors: (Constant), Lifecycle, Principles, Quality, Access, Metadata b. Dependent Variable: Governance				

Table 13: Research question 1 - ANOVA.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.982	5	6.196	25.497	.000[b]
	Residual	26.004	107	0.243		
	Total	56.986	112			
a. Dependent Variable: Governance b. Predictors: (Constant), Lifecycle, Principles, Quality, Access, Metadata						

Table 14: Research question 1 - coefficients.

Coefficients								
Model		Unstandardized Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-.325	.339		-.961	.339	-.997	.346
	Quality	.255	.089	.221	2.859	.005	.078	.431
	Principles	.083	.164	.040	.508	.613	-.242	.409
	Metadata	.321	.149	.331	2.159	.033	.026	.615
	Access	-.012	.109	-.014	-.106	.916	-.228	.205
	Lifecycle	.448	.116	.330	3.855	.000	.218	.678
a. Dependent Variable: Governance								

The coefficient table above indicates that data quality, metadata and data lifecycle are variables that have a major effect on data governance. The positive b-value of all predicators indicates positive relationships.

Table 15: Summary of hypotheses.

Hypotheses		**Coefficient**	**t**	**p-value**	**Decision**
H1	Data principles play an important part in data governance in SMEs.	0.040	0.508	0.613	**Decline**
H2	Data quality plays an important part in data governance in SMEs	0.221	2.859	0.005	Accept
H3	Data access plays an important part in data governance in SMEs	-0.014	-0.106	0.916	**Decline**
H4	Metadata information is an important part of data governance in SMEs	0.331	2.159	0.033	Accept
H5	Data lifecycle plays important part in data governance in SMEs	0.330	3.855	0.000	Accept
H6	Perceived adoption of Data governance has a major effect on corporate performance within SMEs	.694	10.156	0.000	Accept

RQ2: To what extent does quality data governance influence the organisational performance of companies within the SME sector?

Hypothesis 6 : Data governance has a major role in corporate performance within SMEs.

Table 16: Research question 2 - model summary.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.694	.482	.477	.52162
a. Predictors: (Constant), Governance b. Dependent Variable: Performance				

Table 17: Research question 2 – ANOVA.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.064	1	28.064	103.144	.000[b]
	Residual	30.201	111	.272		
	Total	58.265	112			
a. Dependent Variable: Performance b. Predictors: (Constant), Governance						

Table 18: Research question 2 – coefficients.

Coefficients								
Model		Unstandardized Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.521	.119		4.361	.000	.284	.757
	Governance	.702	.069	.694	10.156	.000	.565	.839
a. Dependent Variable: Performance								

To test this proposition simple regression was carried out. R square (0.482) show that a 48% variance in corporate performance is explained by the quality of data governance. The p-value is 0.00 level that is p-value < =0.05. Proposition 6 is supported. The beta value has a positive value indicating that there is a positive relationship between the quality of data governance and corporate performance. This shows that changes in corporate performance are related to changes in the quality of data governance. A linear regression established quality of data governance could statistically and significantly predict corporate performance.

Table 19: Hypothesis 6

Hypothesis		Coefficient	t	p-value	Decision
H6	Perceived adoption of Data governance has a major effect on corporate performance within SMEs	.694	10.156	0.000	Accept

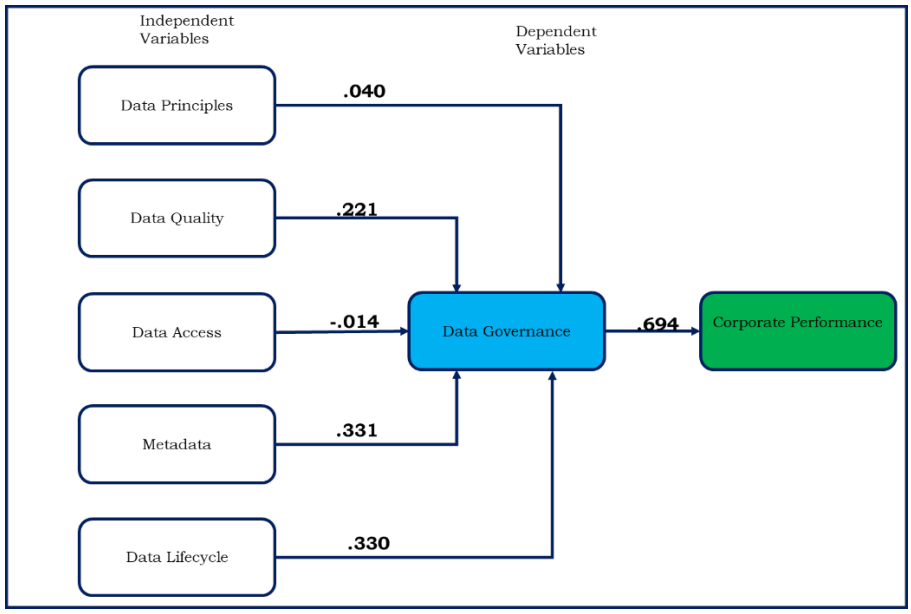


Figure 17: Conceptual model with test results

4.8 Discussion and Summary of Findings

This study finds that SMEs interviewed have a variety of data needs with similar views of the need for implementing data governance strategies. Most of these organizations have similar problems in relation to their ability to address data management and control as an organizational asset successfully.

The lack of knowledge and experience with data management in combination with organizational culture such as awareness has a huge impact on the ability of a SME to develop and implement a robust data governance strategy. The results show that SMEs studied did not have a data retention policy in place and this could lead to hogging of data and data lifecycle issues may not be properly addressed. It is not easy for organizations to monetize the value of data, and this poses a challenge when coming up with a business case for a data governance strategy. This is despite respondents recognizing data as an organizational asset that greatly influences both IT and business strategies.

Table 20: Summary of construct findings

		Dimension	**Mean**	**Std. Deviation**
Attitude and perception of DG	ADG1	Experience with DG	1.19	0.391
	ADG2	Option that fits with your organization	1.65	0.755
	ADG3	Importance of data	4.46	0.926
	ADG4	DG department	1.76	0.428
	ADG5	Data to make policy related decisions	1.3	0.461
	ADG6	Formal data governance policy?	1.79	0.411
	ADG7	How often are data audits performed	2.15	0.899
	ADG8	Data stewards who are in charge of data quality	1.47	0.682
	ADG9	external data requests scrutinized	1.3	0.461
Data Principles	DP1	Where do data stewards reside?	1.54	0.501
	DP2.1	Data is an important asset in your organization	1.76	0.735
	DP2.2	Data should be shared between different systems	4.46	0.926
	DP2.3	Internal & external data sources should be considered as data assets	1.11	0.309
	DP2.4	Value of data and essential element of operational efficiency	1.76	0.735
Data Quality	DQ1.1	Data is accurate	1.72	0.661
	DQ1.2	Data is consistent	1.92	0.814
	DQ1.3	Data is complete	1.98	0.824
	DQ1.4	Timeliness of data	1.96	0.91
	DQ2.1	Extra time to reconcile data	1.98	1.026

		Dimension	Mean	Std. Deviation
	DQ2.2	Delay in deploying a new system	2.15	1.063
	DQ2.3	Loss of credibility in a system	2.36	1.188
	DQ2.4	Lost revenue	2.31	1.07
	DQ2.5	Customer dissatisfaction	1.97	1.039
	DQ2.6	Compliance problems	1.97	1.039
	DQ3	What often raises an alarm on the Quality of data?	1.83	0.693
	MD1.1	You are conversant with the term metadata	1.85	0.837
	MD1.2	Corporate data is being documented in your organization	1.72	0.881
Metadata	MD1.3	data dictionary is important for your organization's data interpretation	1.63	0.793
	DA1.1	Your organizations data access should be restricted	1.88	0.927
	DA1.2	Data handling systems open to abuse in your organization?	1.83	0.934
Data Access	DA1.3	Potential data loss can be prevented by appropriate data backup procedures	1.87	0.95
	DL1.1	Your organizations data has a life span	1.63	0.793
	DL1.2	There is a data retention policy in place	1.71	0.798
Data Lifecycle	DL2	Has a data retention policy been defined for all your data?	1.19	0.398
	DG1.1	In order to derive more value on data, a data framework should be established	1.54	0.744
	DG1.2	Proper accountability framework can improve the data value	1.62	0.849
Data	DG1.3	Data governance to IT strategy	1.55	0.856
Governance	DG1.4	Data governance to Business strategy	1.59	0.873
	CP1.1	Customer Related Measure:	1.53	0.791
	CP1.2	Financial Measure:	1.71	0.852
Corporate	CP1.3	Internal Business Processes	1.53	0.78
Performance	CP1.4	Learning and Growth Measure	1.73	0.876

The table 20 above shows the standard deviation and means of the different dimensions of the variables. Results also show that, data governance affects corporate performance of organizations.

CHAPTER FIVE – CONCLUSION AND RECOMMENDATION

This section summarises the findings of the study in relation to the set objectives in chapter one, literature review and framework constructs. Suggestions for further study and recommendations will also be captured.

5.1. Study Achievements

i. ***Research Objective 1: To assess data governance practices in selected SMEs.***

Most SMEs have experience with data governance and majority have small pilot projects concerning data governance running as opposed to full data governance projects. Majority do not have data governance departments as these are part of the IT department's mandate. They understand the benefits that data governance can offer and sometimes seem higher than the perceived benefits the effort needed to achieve data governance.

ii. ***Research Objective 2: To explore the factors that affect data governance in SME sector.***

In most organisations, data stewards reside within the IT department as opposed to Business Units. Data stewards should reside in both the IT department and Business Units. Most organisations agreed that data should be shared between systems as opposed to working in silos.

In most organisations, an alarm for data quality was raised by audits. Whilst this is the norm, the ideal case should have these initiatives informed by the business strategy. Most organisations agreed that poor data quality is bad for business. Data quality should aim to meet the four dimensions: accuracy, consistency, completeness and timeliness. Other problems caused by poor data quality such as compliance problems, extra time to reconcile data and loss of credibility in systems.

Most organisations have sensitive data that is restricted to curb unauthorised access and they have data backup procedures that can reactively resolve potential data loss. Metadata was not a new term with the SME sector and most respondents were conversant with it. There was a need to have a formal data dictionary in place and accessible to all users. Most SMEs studied did not have a data retention policy in place and this could lead to hogging of data and data lifecycle issues not properly addressed.

What are the barriers and drivers of data governance in SMEs in Kenya?

The study also identified barriers and drivers of data governance. Results show that most respondents agreed that compliance with regulatory requirements, improved data quality, improved data security, improved operational efficiency and improved customer engagement and financial performance are the most common drivers to implementation of data governance in most institutions. Results also show that most respondents agreed that lack of knowledge and experience, lack of data ownership, poor organisation culture and the inability to monetise the value of data as the main factors hindering successful implementation of data.

iii. Research Objective 3: To what extent does quality data governance influence companies' organizational performance in the SME sector?

Perceived adoption of Data governance has a major effect on corporate performance within SMEs. There is a link between data governance and corporate performance. Data governance outcomes reduce risk and improve the decision-making process. Data governance practices are key to shaping performance measures that can increase competitive advantage. A balanced scorecard is therefore a good measure of the impact of data governance on organisational performance.

iv. ***Research Objective 4: Propose a data governance implementation model for SMEs.***

From literature reviewed, a number of models were studied, and each model provides an aspect that should be considered to improve data management in organizations. There is no "one-size-fits-all" prescription for how an organization should implement and optimize the governance and management of data (Weber et al. 2009). SMEs environment presents peculiarities that have direct and dynamic impact on data governance. After analysing these existing models, a model is proposed below that allows integration of six domains mainly data principles, data lifecycle, metadata, data quality, data security and information technology.

This model proposes to replace data access with data security because data security brings in the mechanisms that ensure confidentiality, integrity and availability. One of the major goals of data governance is to meet regulatory and compliance requirements, such as GDPR and data privacy laws. Risk management and business continuity are part of these requirements that SMEs will have to comply to compete in the global markets, as these SMEs collect a lot of personal data in the course of their business.

Data Security will ensure risks are identified, responsibilities are assigned and that access to data is restricted with frequent monitoring and audits.

The model introduces information technology as a new domain. This involves the use of technology to support and monitor data. Information technology is a critical source that supports data volume such as customer information and transaction details in its various stages such as collection, processing, storage and distribution. Information technology is therefore considered a key success factor in implementation of data governance and can be considered as data integration and interoperability, data warehousing and architecture, business intelligence.

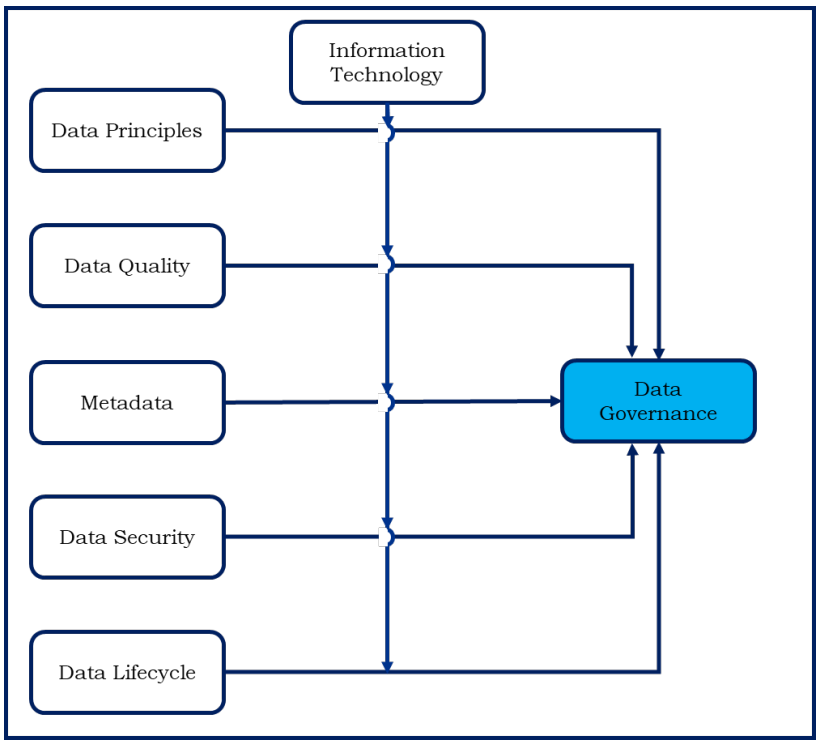


Figure 18: Proposed data governance implementation model for SMEs

5.2. Limitations of Study

This study was conducted on SMEs within the top 100 mid-sized companies survey done in Kenya by KPMG and Standard media group therefore not adequately capturing process within SMEs that are adopting data governance in Kenya. Furthermore, majority of the respondents were based in Nairobi county.

5.3. Conclusions and Recommendation

This study aimed to explore the effects data governance has on organisation performance within SMEs in Kenya and to investigate the factors that affect data governance. The study shows that data principles, data quality, data access, metadata and data lifecycle had an impact on data governance. There is a positive relationship between data governance and corporate performance as well. Organisations should adopt data governance such as clearly defining data roles and responsibilities, allocating resources initiatives that strengthen to data projects and carrying out training.

In section 5.1 above, an implementation model was presented that practitioners can use to develop data governance strategies for organizations. This model has six domains and an argument has been presented for why the additional two domains are important. These domains are data security and information technology as a mediating variable. There is a need to implement the proposed model and evaluate its impact on data governance.

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APPENDICES

Questionnaire

Demographic Questions

What is your current title
Which business unit are you in
how long have you worked with your organisation
What is your Highest level of education

data governance within the SMEs

Item Number	**Assessing data governance**
ADG1	My organisation has experience with data governance o Yes o No
ADG2	Please choose the option that fits best to your organisation o We have a small pilot project concerning data governance running o data governance projects are running with participation of different departments within our organisation o We do not have a data governance project yet
ADG3	How would you classify the importance of data to your organisation? (1= Not important, 5= Very important) o 1 o 2 o 3 o 4 o 5
ADG4	Do you have a data governance department in your organisation? o Yes o No
ADG5	Do you use your data to make policy related decisions? o Yes o No
ADG6	Is there a formal data governance policy? o Yes o No
ADG7	How often are data audits performed in your organisation? o Never o Quarterly o Once a year o Monthly o Twice a year o Weekly
ADG8	Are there data stewards who are in charge of data quality? o Yes o No
ADG9	Are all external data requests scrutinized, personal identification information protected as needed, and approved by the Privacy and Security workgroup? o Yes o No

Framework concepts

<table>
<tr><td>Item No.</td><td>data Principles</td></tr>
<tr><td>DP1</td><td>Where do data stewards reside?
o Business unit o IT department</td></tr>
<tr><td>DP2</td><td>Based on your experience, please indicate your level of agreement with these statements regarding data principles within your organisation
<table>
<tr><td></td><td>Strongly Agree</td><td>Agree</td><td>Neutral</td><td>Disagree</td><td>Strongly Disagree</td></tr>
<tr><td>data is an important asset in your organisation</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>data should be shared between different systems</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>Internal & external data sources should be considered as data assets for your organisation</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>Value of data and essential element of operational efficiency</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
</table></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td>data Quality</td></tr>
<tr><td>DQ1</td><td>Based on your experience, please indicate your level of agreement with these statements regarding data Quality within your organisation
<table>
<tr><td></td><td>Strongly Agree</td><td>Agree</td><td>Neutral</td><td>Disagree</td><td>Strongly Disagree</td></tr>
<tr><td>data is Accurate : Data item is close to its true value in terms of meaning and truthfulness</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>data is Consistent : Data unit is specified the same throughout the organisation</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>data is Complete: completeness of columns of a table containing data</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>Timeliness of data: promptness freshness and frequency of updates of data</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
</table></td></tr>
<tr><td>DQ2</td><td>Based on your experience, please indicate your level of agreement with these statements regarding data Quality within your organisation:
<table>
<tr><td></td><td>Strongly Agree</td><td>Agree</td><td>Neutral</td><td>Disagree</td><td>Strongly Disagree</td></tr>
<tr><td>Extra time to reconcile data</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
<tr><td>Delay in deploying a new system</td><td>o</td><td>o</td><td>o</td><td>o</td><td>o</td></tr>
</table></td></tr>
</table>

	Loss of credibility in a system	○	○	○	○	○
	Lost revenue	○	○	○	○	○
	Customer dissatisfaction	○	○	○	○	○
	Compliance problems	○	○	○	○	○

DQ3 What often raises an alarm on the Quality of data?

○ User Complaints	○ Audits	○ Business strategy

Metadata

MD1 Based on your experience, please indicate your level of agreement with these statements regarding metadata within your organisation:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
You are conversant with the term metadata	○	○	○	○	○
Corporate data is being documented in your organisation	○	○	○	○	○
data dictionary is important for your organisation's data interpretation	○	○	○	○	○

data Access

DA1 Based on your experience, please indicate your level of agreement with these statements regarding data Access within your organisation:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Your organisations data access should be restricted	○	○	○	○	○
data handling systems open to abuse in your organisation?	○	○	○	○	○
data backup procedures that can reactively resolve any potential data loss are in place	○	○	○	○	○

data Lifecycle

DL1 Based on your experience, please indicate your level of agreement with these statements regarding data lifecycle within your organisation:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

	Your organisations data has a life span	○	○	○	○	○
	There is a data retention policy in place	○	○	○	○	○
DL2	Has a data retention policy been defined for all your data? ○ Yes ○ No					
	Good data governance					
DG1	Based on your experience, please indicate your level of agreement with these statements regarding data governance in organisations					
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	In order to derive more value on data, a data framework should be established	○	○	○	○	○
	data value can be improved through proper accountability framework.	○	○	○	○	○
	data governance to IT strategy	○	○	○	○	○
	data governance to Business strategy	○	○	○	○	○
	data governance –Corporate Performance					
CP1	Corporate performance is a composite assessment of how well an organisation executes on its most important parameters. Please rank from strongly agree- Strongly disagree.					
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	Customer Related Measure: There has been an improvement of customer satisfaction rating as a result data governance initiative	○	○	○	○	○
	Financial Measure: There has been reduction of costs due to improvement in regulatory compliance/reduction of regulatory risk	○	○	○	○	○
	Internal Business Processes: Measure There has been an improvement in Internal business processes e.g. quick responses fewer errors experienced due to data governance initiatives	○	○	○	○	○
	Learning and Growth Measure: There has been a reduction of	○	○	○	○	○

	hours of employee training per employee due to consistent usage of data across the organisation						

Factors affecting data governance within SMEs

Item Number	**Factors affecting data governance within SMEs**
FDG1	Based on your experience, please indicate your degree of agreement with these claims regarding the reasons for implementing data governance

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Compliance with an existing regulatory framework	○	○	○	○	○
Improved quality of data	○	○	○	○	○
Improved data security	○	○	○	○	○
Improved operational efficiency	○	○	○	○	○
Improved customer engagement and financial performance	○	○	○	○	○

FDG2 Based on your experience, please indicate your degree of agreement with these claims regarding the barriers for successful implementation of data governance

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lack of knowledge and experience with data governance	○	○	○	○	○
Lack of ownership with data	○	○	○	○	○
Poor organisational data culture	○	○	○	○	○
Not easy to monetize the value of data	○	○	○	○	○
Old IT systems	○	○	○	○	○

Appendix III: 2018 Top 100 Mid-sized Companies in Kenya

Rank	Company	Industry
1	Napro Industries Ltd	Manufacturing
2	Polygon Logistics Ltd	Logistics
3	North Star Cooling Systems	Supplies
4	Ravenzo Trading Limited	Supplies
5	Care Chemists	Health
6	Isolutions Associates	ICT
7	Valley Hospital	Health
8	Soloh WorldWide Inter-Enterprises Limited	Supplies
9	Super Broom Services Ltd	Cleaning
10	Well Told Story	Media
11	Novel Technologies (E.A) Ltd	ICT
12	Melvin Marsh International Ltd	Agriculture
13	Polucon Services	Air Cargo
14	Specicom Technologies Ltd	Supplies & ICT
15	Manix Clothing	Clothing
16	Software Technologies Limited	ICT
17	Vinep Forwarders Limited	Clearing and Forwarding

18	Prafulchandra & Brothers Ltd	Supplies
19	Amex Auto & Industrial Hardware Ltd	Automobile
20	Sheffield Steel Systems Limited	Supplies
21	Vivek Investments Ltd	Manufacturing
22	Bluekey Seidor	ICT
23	Skypex Supplies Ltd	Supplies
24	Pathcare Kenya Ltd	Health
25	Orange Pharma Ltd	Pharmaceutical
26	Pinnacle (K) Travel & Safaris Ltd	Tours and Travel
27	Superior Homes Kenya	Real Estate
28	Furniturerama	Furniture
29	Bagda's Auto Spares Ltd	Automotive
30	Nairobi Enterprises Ltd	Supplies
31	Express Kenya Limited	Clearing and Forwarding
32	Gina Din Corporate Communications	Communications
33	Zaverchand Punja LTD	Manufacturing
34	Patmat Bookshop Ltd	Supplies
35	Executive Healthcare Plan	Health
36	Elite Tools	Supplies
37	BIMAS Kenya Limited	-
38	Mandhir Construction Limited	Construction
39	Waterbuck	Hospitality
40	General Automobile Corporation	Automobile
41	Economic Industries Ltd	Manufacturing
42	Waterman Drilling Africa	Construction
43	Ndugu Transport Company Limited	Transport
44	Fayaz Bakers Limited	Manufacturing
45	MPPS Accessories	Automobile
46	Trident Plumbers Ltd	Plumbing
47	Riley Services Ltd	Security
48	Thika Cloth Mills Limited	Manufacturing
49	Maroo Polymers	Manufacturing
50	Mukurweini Wakulima Dairy	Processing
51	Total Solutions Ltd	Technology
52	Oil Seals & Bearings Centre Ltd	Automotive
53	Palmhouse Dairies	Processing
54	Sensations Limited	Supplies
55	Makini School	Education
56	Computer Pride	Training services
57	General Cargo Services Ltd	Logistics and Transport
58	Varsani Brakeline Limited	Auto Repair
59	Typotech Imaging Systems Ltd	Supplies
60	Kenya Bus Services Management Limited	Transport
61	Philafe Engineering Ltd	Engineering consultancy

62	MIC Global Risks Insurance Brokers (K) Ltd	
63	Synergy Gases (K) Ltd	Supplies
64	Machines Technologies Limited	Supplies
65	Orbit Engineering Ltd	Manufacturing
66	Zen Garden	Hospitality
67	Norda Industries	Manufacturing
68	Astral Industries Ltd	Supplies
69	Lota Motors Ltd	Automobile
70	Warren Enterprises	Supplies
71	Xtreme adventures limited	Tours and Travel
72	Ideal Manufacturing	Manufacturing
73	Canon Aluminium Fabricators	Manufacturing
74	Master Fabricators Ltd	Automotive
75	Specialized Aluminum Renovators Limited (SARL	Construction
76	Hydro Water Well (K) Ltd	Construction
77	Roy Transmotors Ltd	Logistics
78	Rongai Workshop & Transport	Transport
79	Hipora Business Solutions	Logistics
80	Nationwide Electrical Industries	Supplies
81	Allwin Packaging	Supplies
82	Komal Construction	Construction
83	Impax Business Solutions	Information and Communication Technology (ICT)
84	SYNERMEDICA (KENYA) LIMITED	-
85	Syner-Med	Pharmaceuticals
86	Uneek Freight Services	Clearing and Forwarding
87	Sollatek Electronics	Supplies
88	Avtech Systems Ltd	Information and Communication Technology (ICT)
89	Kisima Drilling	Construction
90	Specialised Hardwares	Supplies
91	Smart Brands Limited	Supplies
92	Classic Mouldings Ltd	Interior design
93	Farm parts Limited	Supplies
94	Educate Yourself Ltd	Supplies
95	Emmerdale Limited	Carpets and Furnishings
96	Rift Valley Machinery Services Ltd	Supplies
97	Hajar Services Ltd	Construction
98	Advanta Africa Ltd	Information and Communication Technology (ICT)
99	eMomentum Interactive	Information and Communication Technology (ICT)
100	United Engineering Supplies Limited	Supplies