THE MODERATING EFFECT OF STAKEHOLDER INVOLVEMENT ON THE RELATIONSHIP BETWEEN REGULATORY FRAMEWORK AND DENTAL SUPPLY CHAIN PERFORMANCE IN KENYA

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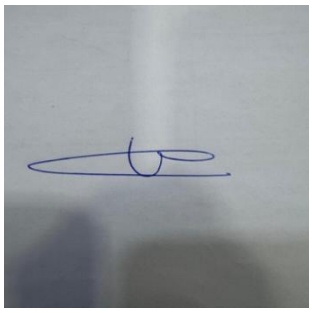
171784

A THESIS SUBMITTED TO THE STRATHMORE BUSINESS SCHOOL IN FULFILLMENT OF THE DEGREE MASTER OF COMMERCE, STRATHMORE UNIVERSITY

JUNE 2025

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another except where due reference is made in the proposal itself.



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ACKNOWLEDGEMENT

I would like to thank the Almighty Allah for granting me strength, wisdom, good health, and guidance throughout the entire period of this study. I sincerely acknowledge and appreciate my supervisor, Professor Jonathan Annan, for the invaluable guidance, constructive criticism, continuous support, and professional insights offered throughout the research process. I also extend my gratitude to my colleagues for their encouragement and assistance during the writing of this research. Special appreciation goes to my family and friends for their moral support, patience, and encouragement throughout the study period. Finally, I am grateful to all the respondents and institutions that participated in the study and contributed towards the successful completion of this research.

DEDICATION

I dedicate this thesis to my family, who assisted and supported me tremendously while I pursued this research proposal.

Above all, I dedicate this thesis to Allah first and those in Kenyan dental supplies field for the assistance and knowledge

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LIST OF ABBREVIATIONS AND ACRONYMS

AMDRH – African Medical Devices Regulatory Harmonization:

A regional initiative aimed at harmonizing the regulations for medical devices across African countries.

CE – Conformité Européenne
A mark indicating that a product has met EU standards for health, safety, and environmental protection.

EAC – East African Community:
A regional intergovernmental organization of six countries in the African Great Lakes region that collaborates on economic, political, and regulatory issues.

EU MDR – European Union Medical Device Regulations:
A set of regulations in the European Union ensuring the safety and performance of medical devices, including dental products.

EMCA – Environmental Management and Coordination Act:
Kenya's legislation aimed at regulating environmental practices, referenced in the context of regulatory frameworks.

IDF – Import Declaration Form:
A document required by customs authorities (such as the Kenya Revenue Authority) for the importation of goods, including dental supplies.

ISO – International Organization for Standardization:
An international body that develops and publishes a wide range of proprietary, industrial, and commercial standards, many of which are referenced for ensuring product quality and safety.

KEBS – Kenya Bureau of Standards:
The national standards body responsible for setting and enforcing quality standards across various products and services, including dental equipment.

KEMSA – Kenya Medical Supplies Authority:
A state corporation responsible for managing the procurement and distribution of medical supplies within Kenya.

KMPDC – Kenya Medical Practitioners and Dentists Council:
The regulatory body that governs the practice of medicine and dentistry in Kenya, ensuring professionals meet established standards.

KRA – Kenya Revenue Authority:
The government agency responsible for tax collection, including duties on imported dental products.

NGO(s) – Non-Governmental Organization(s)
Organizations that operate independently from the government, sometimes involved in advocacy, implementation, or oversight within the health and supply chain sectors.

PPADA – Public Procurement and Asset Disposal Act
Legislative framework governing the procurement processes and asset management in Kenya, influencing supplier relationships and regulatory compliance.

PPB – Pharmacy and Poisons Board
The regulatory body in Kenya responsible for ensuring the safety, efficacy, and quality of pharmaceuticals and medical devices, including dental supplies.

PVoC – Pre-Export Verification of Conformity
A process through which products are inspected to verify that they meet regulatory standards before being exported to Kenya.

SCM – Supply Chain Management
A framework and set of practices dedicated to the efficient management of the flow of goods, services, and information from suppliers to customers, critical in the context of dental product supply chains.

SEM – Structural Equation Modelling
A statistical technique used in the document to analyze complex relationships between latent variables (e.g., regulatory frameworks, stakeholder involvement) and observed outcomes in supply chain performance.

SDGs – Sustainable Development Goals
A set of 17 global goals set by the United Nations to address a wide range of social,

economic, and environmental challenges, referenced in relation to improving Kenya's dental supply chain within broader development objectives.

SMEs – Small and Medium Enterprises
Business entities that are often mentioned in discussions about regulatory impact, particularly regarding market entry challenges and resource constraints within the supply chain.

TRIPS – Trade-Related Agreement on Intellectual Property Rights
An international agreement administered by the World Trade Organization (WTO) that sets minimum standards for intellectual property regulation, affecting areas such as the importation of branded dental products.

WHO – World Health Organization
An international public health agency that provides guidelines, standards, and data relevant to healthcare supply chains, including dental product regulations.

OPERATIONAL DEFINITION OF TERMS

Compliance: The adherence of dental product importers and distributors to local and international regulatory standards (e.g., ISO 13485, WHO guidelines) to ensure product safety, quality, and market integrity (Schmalz & Reichl, 2021).

Dental Products: A range of medical tools, consumables, and advanced equipment (e.g., dental implants, dental chairs, imaging system like CBCT X-ray machines) imported into the country of Kenya for use in oral healthcare, requiring adherence to quality and safety standards (Subramanian, 2020; Gonçalves et al., 2023).

Efficiency: The ability of the supply chain to minimize delays, reduce costs, and optimize resource use while ensuring timely delivery of dental products to end users (Mangla et al., 2018).

Quality Standards: Established benchmarks (e.g., WHO Global Benchmarking Tool, ISO and CE standards) that dental products must meet to ensure safety, efficacy, and suitability for human use (World Health Organization, 2021).

Regulatory Framework: A set of policies, laws, and guidelines established by governing bodies (e.g., Pharmacy and Poisons Board, Kenya Bureau of Standards, Kenya Revenue Authority) to oversee the importation, compliance, and distribution of dental products, ensuring quality, safety, and efficiency in the supply chain process (Nasir et al., 2023).

Stakeholder Involvement: The active participation, collaboration, and engagement of key players such as regulators, importers, suppliers, and healthcare providers in decision-making, communication, and supply chain activities related to dental product imports (Freeman, 1984).

Supply Chain Performance: The efficiency, reliability, and effectiveness of the dental product supply chain, from importation to distribution, in delivering high-quality products in a timely and cost-effective manner to meet demand (Christopher & Holweg, 2017; Mangla et al., 2018).

ABSTRACT

The dental healthcare sector plays a critical role in healthcare service delivery and public health outcomes. However, Kenya's dental supply chain continues to experience procurement inefficiencies, counterfeit and substandard products, supply disruptions, regulatory compliance costs, and operational risks that affect the availability, quality, and affordability of dental healthcare services. Despite the importance of regulatory systems within healthcare supply chains, limited empirical research has examined how regulatory framework influences dental supply chain performance in Kenya. This study therefore examined the influence of regulatory framework on dental supply chain performance in Kenya, focusing on compliance requirements and risk management, while also examining the moderating effect of stakeholder involvement. The study was anchored on Regulatory Compliance Theory, Stakeholder Theory, and Contingency Theory. The study adopted a positivist philosophy and explanatory cross-sectional research design using a quantitative approach. Primary data were collected from 212 respondents drawn from Kenya's dental supply chain. The sample comprised 158 respondents from operational organizations including public and private dental clinics, referral hospitals, and importers/distributors of dental products, and 54 respondents from regulatory institutions including Kenya Bureau of Standards, Kenya Medical Practitioners and Dentists Council, Kenya Revenue Authority, and Pharmacy and Poisons Board. Data were analyzed using descriptive statistics, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), correlation analysis, hierarchical regression, and Structural Equation Modelling (SEM) through SPSS version 27 and LISREL 8.8. The findings revealed that compliance requirements significantly and positively influenced dental supply chain performance, supporting H1a, while risk management also had a significant positive influence on performance, supporting H1b. The results showed that organizations with stronger compliance systems and proactive risk management practices experienced better procurement efficiency, operational continuity, responsiveness, and product quality assurance. However, stakeholder involvement did not significantly moderate the relationship between regulatory framework and dental supply chain performance, leading to the rejection of H2a and H2b. The regression results further showed that the study variables explained 10.4% of the variation in dental supply chain performance.

The study concluded that regulatory compliance and proactive risk management are critical strategic mechanisms for improving efficiency, accountability, resilience, and operational performance within Kenya's dental supply chain. The study recommends strengthening compliance systems, supplier evaluation mechanisms, and coordinated regulatory oversight to improve supply chain performance and reduce operational inefficiencies within Kenya's dental healthcare sector.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Efficient supply chains are fundamental to the timely, reliable, and cost-effective delivery of healthcare products and services. In healthcare systems, supply chain performance affects the availability, accessibility, quality, and affordability of medical products required for effective patient care (Christopher & Holweg, 2017). The global dental products market has continued to expand because of technological advancements, increased awareness of oral health, population growth, and rising demand for specialized dental procedures (Mbugua & Namada, 2019). Dental products such as imaging systems, sterilization equipment, orthodontic devices, implants, and restorative materials require effective regulatory oversight to ensure safety, quality assurance, and operational reliability within healthcare systems (Cimilluca et al., 2021).

Globally, governments and regulatory agencies increasingly rely on regulatory frameworks to improve healthcare supply chain performance through quality assurance systems, import controls, certification procedures, and risk management mechanisms (Abaku & Odimarha, 2024). Effective regulatory systems enhance accountability, traceability, operational efficiency, and product safety within healthcare supply chains. However, healthcare supply chains in many developing economies continue to experience operational inefficiencies arising from fragmented regulatory enforcement systems, inadequate institutional coordination, weak technological integration, and limited stakeholder participation in regulatory implementation processes (Sorato et al., 2024).

In Africa, healthcare supply chains remain highly dependent on imported medical and dental products because of limited local manufacturing capacity and weak regional regulatory harmonization mechanisms (Melo & Twum, 2021). Differences in registration procedures, product standards, tariff classifications, and import requirements increase procurement costs and delay clearance processes for healthcare products (Wang et al., 2023). Although initiatives such as the African Medical Devices Regulatory Harmonization (AMDRH) program seek to improve regulatory coordination across African countries, implementation challenges continue to limit their effectiveness (WHO, 2017).

In Kenya, the dental supply chain operates within a multi-agency regulatory environment involving institutions such as the Pharmacy and Poisons Board (PPB), Kenya Bureau of Standards (KEBS), and Kenya Revenue Authority (KRA). These agencies oversee product registration, conformity assessment, customs clearance, taxation, and quality assurance of imported dental products (Mensah et al., 2021). Despite these institutional structures, Kenya's dental supply chain continues to experience procurement delays, duplicated procedures, prolonged approvals, fragmented enforcement systems, and rising operational costs associated with importation processes (Ong'ayo et al., 2020). The sector also remains heavily dependent on imported dental technologies and consumables, making it vulnerable to external supply disruptions and regulatory bottlenecks (Nasir et al., 2023).

Within this study, regulatory framework refers to the policies, procedures, standards, and institutional controls governing the importation, approval, distribution, and monitoring of dental products in Kenya. The study operationalized regulatory framework using compliance requirements and risk management dimensions. Compliance requirements include licensing procedures, documentation standards, certification processes, inspection requirements, and quality assurance mechanisms governing dental product importation and distribution (Mahjoub & Soliman, 2024). Risk management refers to processes of identifying, assessing, monitoring, and mitigating operational and regulatory risks affecting the movement and availability of dental products within the healthcare system (Paul et al., 2021).

Stakeholder involvement is also considered important in improving the effectiveness of healthcare supply chains. Stakeholder involvement refers to the participation and collaboration of regulators, importers, suppliers, distributors, dentists, healthcare providers, and professional associations in regulatory and supply chain processes (Freeman, 1984). Effective stakeholder engagement improves communication, policy acceptance, operational coordination, and implementation of regulatory requirements within supply chains (Siems et al., 2022). However, stakeholder participation within Kenya's dental supply chain remains inconsistent and inadequately institutionalized, thereby weakening coordination and implementation effectiveness.

Dental supply chain performance in this study refers to the efficiency, responsiveness, reliability, quality, and cost-effectiveness of the dental supply chain in ensuring timely availability and accessibility of dental products within healthcare facilities (Christopher & Holweg, 2017). The

study operationalized dental supply chain performance using indicators such as cost efficiency, reliability, quality and accuracy, and speed of delivery. Although previous studies examine healthcare supply chains broadly, most focus on pharmaceutical supply chains, public procurement systems, or general healthcare logistics without specifically examining the dental sector in Kenya (Lugada et al., 2022; Owich & Odero, 2023). Furthermore, limited studies have simultaneously examined compliance requirements, risk management, and stakeholder involvement within a unified analytical framework. Consequently, limited empirical evidence exists regarding the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. This study therefore addressed the conceptual, contextual, and methodological gaps by examining the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya.

1.1.1 Regulatory Frameworks for the Dental Supply Chain in Kenya

Internationally, Regulatory frameworks play an important role in ensuring the safety, quality, traceability, and effectiveness of healthcare products within supply chains. In the dental sector, regulatory systems establish standards governing product importation, licensing, conformity assessment, quality assurance, distribution, and post-market surveillance of dental products and equipment (WHO, 2021). Effective regulatory frameworks improve operational efficiency, strengthen accountability, and reduce circulation of counterfeit or substandard healthcare products. Globally, regulation of dental and medical products is guided by standards developed by organizations such as the World Health Organization and the International Organization for Standardization (ISO). These standards provide guidance on medical device safety, quality management systems, conformity assessment, and product monitoring processes (ISO, 2022; WHO, 2021). However, implementation of these standards requires adequate institutional capacity, technical expertise, technological infrastructure, and effective inter-agency coordination, which remain challenging in many developing economies (Goncalves et al., 2023).

At the regional level, African countries continue to pursue harmonization of medical device regulations through initiatives such as the African Medical Devices Regulatory Harmonization (AMDRH) program. The initiative seeks to standardize registration procedures, improve regulatory cooperation, and reduce duplication of regulatory requirements across countries (WHO,

2017). However, implementation challenges and inconsistent adoption continue to limit the effectiveness of these harmonization efforts (Azatyan, 2024). In Kenya, regulation of dental products involves several agencies including the Pharmacy and Poisons Board (PPB), Kenya Bureau of Standards (KEBS), and Kenya Revenue Authority (KRA). The Pharmacy and Poisons Board regulates importation and registration of medical and dental products under the Pharmacy and Poisons Act (Cap 244), while KEBS oversees conformity assessment and quality verification processes (Ondari, 2019; Mbugua & Namada, 2019). KRA administers customs clearance and tariff classification processes for imported products.

Despite the existence of these institutional frameworks, Kenya's dental supply chain continues to experience regulatory inefficiencies arising from fragmented enforcement systems, duplicated procedures, prolonged approvals, and weak coordination among regulatory agencies (Otieno, 2022; Xiao, 2022). Limited interoperability among PPB, KEBS, and KRA contributes to repetitive documentation requirements, inconsistent decisions, and delayed clearance timelines. These inefficiencies increase procurement costs and reduce responsiveness within the dental supply chain. This study operationalized regulatory framework using compliance requirements and risk management dimensions. Compliance requirements include licensing procedures, product certification standards, documentation processes, inspection requirements, and quality assurance mechanisms governing dental product importation and distribution (Mensah et al., 2022). Although compliance systems improve accountability and product quality assurance, excessive compliance procedures and repetitive inspections increase operational costs and procurement delays for importers and healthcare providers (Otieno, 2022).

Risk management represents another important dimension of regulatory framework within healthcare supply chains. Risk management involves identifying, assessing, monitoring, and mitigating risks associated with counterfeit products, operational disruptions, supply interruptions, and regulatory non-compliance (Paul et al., 2021). Effective risk management practices improve supply chain resilience and continuity of supply. However, many healthcare institutions and regulatory agencies in Kenya continue to experience challenges in implementing proactive risk monitoring and mitigation systems (Jajja et al., 2023). Although previous studies recognize the importance of regulation within healthcare supply chains, many focus broadly on healthcare systems without specifically examining how compliance requirements and risk management

influence dental supply chain performance in Kenya. This study therefore sought to address this contextual and conceptual gap.

1.1.2 Dental Supply Chain Performance in Kenya

Dental supply chain performance refers to the extent to which dental products are delivered efficiently, reliably, and cost-effectively to healthcare facilities in the required quantity and quality standards (Odhiambo & Wanjiru, 2021). Supply chain performance is commonly evaluated using indicators such as lead time, responsiveness, inventory turnover, service reliability, product quality, and cost efficiency (Christopher & Holweg, 2017; Mangla et al., 2018). Efficient supply chains improve product availability, reduce procurement costs, minimize operational disruptions, and enhance healthcare service delivery outcomes.

In Kenya, dental supply chain performance continues to face major operational challenges because the sector relies heavily on imported dental equipment, consumables, biomaterials, and specialized technologies. Dental products imported from countries such as China, India, Germany, and the United States constitute a significant proportion of products used within Kenya's healthcare facilities (Odhiambo & Wanjiru, 2021). This dependence on imports exposes the sector to customs delays, fluctuating import costs, regulatory bottlenecks, and disruptions associated with international logistics systems.

Lead time inefficiencies remain a significant challenge within Kenya's dental supply chain. Toroitich et al. (2020) observed that lengthy approval procedures, fragmented procurement systems, and bureaucratic administrative processes delay the acquisition and distribution of healthcare products within public institutions. Similarly, the World Health Organization (2024) reported that healthcare facilities in many low- and middle-income countries continue to experience delays in receiving essential healthcare products because of inefficient import and regulatory clearance systems. Such delays affect the availability of imaging systems, sterilization equipment, restorative materials, orthodontic supplies, and other specialized dental products required for patient care.

Inventory management inefficiencies also affect supply chain performance within Kenya's dental sector. Mwangi et al. (2020) noted that many healthcare institutions lack integrated inventory systems capable of supporting real-time stock monitoring, forecasting, and automated replenishment processes. Consequently, some healthcare facilities experience overstocking non-

essential items while simultaneously facing shortages of critical dental products. Weak forecasting systems and irregular procurement schedules contribute to inventory imbalances, resource wastage, and operational inefficiencies within healthcare supply chains (Johnson et al., 2020; Williams & Garcia, 2019).

Cost efficiency remains another major challenge affecting dental supply chain performance in Kenya. Importation of dental products involves multiple administrative and logistical processes that increase procurement expenses and clearance timelines (Otieno, 2022). According to the USAID Global Health Supply Chain Report (2021), fragmented procurement systems and inefficient import logistics contribute significantly to increased acquisition costs for healthcare products in Kenya. These costs are often transferred to patients through higher treatment charges, thereby limiting affordability and accessibility of dental healthcare services.

Despite increasing concerns regarding procurement inefficiencies, stock shortages, delayed deliveries, and rising treatment costs within Kenya's dental sector, limited studies specifically examine dental supply chain performance within the dental healthcare context. Existing studies largely focus on pharmaceutical supply chains or general healthcare logistics without adequately addressing operational challenges affecting dental products and technologies. This study therefore sought to contribute empirical evidence regarding dental supply chain performance within the Kenyan healthcare sector.

1.1.3 Stakeholder Involvement in dental supply chain in Kenya

Stakeholder involvement plays an important role in improving coordination, communication, and implementation effectiveness within healthcare supply chains. In healthcare systems, stakeholder involvement refers to the participation and collaboration of key actors involved in procurement, regulation, distribution, and utilization of healthcare products (Freeman, 1984). Within the dental supply chain, stakeholders include regulatory agencies, importers, distributors, suppliers, dentists, healthcare facilities, procurement agencies, and professional associations. Effective stakeholder involvement improves information sharing, strengthens operational coordination, enhances policy acceptance, and promotes accountability within supply chain systems (Siems et al., 2022). Stakeholder participation also enables regulatory agencies to obtain practical industry feedback regarding procurement processes, operational challenges, product classification, and implementation requirements (Qazi, Appolloni, & Shaikh, 2022). Such collaboration improves

regulatory responsiveness and reduces operational disruptions associated with poorly coordinated policies.

Despite the recognized importance of stakeholder involvement, participation of key actors within Kenya's dental supply chain remains limited and inconsistent. Nassir et al. (2023) observed that many healthcare regulations and procurement decisions are developed with minimal consultation of dentists, suppliers, distributors, and healthcare professionals. Consequently, some policies fail to align with operational realities within healthcare facilities and supply chain environments. Weak stakeholder involvement also contributes to poor communication and coordination among actors within the dental supply chain. Dentists and healthcare providers prioritize product quality and patient outcomes, while importers and distributors focus on procurement efficiency and cost management. Regulatory agencies primarily emphasize compliance enforcement and public safety objectives. In the absence of structured stakeholder engagement mechanisms, these differing priorities contribute to implementation conflicts, operational inefficiencies, and low compliance levels within the supply chain system (Martin et al., 2022).

Studies indicate that healthcare systems characterized by effective stakeholder engagement experience improved policy coordination, stronger compliance outcomes, enhanced transparency, and better supply chain responsiveness (WHO, 2021; Adama et al., 2024). Effective collaboration between regulators and supply chain actors strengthens trust, facilitates information sharing, and improves implementation of regulatory requirements. Within Kenya's dental supply chain, stakeholder involvement is particularly important because of the complexity of importation procedures, regulatory requirements, and coordination needs among multiple agencies and private sector actors. However, stakeholder involvement within the sector remains fragmented, irregular, and inadequately institutionalized. Consequently, coordination challenges and weak policy-practice alignment continue to undermine supply chain effectiveness.

Although previous studies acknowledge the importance of stakeholder involvement within healthcare supply chains, limited empirical evidence exists regarding how stakeholder involvement moderates the relationship between regulatory framework and dental supply chain performance in Kenya. This study therefore addressed this gap by examining the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya.

1.2 Problem Statement

The dental healthcare sector plays an important role in supporting healthcare service delivery and economic development in Kenya through provision of preventive, restorative, and specialized oral healthcare services. Globally, oral diseases affect approximately 3.5 billion people, making oral healthcare products and technologies critical components of healthcare systems (World Health Organization [WHO], 2022). In Kenya, oral diseases remain among the most prevalent non-communicable health conditions, with increasing demand for dental products and services in both public and private healthcare facilities (Ministry of Health Kenya, 2023). However, the effectiveness of the sector depends on an efficient dental supply chain capable of ensuring timely availability, affordability, reliability, and quality of dental products and technologies within healthcare facilities. Despite the growing demand for dental healthcare services, Kenya's dental supply chain continues to experience operational inefficiencies characterized by procurement delays, high importation costs, stock shortages, delayed product clearance, and inconsistent product quality, all of which negatively affect service delivery and patient access to dental care (Odhiambo & Wanjiru, 2021; Mwangi et al., 2020). Kenya imports more than 90% of its dental products and equipment, exposing the sector to customs delays, foreign supply disruptions, fluctuating import costs, and regulatory bottlenecks associated with international logistics systems (Nasir et al., 2023).

A major contributor to these inefficiencies is the fragmented regulatory environment governing importation and distribution of dental products in Kenya. Importers and distributors are subjected to multiple compliance procedures involving agencies such as the Pharmacy and Poisons Board (PPB), Kenya Bureau of Standards (KEBS), and Kenya Revenue Authority (KRA), resulting in repetitive documentation requirements, multiple inspections, prolonged approvals, and increased procurement costs (Otieno, 2022; Ong'ayo et al., 2020). According to the Pharmacy and Poisons Board (2024), importers incur numerous charges including Value Added Tax (VAT) of 16%, Import Declaration Fees (IDF) of 1.5%, Railway Development Levy (RDL) of 1.5%, import duty charges, conformity assessment fees, licensing fees, and annual retention charges, collectively increasing the landed cost of dental products by almost 50% above the original product cost. In addition, the USAID Global Health Supply Chain Report (2021) estimated that fragmented procurement systems and inefficient import logistics increase healthcare product acquisition costs in Kenya by between 20% and 30%. Regulatory delays and abrupt policy changes also continue

to disrupt procurement schedules and product availability within healthcare facilities (Benavides et al., 2023; Kenya Nuclear Regulatory Authority, 2023). Consequently, many healthcare facilities experience delays in receiving critical dental equipment, imaging systems, restorative materials, and sterilization products required for service delivery.

Globally and regionally, previous studies have examined healthcare supply chain regulation and performance but with limited focus on the dental supply chain. Hussain et al. (2022) in Asia and Gonçalves et al. (2023) in Europe found that regulatory coordination improves healthcare supply chain efficiency, quality assurance, and operational performance. In Africa, Lugada et al. (2022) and Ndomondo-Sigonda et al. (2021) established that fragmented regulatory systems and weak harmonization mechanisms contribute to procurement inefficiencies and delayed healthcare product availability across African healthcare systems. However, these studies focused on general healthcare supply chains rather than the dental sector and failed to operationalize regulatory framework using compliance requirements and risk management dimensions simultaneously, thereby creating conceptual and contextual gaps. In Kenya, Owich and Odero (2023) examined healthcare supply chain performance using variables such as risk management and supplier assessment, while Lilian and Nancy (2022) focused on healthcare logistics performance using multiple regression analysis. Although these studies established that risk management influences operational performance, they failed to incorporate compliance requirements and stakeholder involvement within the regulatory framework context. Similarly, Wanjema and Wanjiku (2025) examined regulatory framework and healthcare project performance without focusing on dental supply chain performance or the moderating role of stakeholder involvement.

Consequently, existing studies reveal conceptual, contextual, methodological, and theoretical gaps regarding the relationship between regulatory framework and dental supply chain performance in Kenya. Conceptually, previous studies rarely integrate compliance requirements and risk management dimensions within a unified regulatory framework model. Contextually, most studies focus on general healthcare supply chains rather than the dental sector in Kenya despite growing concerns regarding procurement delays, rising treatment costs, and supply disruptions affecting dental healthcare services. Methodologically, many studies rely on descriptive and regression-based approaches that inadequately capture moderating relationships among latent variables. Theoretically, limited empirical evidence exists regarding how stakeholder involvement moderates the relationship between regulatory framework and dental supply chain performance. This study

therefore sought to address these conceptual, contextual, methodological, and theoretical gaps by examining the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya using Structural Equation Modelling (SEM).

1.3 Research Objectives

1.3.1 General Objective

The general objective of the study was to examine the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya.

1.3.2 Research Objectives

The specific objectives of the study were to:

(i) Examine the influence of compliance requirements on dental supply chain performance in Kenya.
(ii) Determine the effect of risk management on dental supply chain performance in Kenya.
(iii) Examine the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya.

1.4 Research Questions

(i) What was the influence of compliance requirements on dental supply chain performance in Kenya?
(ii) What was the effect of risk management on dental supply chain performance in Kenya?
(iii) What was the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya?

1.5 Significance of the Study

1.5.1 Regulators

For regulatory bodies, this study was expected to highlight perceptions, impacts, and gaps within the existing regulatory framework governing dental imports in Kenya. The findings were intended to assist regulators in refining policies aimed at improving compliance, enhancing product quality, and increasing efficiency within the dental supply chain. In addition, stakeholders such as dental suppliers, distributors, and healthcare providers were expected to gain insights into operational bottlenecks and regulatory challenges affecting the industry. The study also contributed to the body of knowledge on Kenya's dental supply chain and was expected to provide reference material for scholars and future researchers interested in healthcare supply chain regulation and performance.

1.5.2 Government

The study was expected to provide the government with insights into challenges affecting dental supply chain management in Kenya and possible interventions for improving sector performance. Information obtained from key industry stakeholders was intended to help policymakers better understand operational challenges associated with regulatory procedures, supply chain inefficiencies, and stakeholder coordination. The findings were also expected to support policy formulation and strategic initiatives aimed at strengthening healthcare supply chain systems in line with Kenya Vision 2030 and broader economic development goals.

1.5.3 Public Agencies and International Institutions

Public agencies and international institutions were expected to benefit from the study by gaining a better understanding of their role in strengthening dental supply chain performance in Kenya. The study was intended to provide insights into areas requiring collaboration among regulatory agencies, healthcare institutions, development partners, and industry stakeholders. In addition, the findings were expected to support initiatives aimed at improving healthcare accessibility, product quality, and operational efficiency within the dental sector. The study also aligned with Sustainable Development Goal 3 on good health and well-being by promoting efficient and reliable healthcare supply chain systems.

1.6 Scope of the Study

This study focused on the relationship between regulatory framework and dental supply chain performance in Kenya, with stakeholder involvement considered as a moderating variable. Specifically, the study examined compliance requirements and risk management as dimensions of the regulatory framework, while dental supply chain performance was measured using cost efficiency, reliability, quality and accuracy, and speed of delivery. The study was anchored on Stakeholder Theory and Regulatory Compliance Theory. The study targeted dentists in private practice, learning institutions, and major referral hospitals, as well as supply chain professionals, regulatory officials, importers, distributors, and industry policymakers involved in the dental supply chain in Kenya. The research examined the roles of key stakeholders, including government agencies, private sector entities, healthcare providers, and professional associations, influencing dental supply chain performance. Geographically, the study was conducted in Kenya. The study covered the period between January 2019 and December 2024 to capture recent trends and developments affecting the dental supply chain sector. Methodologically, the study adopted a positivist research philosophy and an explanatory research design. A stratified random sampling technique was used to select 196 respondents from the target population. Data was collected using structured questionnaires and analyzed using Structural Equation Modelling (SEM) to establish the relationships among the study variables.

1.7 Chapter Summary

This chapter presented the background of the study by discussing the concepts of regulatory framework, stakeholder involvement, and dental supply chain performance from global, regional, and Kenyan perspectives. The chapter further highlighted the research problem, emphasizing the operational and regulatory challenges affecting the dental supply chain in Kenya and the existing conceptual, contextual, methodological, and theoretical gaps addressed by the study. In addition, the chapter outlined the research objectives and questions, significance of the study, and scope of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The section comprises the theoretical review, empirical review, research gaps, and conceptual framework of the research study. It also presents the operationalization of the variables.

2.2 Theoretical Framework

The theoretical framework provides the foundation for explaining the relationships among regulatory framework, stakeholder involvement, and dental supply chain performance in Kenya. The study was anchored on Stakeholder Theory, Regulatory Compliance Theory, and Contingency Theory. These theories were selected because they collectively explain the independent variables, moderating variables, and dependent variables of the study while addressing the interaction between regulatory systems, stakeholder participation, and supply chain performance outcomes. Stakeholder Theory explains the moderating role of stakeholder involvement, Regulatory Compliance Theory explains the influence of regulatory framework dimensions such as compliance requirements and risk management, while Contingency Theory explains how organizational performance depends on alignment between operational conditions and management practices.

2.2.1 Stakeholder Theory

Stakeholder Theory was developed by R. Edward Freeman in 1984 and argues that organizations operate within networks of interdependent relationships involving customers, suppliers, regulators, employees, communities, and other stakeholders whose interests influence organizational performance (Freeman, 1984). The theory emerged as a response to shareholder-oriented approaches that focused primarily on profit maximization while neglecting the interests of other actors involved in organizational operations. Stakeholder Theory emphasizes collaboration, participation, communication, accountability, trust, and shared value creation as critical determinants of organizational effectiveness and sustainability (Nunes, Gomes, & Santana, 2023).

The theory has been extensively applied in supply chain management, healthcare management, project management, logistics, and corporate governance to explain how stakeholder engagement influences organizational performance and operational sustainability (Aryee, 2024; Bhattacharya

& Fayezi, 2021). In healthcare supply chains, stakeholder involvement improves policy coordination, communication, transparency, and implementation of operational procedures across supply networks (Siems et al., 2022). Ndungu and Muathe (2025) established that stakeholder engagement positively influenced supply chain performance at Kenya Medical Supplies Authority, while Olwande (2021) observed that communication and stakeholder collaboration enhanced efficiency within Kenya's antiretroviral supply chain. Similarly, Thomas (2024) reported that stakeholder identification, engagement, and communication significantly improved healthcare project performance outcomes.

Despite its extensive application, Stakeholder Theory has attracted several criticisms. Critics argue that the theory does not clearly specify which stakeholders should receive priority in organizational decision-making processes, thereby creating ambiguity in managerial practice (Kortetmäki, Heikkinen, & Jokinen, 2023). The theory has also been criticized for inadequately explaining how organizations should balance competing stakeholder interests when conflicts arise between operational efficiency, profitability, regulatory compliance, and public welfare objectives (Marcon, Nora, & Alberton, 2023). Furthermore, Munir and Furinto (2022) argued that the theory does not clearly explain the optimal level of stakeholder involvement required to achieve measurable performance outcomes. These criticisms notwithstanding, the theory remains widely applicable because it provides a strong basis for understanding how collaboration and participation influence organizational effectiveness within complex operational environments.

In the context of this study, Stakeholder Theory provided theoretical foundation for explaining the moderating variable of stakeholder involvement and its interaction with regulatory framework and dental supply chain performance. The theory informed the fourth objective of the study, which sought to examine the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. The theory supports the argument that stakeholder participation strengthens implementation of compliance requirements and risk management practices through improved information sharing, communication, trust, coordination, and policy acceptance among regulators, suppliers, distributors, importers, dentists, and healthcare providers (Chowdhury et al., 2020). Consequently, the theory explains why the effectiveness of regulatory framework on dental supply chain performance may vary depending on the level of stakeholder engagement within Kenya's dental supply chain.

2.2.2 Regulatory Compliance Theory

Regulatory Compliance Theory emerged from governance and legal scholarship during the 1970s through the works of scholars such as Michael Lipsky and Scholz. The theory explains how organizations comply with rules, standards, legal requirements, and policies established by regulatory authorities (Lipsky, 1980). According to Regulatory Compliance Theory, compliance is not merely a legal obligation but also a strategic organizational function that influences legitimacy, accountability, operational efficiency, and risk management (Parker & Nielsen, 2017). The theory assumes that organizations operating within highly regulated sectors must align their operational systems and procedures with external regulations in order to maintain legitimacy, avoid sanctions, and improve long-term sustainability.

Regulatory Compliance Theory has been widely applied in healthcare, finance, logistics, and supply chain management to explain how regulatory adherence affects operational processes and organizational performance outcomes (Shah, 2023; Aryee, 2024). Within healthcare supply chains, compliance requirements such as licensing procedures, import approvals, inspection protocols, documentation standards, and product certification systems improve product quality assurance, accountability, traceability, and operational consistency (Christensen & Lægreid, 2020). Mahjoub and Soliman (2024) established that compliance with medical regulations improved cost efficiency and reduced procurement delays within dental supply chains, while Ouma and Njoroge (2022) found that regulatory adherence strengthened trust and operational performance within Kenya's pharmaceutical and dental sectors.

However, the theory has faced several criticisms. Scholars argue that Regulatory Compliance Theory promotes a "tick-box" culture in which organizations focus on satisfying minimum legal requirements rather than pursuing innovation, flexibility, and continuous operational improvement (Parker & Gilad, 2021). Critics further contend that compliance systems may impose significant operational and financial burdens on smaller organizations lacking adequate technological and financial resources to implement sophisticated compliance mechanisms (Ouma & Njoroge, 2022). Additionally, the theory has been criticized for being largely enforcement-driven and reactive because it inadequately explains the role of stakeholder collaboration, participation, and communication in enhancing regulatory effectiveness and performance outcomes (Shah, 2023). Despite these criticisms, the theory remains highly relevant within regulated healthcare

environments because it directly explains how regulatory structures shape organizational operations and performance.

In this study, Regulatory Compliance Theory provided the theoretical foundation for explaining the independent variable of regulatory framework, operationalized through compliance requirements and risk management. The theory informed the first and second objectives of the study, which sought to examine the influence of compliance requirements and risk management on dental supply chain performance in Kenya. Compliance requirements such as licensing procedures, documentation standards, inspections, import approvals, and product certification significantly influence procurement efficiency, operational consistency, and product quality assurance within the dental supply chain (Mensah et al., 2022). Similarly, risk management practices involving identification, assessment, monitoring, and mitigation of operational and regulatory risks improve supply chain resilience, continuity, and responsiveness (Paul et al., 2021). The theory therefore provided the analytical basis for explaining how regulatory framework dimensions influence dental supply chain performance in Kenya.

2.2.3 Contingency Theory

Contingency Theory was developed by organizational theorists such as Joan Woodward, Tom Burns, G. M. Stalker, and Paul Lawrence during the 1960s. The theory argues that there is no universally optimal way of managing organizations because organizational effectiveness depends on alignment between organizational practices and environmental conditions (Lawrence & Lorsch, 1967). According to the theory, organizational structures, operational systems, and management practices must adapt to contextual factors such as technological change, uncertainty, regulatory complexity, environmental turbulence, and stakeholder demands in order to achieve superior performance outcomes (Donaldson, 2001).

Contingency Theory has been extensively applied in supply chain management and healthcare operations to explain how organizations respond to changing operational environments and external uncertainties (Donaldson, 2001). In healthcare supply chains, organizations operate within environments characterized by regulatory changes, technological advancements, global supply disruptions, stakeholder pressures, and fluctuating operational risks. Consequently, supply chain performance depends on how effectively organizations align compliance systems, coordination mechanisms, and risk management strategies with prevailing environmental

conditions (Wieland, 2021). Jajja et al. (2023) established that adaptive risk management systems improved supply chain resilience within healthcare environments, while Nguyen and Tran (2022) found that operational flexibility enhanced supply chain responsiveness under conditions of uncertainty. Similarly, Kache and Seuring (2020) observed that supply chains characterized by adaptive coordination mechanisms demonstrated greater resilience and operational continuity during periods of disruption.

Despite its relevance, Contingency Theory has been criticized for lacking universally applicable managerial principles because organizational effectiveness varies across contexts and environments (Donaldson, 2001). Critics further argue that the theory is difficult to operationalize empirically because contextual variables and environmental conditions may vary significantly across organizations and industries (Scott, 2014). Additionally, the theory has been criticized for being highly situational and lacking predictive precision regarding which organizational arrangements are most effective under specific circumstances (Burns & Stalker, 1961). Nevertheless, the theory remains highly applicable within dynamic and uncertain environments because it explains why similar organizational practices may produce different performance outcomes depending on contextual conditions and environmental adaptability (Lawrence & Lorsch, 1967).

In this study, Contingency Theory complemented Stakeholder Theory and Regulatory Compliance Theory by providing an integrative explanation of the dependent variable of dental supply chain performance. The theory informed the overall conceptual relationship among regulatory framework, stakeholder involvement, and dental supply chain performance. Specifically, the theory explains that the effectiveness of compliance requirements and risk management practices depends on how well they align with stakeholder expectations, operational realities, and environmental conditions within Kenya's dental supply chain (Wieland, 2021). The theory therefore supports the argument that stakeholder involvement enhances adaptability, coordination, and responsiveness, thereby strengthening the influence of regulatory framework on cost efficiency, reliability, quality and accuracy, and speed of delivery within the dental supply chain (Jajja et al., 2023; Nguyen & Tran, 2022).

2.3 Empirical Literature Review

This section reviewed empirical studies related to the study variables in line with the research objectives of the study. The review was organized according to the specific objectives, namely: compliance requirements and dental supply chain performance, risk management and dental supply chain performance, and the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. The review synthesized global, regional, and local empirical evidence while identifying conceptual, contextual, methodological, and empirical gaps that justified the present study.

2.3.1 Compliance Requirements and Dental Supply Chain Performance

Compliance requirements constitute a critical component of regulatory frameworks within healthcare supply chains because they establish the standards, procedures, and controls governing procurement, importation, distribution, quality assurance, and operational accountability. In healthcare and dental supply chains, compliance requirements include licensing procedures, product certification, documentation standards, inspection protocols, customs approvals, and conformity assessment processes that organizations must satisfy before products are approved for market entry and distribution (Mensah et al., 2022). Effective compliance systems improve product traceability, operational consistency, quality assurance, and supply chain coordination, thereby enhancing overall supply chain performance (Christensen & Lægreid, 2020). However, excessive compliance procedures, fragmented regulatory enforcement, and duplicated approvals may increase procurement delays, operational costs, and inefficiencies within healthcare supply chains, particularly in developing countries characterized by weak institutional coordination systems (Otieno, 2022; WHO, 2024). Consequently, empirical studies have generated mixed findings regarding the extent to which compliance requirements improve supply chain performance across different operational and regulatory environments.

Zhang Fan and Fan (2020) empirically investigated the association between compliance requirements, supply chain integration, and firm performance using survey data collected from manufacturing firms and analyzed through structural equation modeling (SEM). The findings established that compliance requirements positively influenced supply chain integration by strengthening internal coordination and collaboration with suppliers and customers. Similarly, Ali et al. (2017) examined determinants of supply chain resilience among small and medium-sized enterprises dealing with perishable products using a qualitative research design based on semi-

structured interviews with managers. The study established that collaboration, compliance, and information sharing improved organizational resilience and operational continuity during disruptions. In another study, Dubey et al. (2021) conceptualized supply chain resilience as a dynamic organizational capability and established that organizations characterized by adaptive compliance systems, collaborative coordination mechanisms, and integrated operational procedures demonstrated superior performance during periods of uncertainty and disruption. Although these studies provide valuable insights regarding compliance systems and supply chain outcomes, their primary focus was on manufacturing firms and general commercial supply chains operating largely within developed economies. Consequently, the studies provide limited contextual understanding of how compliance requirements influence performance within highly regulated healthcare supply chains such as Kenya's dental sector, where regulatory fragmentation, import dependency, and institutional coordination challenges significantly shape operational outcomes.

At the global and regional levels, studies have increasingly emphasized the importance of regulatory harmonization and coordinated compliance systems in improving healthcare supply chain performance. World Health Organization reports indicated that more than 70% of countries continue to experience weak regulatory systems that undermine healthcare product accessibility, quality assurance, and supply chain effectiveness (WHO, 2024). Azatyan (2024) examined the role of regulatory harmonization and convergence in strengthening healthcare supply chains and found that regulatory dependence mechanisms reduced duplication of procedures, improved decision-making speed, and enhanced product availability across countries. Similarly, Hoekman (2015) investigated the influence of trade agreements on supply chain performance and established that harmonized regulations and mutual recognition frameworks reduced compliance costs and improved cross-border supply chain efficiency. In the African context, the Organisation for Economic Co-operation and Development and Korea Development Institute (2021) examined regulatory barriers affecting adoption of digital technologies in smart logistics systems and concluded that adaptive and flexible compliance systems enhanced supply chain responsiveness and operational efficiency. However, while these studies emphasize regulatory convergence and macro-level institutional reforms, they pay limited attention to firm-level compliance practices and operational realities within specialized healthcare subsectors such as dental supply chains. The studies also predominantly conceptualize compliance as a procedural or institutional issue without

sufficiently explaining how stakeholder interaction and operational coordination influence the effectiveness of compliance systems in improving supply chain performance outcomes.

Empirical findings within developing economies further demonstrate contrasting perspectives regarding the relationship between compliance requirements and supply chain performance. Aura (2017) established that regulatory reforms within Kenyan government ministries improved operational efficiency and procurement transparency by strengthening compliance enforcement mechanisms. The study, however, also observed that low stakeholder awareness and weak enforcement capacity limited effective implementation of procurement regulations. Similarly, Kurgat (2021) found that stronger regulatory compliance systems improved supplier relationship management and operational performance among commercial state corporations in Kenya. Conversely, studies within healthcare environments suggest that excessive compliance requirements, repetitive inspections, and fragmented approval procedures may increase procurement delays and operational costs rather than improve efficiency outcomes (Otieno, 2022; Xiao, 2022). These contrasting findings suggest that compliance requirements may not automatically translate into improved supply chain performance unless implementation systems are supported by effective coordination, stakeholder engagement, technological integration, and adaptive operational mechanisms. The inconsistencies further indicate that the relationship between compliance requirements and performance is likely contingent upon contextual and institutional factors rather than being universally linear across sectors and operational environments.

Overall, the reviewed empirical literature demonstrates that compliance requirements influence supply chain performance through mechanisms such as operational coordination, quality assurance, accountability, resilience, and regulatory harmonization (Dubey et al., 2021; Azatyan, 2024; Kurgat, 2021). However, existing studies predominantly focus on manufacturing industries, public procurement systems, pharmaceuticals, and general healthcare logistics, thereby providing limited empirical understanding of compliance requirements within Kenya's dental supply chain context. Furthermore, many studies conceptualize compliance as a direct operational determinant without critically examining the interaction between compliance systems, stakeholder coordination, and supply chain performance outcomes (Hoekman, 2015; Aura, 2017). The literature therefore reveals a contextual gap regarding the dental healthcare subsector, a conceptual gap concerning the integration of compliance requirements with stakeholder involvement, and a

methodological gap because many studies rely on generalized supply chain indicators without examining compliance mechanisms within highly regulated healthcare environments. This study addressed these gaps by examining how compliance requirements influence dental supply chain performance in Kenya within a regulatory environment characterized by multiple agencies, import dependency, and stakeholder coordination challenges.

2.3.2 Risk Management and Dental Supply Chain Performance

Risk management is increasingly recognized as a critical determinant of supply chain performance within healthcare systems because it enhances organizational preparedness, operational continuity, and responsiveness to disruptions. In healthcare and dental supply chains, risk management involves processes of identifying, assessing, monitoring, and mitigating operational, regulatory, technological, and logistical risks that may interfere with product availability and service delivery (Paul et al., 2021). Cheng, Chaudhuri, and Farooq (2022) investigated sustainable supply chains from a risk management perspective using a quantitative research design and established that environmental, social, and economic risks significantly increased supply chain uncertainty and complexity. The study further found that stakeholder collaboration, communication, and shared decision-making strengthened risk mitigation capabilities and improved organizational responsiveness during disruptions. Similarly, Chen, Sohal, and Prajogo (2020), using survey data from manufacturing firms, established that collaborative risk mitigation mechanisms involving suppliers, customers, and internal operational systems significantly reduced supply, demand, and process risks, thereby improving supply chain outcomes. Dubey et al. (2021) further emphasized that resilient integration, adaptive procedures, and collaborative supply networks enhanced organizational capacity to withstand disruptions and sustain operational performance. These studies collectively demonstrate that risk management enhances operational stability and continuity; however, they mainly focused on manufacturing and generalized supply chains with limited contextual application to highly regulated healthcare subsectors such as dental supply chains in developing economies.

Empirical evidence further demonstrates that proactive risk management practices improve supply chain resilience, reliability, and service quality. Agyabeng-Mensah et al. (2020) examined the relationship between internal green supply chain practices, green human resource management, and supply chain environmental cooperation using survey data and structural equation modeling.

The findings established that risk mitigation mechanisms supported by collaboration and organizational capabilities improved operational and financial performance outcomes. Similarly, Kusi-Sarpong, Gupta, and Sarkis (2021), using a multi-criteria decision-making approach, found that technological capability, management commitment, and innovation significantly enhanced supply chain sustainability and operational performance. The study emphasized that supplier risk assessment, contingency planning, and diversification strategies reduced shortages and delays while strengthening supply chain responsiveness and reliability. Within healthcare and dental environments, effective risk management supports infection control, product safety, regulatory compliance, and continuity of care, all of which directly influence service quality and operational efficiency (Kusi-Sarpong et al., 2021). The findings therefore suggest that risk management should not merely be viewed as a defensive mechanism against disruptions but also as a strategic capability that enhances supply chain performance outcomes.

Despite broad consensus regarding the importance of risk management, empirical studies report contrasting findings concerning the pathways through which risk management influences supply chain performance. Queiroz, Ivanov, Dolgui, and Fosso Wamba (2022) established that global disruptions such as the COVID-19 pandemic created severe ripple effects across supply chains despite the existence of formal risk management systems, suggesting that traditional risk mitigation approaches may be inadequate under highly volatile conditions. Conversely, Dubey, Gunasekaran, and Childe (2020) found that big data analytics capability significantly strengthened supply chain agility, adaptability, and responsiveness by improving organizations' ability to identify and respond to operational risks. Similarly, Paul, Sarker, and Essam (2021) established that collaboration and resilience capabilities strengthened the effectiveness of risk management practices and improved customer satisfaction and cost efficiency. Golan et al. (2020) further observed that organizations adopting proactive risk mitigation strategies such as safety stock policies, digital tracking systems, and supplier collaboration were more capable of maintaining continuity of healthcare services during crises. The contrasting findings indicate that the effectiveness of risk management may depend on contextual factors such as technological capability, institutional coordination, stakeholder collaboration, and operational adaptability. Consequently, risk management alone may not automatically improve performance unless supported by flexible operational systems and effective stakeholder engagement mechanisms.

Synthesis of empirical literature demonstrates that existing studies consistently acknowledge the importance of risk management in improving supply chain resilience, responsiveness, continuity, and operational performance (Chen et al., 2020; Dubey et al., 2020; Paul et al., 2021). However, most studies have concentrated on manufacturing industries, green supply chains, humanitarian logistics, or generalized healthcare systems, thereby providing limited contextual understanding of risk management within Kenya's dental supply chain environment. Furthermore, although studies such as Cheng et al. (2022) and Paul et al. (2021) recognize the importance of collaboration and stakeholder interaction, they do not adequately explain how stakeholder involvement moderates the relationship between regulatory framework and dental supply chain performance within highly regulated healthcare environments. Existing empirical literature also conceptualizes risk management primarily as an operational capability without sufficiently integrating regulatory compliance requirements and stakeholder coordination within a unified analytical framework. Consequently, there remains inadequate empirical understanding regarding how risk management influences dental supply chain performance in Kenya and how stakeholder involvement strengthens or weakens the effectiveness of regulatory framework within the dental healthcare supply chain.

2.3.3 Moderating Effect of Stakeholder Involvement on the Relationship between Regulatory Framework and Dental Supply Chain Performance

Contemporary healthcare supply chains operate within highly regulated environments where compliance requirements, quality assurance standards, licensing procedures, inspections, and risk management systems are designed to improve operational accountability, product safety, and service reliability (Paul et al., 2021). However, empirical literature increasingly demonstrates that regulatory frameworks alone do not automatically guarantee improved supply chain performance outcomes because the effectiveness of regulatory mechanisms largely depends on the extent of stakeholder participation during implementation and operationalization processes (Siems et al., 2022). Stakeholder involvement comprising communication, collaboration, consultation, coordination, and shared decision-making among regulators, suppliers, distributors, healthcare providers, professional associations, and patients influences how regulatory requirements are interpreted, accepted, and executed within supply chain systems (Kusi-Sarpong et al., 2021). Dubey et al. (2020) established that collaborative stakeholder networks improved supply chain resilience, responsiveness, and operational continuity through enhanced information sharing and

coordinated decision-making processes. Similarly, Siems, Seuring, and Schilling (2022), through a systematic review of sustainable supply chain management studies, concluded that proactive stakeholder engagement strengthened organizational learning, institutional trust, and operational capability development. These findings suggest that stakeholder involvement functions as an enabling mechanism through which regulatory frameworks translate into improved supply chain performance outcomes rather than operating as an isolated organizational practice.

Empirical studies further indicate that stakeholder involvement enhances the effectiveness of regulatory compliance and risk management practices within dynamic and uncertain supply chain environments. Queiroz et al. (2022) observed that organizations characterized by strong stakeholder coordination were better able to respond to disruptions associated with pandemics, geopolitical instability, and logistics uncertainties because collaboration enhanced adaptive capacity and operational flexibility. Similarly, Bag et al. (2021) established that digital platforms supporting stakeholder communication, transparency, and collaborative decision-making improved implementation of compliance requirements and strengthened collective risk management across supply chains. Qazi, Appolloni, and Shaikh (2022) further found that strong supplier and customer relationships significantly improved supply chain resilience and organizational performance by facilitating faster coordination and effective problem-solving during disruptions. Within healthcare systems, Martin et al. (2022) demonstrated that stakeholder collaboration strengthened sustainability and operational effectiveness within oral healthcare supply chains, while Ticku et al. (2021) established that collaboration among oral health stakeholders improved integration of healthcare services and accessibility of oral healthcare services in Kenya. Unlike studies that treat regulation as a purely institutional or administrative mechanism, these studies imply that stakeholder involvement strengthens the practical implementation of regulatory framework by improving communication, reducing resistance to compliance requirements, enhancing trust among actors, and aligning regulatory expectations with operational realities within supply chains.

Despite broad consensus regarding the importance of stakeholder involvement, empirical literature presents contrasting findings regarding the extent to which stakeholder engagement strengthens the relationship between regulatory framework and supply chain performance. Chang et al. (2022) argued that where stakeholder participation is weak, compliance requirements often become rigid administrative obligations that increase operational costs, reduce flexibility, and weaken supply

chain responsiveness. Conversely, Weng (2025) found that collaborative stakeholder engagement enhanced transparency, institutional trust, and sustainability within supply chains, thereby improving operational performance and resilience. Cambridge University (2023), in its evaluation of multi-stakeholder initiatives, established that although stakeholder participation improved environmental and social sustainability outcomes, competing stakeholder interests and institutional power imbalances frequently generated implementation conflicts and coordination inefficiencies within regulated supply chains. Similarly, Mulligan et al. (2022) reported that organizations characterized by strong stakeholder relationships achieved higher levels of resilience and supply chain performance; however, the effectiveness of stakeholder collaboration varied depending on institutional structures, technological capabilities, governance systems, and communication mechanisms. These contrasting findings suggest that stakeholder involvement does not exert a universally positive influence on supply chain performance. Rather, its moderating effect depends on contextual factors such as institutional coordination, technological integration, regulatory complexity, and organizational adaptability. Consequently, stakeholder involvement should be analytically understood as a contingent mechanism that shapes the strength and direction of the relationship between regulatory framework and supply chain performance rather than merely as an independent operational variable.

Synthesis of empirical literature demonstrates that stakeholder involvement plays a critical role in strengthening regulatory implementation, enhancing operational coordination, improving resilience, and supporting supply chain performance across healthcare and supply chain systems (Siems et al., 2022; Qazi et al., 2022; Martin et al., 2022). Nevertheless, several important gaps remain evident within existing literature. Contextually, most empirical studies focus on manufacturing industries, sustainable supply chains, humanitarian logistics, and generalized healthcare systems with limited empirical attention directed toward dental supply chains in developing economies such as Kenya. Conceptually, existing studies predominantly examine stakeholder involvement either as an independent predictor of performance or as a general collaboration mechanism without explicitly examining its moderating effect on the relationship between regulatory framework and supply chain performance (Bag et al., 2021; Mulligan et al., 2022). Methodologically, many studies employ cross-sectional approaches and generalized supply chain indicators that inadequately capture the interaction effects among compliance requirements, risk management practices, stakeholder involvement, and operational performance within

regulated healthcare environments. Theoretically, existing literature also provides limited integration of stakeholder theory, regulatory compliance theory, and contingency perspectives in explaining how stakeholder involvement conditions the effectiveness of regulatory frameworks within healthcare supply chains. Consequently, there remains inadequate empirical understanding regarding how stakeholder involvement moderates the relationship between regulatory framework and dental supply chain performance in Kenya, thereby justifying the present study.

2.4 Research Gaps

Empirical literature demonstrates that compliance requirements and risk management significantly influence supply chain performance through improved operational coordination, resilience, quality assurance, and regulatory accountability (Dubey et al., 2021; Paul et al., 2021; Zhang & Fan, 2020). However, existing studies predominantly focus on manufacturing industries, pharmaceuticals, public procurement systems, and generalized healthcare supply chains operating within developed economies, thereby providing limited contextual understanding of dental supply chains in developing countries such as Kenya (Azatyan, 2024; Hoekman, 2015). In addition, many studies conceptualize regulatory framework broadly without operationalizing its key dimensions of compliance requirements and risk management within a unified analytical model (Mensah et al., 2022; Nguyen & Tran, 2022). Methodologically, several studies rely on descriptive or cross-sectional approaches that inadequately explain causal relationships among regulatory framework variables and supply chain performance outcomes (Aura, 2017; Kurgat, 2021). Consequently, there remains a contextual gap concerning Kenya's dental healthcare supply chain, a conceptual gap regarding integration of compliance requirements and risk management, and a methodological gap concerning explanatory analysis of the regulatory framework performance relationship.

Existing literature further demonstrates that stakeholder involvement enhances collaboration, information sharing, resilience, and operational coordination within supply chains (Siems et al., 2022; Martin et al., 2022; Qazi et al., 2022). Nevertheless, most studies examine stakeholder involvement as an independent operational practice rather than as a moderating mechanism influencing the relationship between regulatory framework and supply chain performance (Bag et al., 2021; Mulligan et al., 2022). Moreover, empirical findings remain inconsistent regarding whether stakeholder participation strengthens regulatory effectiveness or creates coordination challenges within highly regulated environments (Cambridge University, 2023; Chang et al.,

2022). Theoretical integration among stakeholder theory, regulatory compliance theory, and contingency theory also remains limited within existing healthcare supply chain literature. Therefore, there is inadequate empirical evidence explaining how stakeholder involvement moderates the relationship between regulatory framework and dental supply chain performance in Kenya. This study sought to address these conceptual, contextual, methodological, and theoretical gaps by examining the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance using an explanatory research design within Kenya's dental healthcare sector.

Table 0.1: Summary of Research Gaps Table

Author(s)	**Study Focus/Objectives**	**Key Findings**	**Research Gaps Identified**	**What the Current Study Will Do**
Azatyan (2024)	Examined the impact of regulatory harmonization on healthcare supply chains	Weak regulatory systems undermine product accessibility and operational efficiency	Geographical and contextual gap since findings largely focus on global regulatory systems rather than Kenya's dental sector	Examine regulatory framework within Kenya's dental supply chain context
Hoekman (2015)	Investigated trade agreements and harmonized regulations on supply chain performance	Harmonized regulations reduced compliance costs and improved trade efficiency	Limited firm-level analysis of compliance requirements and healthcare supply chains	Examine compliance requirements at operational level within dental supply chains
Organization for Economic Co-operation and Development and Korea Development Institute (2021)	Assessed regulatory barriers affecting digital logistics systems	Adaptive regulations improved logistics responsiveness	Limited Kenya-specific analysis and weak focus on dental healthcare systems	Provide empirical evidence from Kenya's dental healthcare supply chain

Aura (2017)	Evaluated regulatory reforms and procurement efficiency in Kenya	Regulatory reforms improved operational efficiency	Methodological gap due to descriptive design and generalized public procurement focus	Apply explanatory research design to establish causal relationships
Kurgat (2021)	Examined regulatory frameworks and supplier relationships in Kenya	Stronger regulations improved supplier relationships and performance	Limited focus on dental supply chains and stakeholder moderation effects	Examine moderating role of stakeholder involvement in dental supply chains
Siems et al. (2022)	Reviewed stakeholder involvement in sustainable supply chain management	Stakeholder engagement improved organizational learning and performance	Geographical bias toward developed economies and generalized supply chains	Provide evidence from a developing-country dental healthcare context
Martin et al. (2022)	Evaluated stakeholder collaboration in oral healthcare sustainability	Collaboration improved sustainability and operational effectiveness	Broader sustainability orientation with limited focus on regulatory frameworks	Examine interaction between regulatory framework and stakeholder involvement
Mulligan et al. (2022)	Investigated stakeholder relationships and supply chain resilience	Strong stakeholder relationships enhanced resilience and performance	Limited examination of moderating effects and healthcare-specific systems	Test moderating effect of stakeholder involvement empirically

Ticku et al. (2021)	Examined stakeholder collaboration in oral healthcare delivery in Kenya	Stakeholder coordination improved access to oral healthcare	Weak conceptual integration between regulation, stakeholders, and performance	Integrate regulatory framework, stakeholder involvement, and performance in one model
Qazi et al. (2022)	Analyzed stakeholder relationships and resilience in Pakistan	Strong supplier and customer relationships improved resilience	Findings focused on large corporations and non-healthcare sectors	Extend analysis to Kenya's dental healthcare supply chain
Weng (2025)	Examined stakeholder collaboration in sustainable supply chains	Transparency and trust improved performance	Limited contextual evidence from developing economies	Generate context-specific evidence from Kenya
University of Cambridge (2023)	Evaluated multi-stakeholder initiatives in global supply chains	Stakeholder engagement improved sustainability outcomes	Limited focus on healthcare and dental supply chains in Africa	Examine stakeholder moderation within regulated dental supply chains in Kenya

Source: Author (2025)

2.5 Conceptual Framework

The conceptual framework illustrated the hypothesized relationship between the independent variable, moderate variable, and dependent variable in the study. The framework was developed based on the theoretical and empirical literature reviewed in Sections 2.2 and 2.3, particularly the propositions of Regulatory Compliance Theory, Stakeholder Theory, and Contingency Theory. The framework demonstrated how regulatory framework dimensions influenced dental supply chain performance and how stakeholder involvement moderated this relationship within the Kenyan dental supply chain context (Freeman, 1984; Parker & Nielsen, 2017; Donaldson, 2001).

The independent variable of the study was regulatory framework, operationalized through compliance requirements and risk management. Compliance requirements included licensing procedures, quality standards, inspection requirements, product certification, and regulatory approvals governing dental products and supply chain operations (Mensah et al., 2022). Risk management comprised risk identification, mitigation strategies, contingency planning, monitoring systems, and operational controls aimed at minimizing supply chain disruptions and enhancing continuity of supply (Paul et al., 2021). Existing empirical literature demonstrated that effective compliance systems and proactive risk management practices improved operational coordination, accountability, resilience, and efficiency within healthcare supply chains (Dubey et al., 2021; Kusi-Sarpong et al., 2021).

The dependent variable was dental supply chain performance, measured using cost efficiency, flexibility and responsiveness, delivery reliability and speed, quality and accuracy, and customer satisfaction. These performance dimensions reflected the ability of the dental supply chain to deliver products efficiently, maintain operational continuity, respond to changing market demands, and ensure quality service delivery within healthcare environments (Chen et al., 2020; Wieland, 2021). The framework therefore proposed that improvements in compliance requirements and risk management would enhance dental supply chain performance outcomes in Kenya.

The moderating variable was stakeholder involvement, operationalized through participation in decision-making, information sharing and communication, collaboration and partnership, feedback and responsiveness, and stakeholder influence and empowerment. Stakeholder involvement included the participation of regulators, suppliers, distributors, dentists, healthcare institutions, and other relevant actors in implementation and operationalization of regulatory requirements within the dental supply chain (Siems et al., 2022). Empirical literature indicated that stakeholder engagement strengthened coordination, enhanced trust, improved communication, and increased adaptability within supply chain systems, thereby influencing the effectiveness of regulatory implementation (Bag et al., 2021; Qazi et al., 2022).

The framework further proposed that stakeholder involvement moderated the relationship between regulatory framework and dental supply chain performance. Specifically, higher levels of stakeholder involvement were expected to strengthen the positive influence of compliance requirements and risk management on supply chain performance by enhancing coordination,

operational flexibility, regulatory acceptance, and collaborative problem-solving. Conversely, weak stakeholder involvement was likely to reduce the effectiveness of regulatory mechanisms by increasing resistance, communication breakdowns, and operational inefficiencies (Chang et al., 2022; Mulligan et al., 2022). The conceptual framework therefore provided the analytical foundation for examining both the direct effects of regulatory framework dimensions on dental supply chain performance and the moderating effect of stakeholder involvement within Kenya's dental healthcare sector.

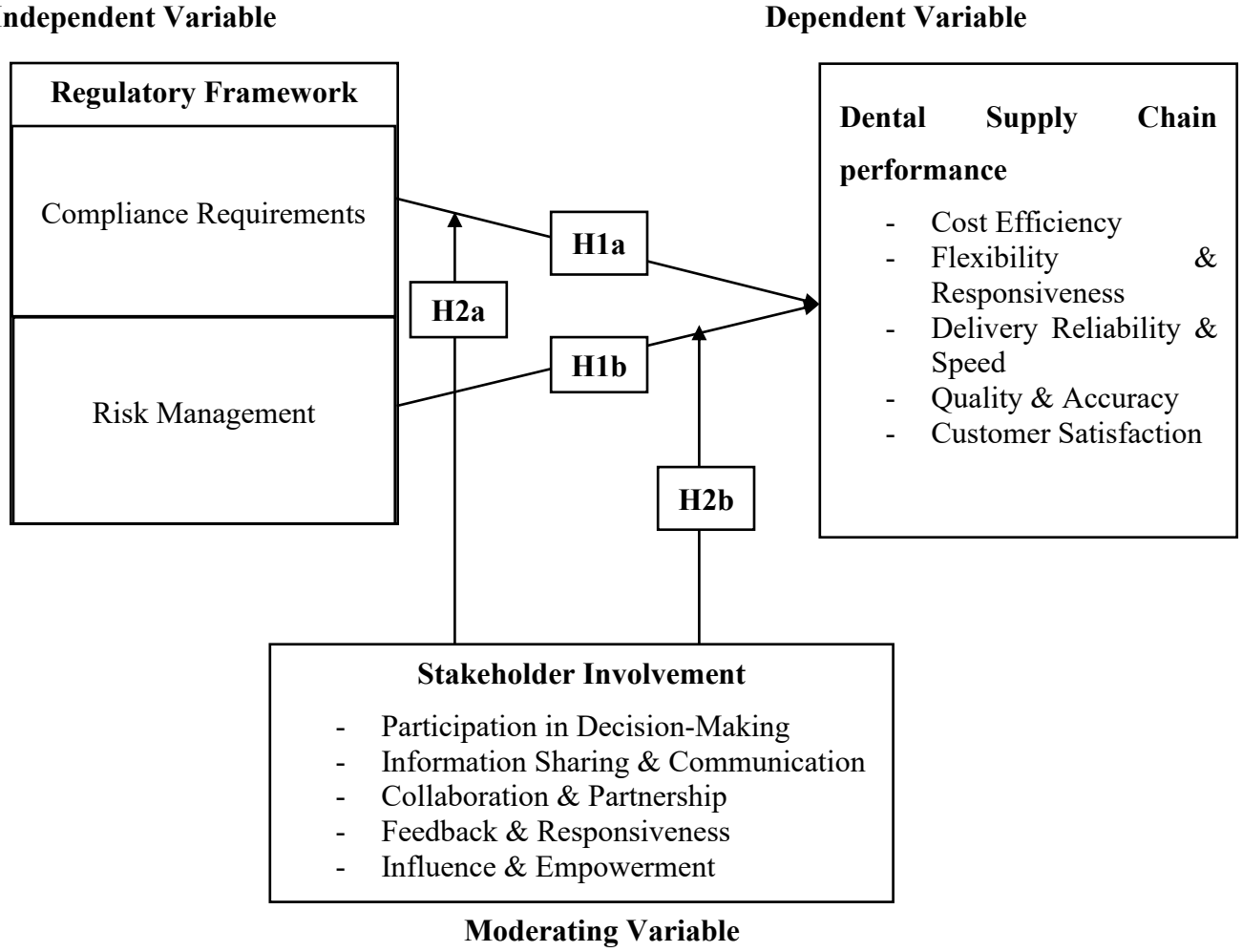

Figure 2.1: Hypothetical model for the Study

Source: Researcher (2025)

2.6 Operationalization of Study Variables

Table 0.2: Operationalization of study variables

Variable	Construct	Supporting Literature
Regulatory Framework	Compliance Requirements Risk Management	Nasir et al. (2023); Schmalz & Reichl (2021); WHO (2021)
Dental Supply Chain Performance	Cost Efficiency Flexibility & Responsiveness Delivery Reliability & Speed Quality & Accuracy Customer Satisfaction	Beamon (1999); Gunasekaran, Patel & Tirtiroglu (2001); Li et al. (2006); Akyuz & Erkan (2010).
Stakeholder Involvement	Participation in Decision-Making Information Sharing & Communication Collaboration & Partnership Feedback & Responsiveness Influence & Empowerment	Freeman (1984); Bryson (2004); Reed et al. (2009); Yang et al. (2011).

2.7 Chapter Summary

This chapter reviewed theoretical and empirical literature relevant to the study variables and established the conceptual and analytical foundation for the research. The theoretical review examined Stakeholder Theory, Regulatory Compliance Theory, and Contingency Theory, and demonstrated their relevance in explaining regulatory framework, stakeholder involvement, and dental supply chain performance. The empirical review analyzed previous studies relating to compliance requirements, risk management, stakeholder involvement, and supply chain performance while identifying conceptual, contextual, methodological, and theoretical gaps within existing literature. The chapter presented the conceptual framework illustrating the hypothesized relationships among the study variables and the moderating role of stakeholder involvement. The identified gaps justified the need for the present study and provided the basis for the research methodology discussed in the subsequent chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodological approach that was adopted in conducting the study. It outlines research philosophy, research design, target population, sampling design, sample size, data collection methods, data analysis procedures, and ethical considerations. The methodology was intended to ensure the reliability and validity of the study while aligning the research process with the study objectives.

3.2 Research Philosophy

The choice of a suitable research philosophy is arguably the most important preliminary step in a researcher's trajectory as it shapes assumptions about reality (ontology), knowledge, epistemology, and value role (axiology). Of the major philosophical traditions, interpretivism tends to understand lived experience as experienced by those who live it, usually through qualitative methods that probe subjective meanings and social constructions. Realism recognizes an objective reality but also accepts that understanding is shaped by perception and context and may include quantitative as well as qualitative data (Saliya, 2023). Even though all these philosophical contributions were instructive, the study adopted positivism because it was suitable for quantifying variables, testing hypotheses, and establishing cause-and-effect relationships.

Positivism is an objectivity-based research philosophy that has become common in supply chain management studies because it emphasizes empirical evidence and quantifiable phenomena (Maksimović & Evtimov, 2023). This philosophical stance was in accordance with the study of how stakeholder involvement moderates the effects of the regulatory framework on supply chain performance since it can be analyzed with quantifiable and statistical data. Positivism holds that knowledge derives from observable and quantifiable realities. It assumes that social phenomena such as supply chain performance, regulatory frameworks, and stakeholder engagement can be studied objectively without researcher biases (Bryman, 2021). Positivism further assumes an external reality independent of human perception.

In this study, the regulatory framework and stakeholder involvement were variables that objectively affected supply chain performance. In the positivist paradigm, relationships between

variables are analyzed using statistical and mathematical models (Saunders, 2019). The impact of stakeholder involvement was measured using survey data from firms within regulated supply chains. Positivism seeks cause-and-effect relationships between variables. It examines how regulatory frameworks influence supply chain performance and whether stakeholder involvement moderates that relationship. A principle of positivism holds that research results should be reproducible and generalizable in all contexts (Neuman, 2020).

The positivist approach allowed a systematic exploration of the interaction between regulatory frameworks, stakeholder involvement, and supply chain performance. This was achieved through the development of hypotheses based on existing literature regarding the direct effects of regulatory frameworks on supply chain performance and the moderating role of stakeholder involvement. The research adopted an empirical validation structure. Data collection from supply chain professionals was conducted through a survey-based questionnaire that collected standardized and measurable responses (Creswell & Creswell, 2018). These variables were operationalized using validated measurement scales. Regression analysis and Structural Equation Modelling (SEM) techniques were applied to assess relationships between regulatory frameworks, stakeholder involvement, and supply chain performance (Hair et al., 2020). These methods were consistent with the positivist demand for quantification and objectivity. Standardized instruments and statistical tools ensured that the research results remained objective and were not subject to subjective interpretation by the researcher.

Additionally, positivism was appropriate because it allowed generalizable knowledge about the effects of regulatory frameworks and stakeholder engagement on supply chain performance to be established. Regulatory frameworks influence supply chain outcomes, but the moderating role of stakeholder involvement requires empirical validation (Christopher, 2021). The positivist approach measured these relationships precisely and provided policymakers and practitioners with evidence-based insights. In addition, the positivist stance improved the reliability and validity of the study. Structured data collection and hypothesis testing supported theoretical claims in supply chain management.

3.3 Research Design

The study adopted an explanatory research design which investigates causal relationships between variables to determine why certain phenomena occur (Saunders, 2019). This study used an

explanatory research design to assess the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. The purpose was to establish cause-and-effect relationships using statistical analysis and quantitative methods. Explanatory research is suitable for studies which seek to identify patterns and causal relationships between independent and dependent variables (Creswell & Creswell, 2018). Since the study investigated how regulatory frameworks affected supply chain performance and how stakeholder involvement moderated this relationship, explanatory research was considered appropriate. The approach allowed hypothesis testing, data-driven conclusions, and generalizable results. Explanatory research design was further appropriate because it facilitated understanding of causal relationships between variables and helped establish how stakeholder involvement influenced the interaction between regulatory frameworks and supply chain outcomes (Saunders, Lewis, & Thornhill, 2019).

A quantitative research approach was used to collect numerical data which could be analyzed statistically. This ensured objectivity and generalizability of results (Creswell & Creswell, 2018). Supply chain professionals, regulators, and industry players were surveyed using a survey strategy. The survey method yielded standardized responses that were suitable for hypothesis testing (Hair et al., 2020). For this study, explanatory research design was appropriate because it provided a methodological basis for analyzing how the moderating influence of stakeholder involvement affected the interaction between regulatory framework and supply chain performance. Hypothesis testing, statistical analysis, and robust data collection were used to derive empirical insights relevant to supply chain management literature and practice.

3.4 Population of the Study

Population refers to the entire group of individuals, organizations, or entities possessing characteristics relevant to the study objectives and from which conclusions of the study are drawn. The target population provides the basis upon which sampling procedures are developed and determines the extent to which study findings can be generalized within the specified context (Saunders et al., 2019). In this study, the target population comprised organizations operating within the Kenyan dental supply chain ecosystem. These included registered public and private dental clinics, licensed importers and distributors of dental products, public referral hospitals involved in procurement of dental supplies, and regulatory institutions responsible for oversight,

compliance enforcement, quality assurance, and import regulation of dental products in Kenya. The population was considered appropriate because the organizations directly participated in procurement, regulation, importation, distribution, quality control, and utilization of dental products, thereby providing institutional insights relevant to regulatory framework, stakeholder involvement, risk management, and dental supply chain performance.

The study targeted organizations operating within the Kenyan dental supply chain because they represented the primary institutional actors affected by regulatory compliance requirements, operational risks, stakeholder coordination processes, and supply chain performance outcomes. Population data were obtained from official institutional and regulatory databases including the Ministry of Health (MoH) Facility Master List, Kenya Medical Practitioners and Dentists Council (KMPDC) records, Pharmacy and Poisons Board (PPB) databases, Kenya Bureau of Standards (KEBS) records, Kenya Revenue Authority (KRA) databases, referral hospital records, and registered dental supplier directories for the year 2024. These databases provided verified and updated records of institutions operating within the Kenyan dental healthcare supply chain. The target population consisted of 400 organizations distributed across public dental clinics, private dental clinics, importers and distributors of dental products, referral hospitals, and regulatory institutions. The organizations formed an appropriate population because they collectively represented the operational, regulatory, and institutional structure of the dental supply chain in Kenya. Table 3.1 presents the target population of the study.

Table 3.1: Target Population

Category	**Population**	**Source**
Public Dental Clinics	80	MoH Facility Master List and County Health Reports (2024)
Private Dental Clinics	80	KMPDC Records and Dental Directories (2024)
Importers and Distributors of Dental Products	100	PPB Licensed Importers and Supplier Directories (2024)
Referral Hospitals	40	MoH Referral Facility List (2024)
Regulatory Institutions (PPB, KEBS, KRA)	100	PPB, KEBS, and KRA Institutional Records (2024)
Total	**400**	

Source: (Author, 2025)

3.5 Sampling Technique and Sample Size

This study adopted a stratified random sampling design because the target population comprised heterogeneous categories of organizations operating within the Kenyan dental supply chain. Stratified sampling was considered appropriate since it allowed the population to be divided into relatively homogeneous strata comprising public dental clinics, private dental clinics, importers and distributors, referral hospitals, and regulatory institutions (Etikan & Bala, 2017). The technique ensured proportional representation of all key institutional categories involved in the dental supply chain, thereby reducing sampling bias and improving representativeness of the study findings. Stratification was also appropriate because organizations within the different categories performed distinct operational and regulatory roles relating to compliance requirements, risk management, stakeholder coordination, procurement, distribution, and quality assurance within the dental supply chain. After stratification, simple random sampling was applied within each stratum to ensure that each organization had an equal probability of being selected for participation in the study (Saunders et al., 2019).

The unit of analysis for the study was the organization, while the unit of observation comprised key officers responsible for supply chain, procurement, compliance, regulatory, and operational functions within the selected organizations. One knowledgeable respondent was selected from each sampled organization because such officers possessed adequate institutional knowledge regarding regulatory compliance requirements, risk management practices, stakeholder involvement, and dental supply chain performance. The respondents included senior dentists or clinic managers from public dental clinics, procurement managers from private dental clinics, supply chain or procurement managers from importing and distribution firms, procurement officers from referral hospitals, and compliance, inspection, quality assurance, or safety officers from regulatory institutions. The selection of these respondents was justified on the basis that they were directly involved in implementation, supervision, enforcement, or operationalization of regulatory and supply chain activities within their organizations, thereby improving the reliability and validity of information collected (Creswell & Creswell, 2018).

The determination of sample size was important in ensuring adequacy, representativeness, reliability, and statistical validity of the study findings. The sample size was determined using Krejcie and Morgan's (1970) sample size determination formula because it provides a

scientifically accepted approach for calculating sample sizes from finite populations. The formula used was as follows:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

Where:

- S= required sample size
- X^2= chi-square value for 1 degree of freedom at 95% confidence level (3.841)
- N= population size
- P= population proportion (0.5)
- d= degree of accuracy expressed as a proportion (0.05)

Substituting the values into the formula:

$$S = \frac{3.841 \times 400 \times 0.5 \times 0.5}{0.05^2(400-1) + 3.841 \times 0.5 \times 0.5} = 196$$

The computed minimum sample size was therefore 196 respondents. However, to account for possible non-response, incomplete questionnaires, and unusable responses, the sample size was adjusted upward by approximately 17.3%, resulting in a target sample of 230 respondents. The adjustment was considered appropriate because studies involving organizational surveys commonly experience non-response rates ranging between 10% and 20% (Hair et al., 2020). Increasing the sample size to 230 respondents therefore ensured that the final usable responses remained statistically adequate even after accounting for potential attrition and non-response. The adjusted sample size also strengthened representativeness and improved the robustness of statistical analysis, particularly Structural Equation Modelling (SEM), which requires relatively larger sample sizes for stable parameter estimation and hypothesis testing (Hair et al., 2020).

Table 3.2 presents the distribution of the sample size across the different strata.

Table 3.2: Sample Size Distribution

Category	**Population (N)**	**Percentage of Population**	**Calculated Sample Size**	**Adjusted Target Sample**
Public Dental Clinics	80	20%	39	46
Private Dental Clinics	80	20%	39	46
Importers and Distributors	100	25%	49	57

Referral Hospitals	40	10%	20	24
Regulatory Institutions (PPB, KEBS, KRA)	100	25%	49	57
Total	**400**	**100%**	**196**	**230**

Source: (Author, 2025)

3.7 Data Collection Method

The study adopted a quantitative data collection approach to assess the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. The primary data collection instrument was a structured questionnaire because it enabled the collection of standardized responses from a large and diverse sample while maintaining consistency, objectivity, and statistical reliability (Saunders, Lewis, & Thornhill, 2019). The questionnaire was developed based on validated measurement scales adopted from previous empirical studies on regulatory framework, compliance requirements, risk management, stakeholder involvement, and supply chain performance. The instrument consisted mainly of close-ended questions measured using a five-point Likert scale ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree." The Likert scale was considered appropriate because it enhanced response precision and facilitated quantitative statistical analysis (Hair et al., 2020).

The questionnaire was divided into sections corresponding to the study variables. The first section captured general organizational information, while subsequent sections measured compliance requirements, risk management practices, stakeholder involvement, and dental supply chain performance. The instrument was designed to ensure clarity, relevance, and consistency with the study objectives and hypotheses. Structured questionnaires were considered suitable because they minimized interviewer bias and enhanced comparability of responses across the sampled organizations (Creswell & Creswell, 2018).

Data collection was conducted using a mixed-mode distribution strategy involving both online and physical administration of questionnaires. Online questionnaires were distributed through platforms such as Google Forms to respondents who could easily access digital platforms, particularly regulators, policymakers, and managers located in different geographical areas. Physical questionnaires were administered to selected dental clinics, referral hospitals, importers, and distributors to improve accessibility and participation among respondents who preferred hard-

copy instruments. The mixed-mode approach enhanced coverage, flexibility, and response rates across the different stakeholder groups involved in the dental supply chain.

The questionnaires were administered to senior officers who possessed adequate knowledge regarding regulatory compliance, procurement processes, supply chain operations, and stakeholder coordination within their respective organizations. These included senior dentists, procurement managers, supply chain managers, compliance officers, and regulatory officers. Prior to the actual data collection exercise, authorization letters were obtained from relevant institutions to facilitate access to respondents. Follow-up procedures including reminder emails, telephone calls, and physical visits were conducted to improve response rates and minimize non-response bias (Dillman, Smyth, & Christian, 2014). Completed questionnaires were checked for completeness, consistency, and accuracy before coding and analysis. The collected data were then prepared for statistical analysis to test the study hypotheses and examine the relationships among the study variables.

3.8 Data Analysis

The data analysis process was structured to examine the relationships among compliance requirements, risk management, stakeholder involvement, and dental supply chain performance in Kenya. The process began with checking the completed questionnaires for completeness, consistency, and accuracy before coding and data entry. The data collected was then cleaned to identify missing values, outliers, and inconsistencies that could affect statistical analysis. After cleaning, the data were coded and entered-into Statistical Package for Social Sciences (SPSS) version 29 for preliminary analysis. Descriptive statistics including frequencies, percentages, means, and standard deviations were generated to summarize the characteristics of the respondents and study variables. Inferential statistical analysis was subsequently conducted to test the study hypotheses and establish the relationships among the study variables.

The study utilized Structural Equation Modelling (SEM) as the primary analytical technique because SEM enables simultaneous examination of multiple relationships among observed and latent variables within a single model (Hair et al., 2020). SEM was considered appropriate for this study because the study variables including compliance requirements, risk management, stakeholder involvement, and dental supply chain performance were latent constructs measured using multiple indicators. Unlike traditional regression techniques, SEM allowed the study to

simultaneously assess the measurement properties of the constructs and the structural relationships among the constructs while accounting for measurement errors. The technique was therefore suitable for examining both the direct effects of regulatory framework dimensions on dental supply chain performance and the moderating effect of stakeholder involvement. SEM further provided stronger analytical rigor because it enabled evaluation of complex interrelationships, mediation and moderation effects, model fitness, and construct validity within a single integrated analytical framework (Kline, 2016).

The analysis process involved two major stages, namely measurement model analysis and structural model analysis. Measurement model analysis was conducted to assess the reliability and validity of the research constructs before testing the hypothesized relationships. Reliability analysis was performed using Cronbach's Alpha and Composite Reliability coefficients to determine internal consistency of the measurement items. Exploratory Factor Analysis (EFA) was conducted using SPSS version 29 to identify the underlying factor structure of the measurement items and determine whether the items loaded appropriately onto their respective constructs. Confirmatory Factor Analysis (CFA) was subsequently performed using LISREL version 8.8 to validate the measurement model and assess construct validity through factor loadings, Average Variance Extracted (AVE), and model fitness indices. Common Method Bias (CMB) tests were also conducted to determine whether the data collection method introduced systematic measurement bias into the study results.

Structural model analysis was then conducted using Structural Equation Modelling (SEM) through LISREL version 8.8 to test the hypothesized relationships among the study variables. Path analysis was employed to determine the magnitude and direction of the relationships between compliance requirements, risk management, stakeholder involvement, and dental supply chain performance. Moderation analysis was specifically conducted to examine whether stakeholder involvement significantly moderates the relationship between regulatory framework and dental supply chain performance. Model fitness was evaluated using established goodness-of-fit indices including Chi-square statistics, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Goodness-of-Fit Index (GFI) to determine whether the proposed model adequately fitted the observed data (Hair et al., 2020). The findings were then presented using tables, figures, and explanatory narratives aligned with the study objectives and hypotheses.

3.9 Research Quality

Research quality was important in ensuring that the study findings were credible, accurate, and generalizable. The study therefore assessed the quality of the research instrument through pilot testing, validity assessment, and reliability testing. These procedures ensured that the questionnaire measured the intended constructs consistently and accurately.

3.9.1 Pilot Testing

A pilot study was conducted prior to the main data collection exercise to assess the clarity, relevance, and suitability of the research instrument. The pilot test involved 20 respondents drawn from organizations operating within the dental supply chain, but who were not included in the final study sample. The pilot respondents possessed characteristics like those of the actual study participants, thereby enabling the researcher to evaluate whether the questionnaire items were understandable, relevant, and capable of generating the required information.

The pilot's study helped identify ambiguous questions, unclear wording, and inconsistencies within the questionnaire. Feedback obtained from the pilot respondents was used to refine the instrument by improving question sequencing, simplifying statements, and enhancing clarity of instructions. The pilot exercise also assisted in estimating the time required to complete the questionnaire and evaluating the practicality of the data collection procedures. In addition, the pilot study facilitated preliminary assessment of the reliability and validity of the measurement scales before the full-scale data collection process commenced (Saunders, Lewis, & Thornhill, 2019).

3.9.2 Validity of the Research Instrument

Validity refers to the extent to which a research instrument accurately measures the intended theoretical constructs (Hair et al., 2020). In this study, validity was assessed through content validity, construct validity, and convergent validity. Content validity was established through an extensive review of empirical and theoretical literature relating to regulatory framework, compliance requirements, risk management, stakeholder involvement, and dental supply chain performance. The questionnaire items were adapted from previously validated instruments used in earlier studies. To further strengthen content validity, the draft questionnaire was reviewed by experts in supply chain management, procurement, healthcare regulation, and research methodology. The experts assessed the relevance, clarity, adequacy, and appropriateness of the

questionnaire items in relation to the study objectives and constructs. Their recommendations were incorporated during revision of the final instrument to ensure that all dimensions of the study variables were adequately represented.

Construct validity was assessed using Confirmatory Factor Analysis (CFA) to determine whether the observed measurement items adequately reflected their respective latent constructs. CFA examined the degree to which the questionnaire items loaded significantly onto their intended constructs and whether the measurement model demonstrated acceptable fitness levels (Hair et al., 2020). Convergent validity was evaluated using the Average Variance Extracted (AVE). An AVE value of 0.50 or higher was considered acceptable because it indicated that the construct explained at least 50% of the variance of its indicators (Fornell & Larcker, 1981).

3.9.3 Reliability of the Research Instrument

Reliability refers to the consistency and stability of measurement items in measuring a particular construct overtime (Nunnally & Bernstein, 1994). In this study, reliability was assessed using Cronbach's Alpha coefficient and Composite Reliability (CR). Cronbach's Alpha was used to determine the internal consistency of the questionnaire items within each construct. A reliability coefficient of 0.70 or above was considered acceptable for establishing internal consistency.

The pilot study results indicated that all study constructs achieved Cronbach's Alpha values above the recommended threshold of 0.70, thereby confirming acceptable reliability levels. Specifically, compliance requirements recorded a Cronbach's Alpha coefficient of 0.811, risk management recorded 0.836, stakeholder involvement recorded 0.854, and dental supply chain performance recorded 0.879. These results demonstrated that the measurement items consistently measured their respective constructs. Composite Reliability values were also computed to complement Cronbach's Alpha and further confirm construct reliability. All CR values exceeded the recommended threshold of 0.70, indicating satisfactory internal consistency and reliability of the research instrument (Hair et al., 2020).

3.10 Ethical Consideration

Ethical considerations are critical to research credibility, fairness and integrity, especially when investigating the moderating effect of stakeholder involvement on the relationship between the regulatory framework and supply chain performance. Ethical principles protect participant rights,

increase transparency and promote research integrity. Important ethical guidelines such as informed consent, confidentiality, voluntary participation, non-malfeasance, beneficence and research integrity were observed in this study (Saunders, Lewis, & Thornhill, 2019). Informed consent is an ethical principle that requires participants to agree to participate in the study knowing the purpose, procedures and consequences (Bryman & Bell, 2021). To uphold this principle: Participants received an information sheet outlining the study goals, the nature of data collection and how responses will likely be used. A consent form was supplied for participants to sign before participating in the study as a show of their willingness and consent to participate. Voluntary participation means people are not forced to participate in the research or pressured to do so (Saunders and Coll, 2019). Participants were also informed that they could withdraw at any time without penalty or negative consequence. To protect participants' confidentiality and anonymity, no personal identifiable information was collected or divulged, including names, occupations or organization affiliations. All responses were coded and encrypted to prevent unauthorized access. Findings were reported using only aggregated data to prevent tracing individual responses to participants (Creswell & Creswell, 2018). Electronic records were protected using data encryption and passwords. Before the commencement of data collection exercise, the researcher sought and obtained an ethics approval letter from the Strathmore University Institutional Scientific Ethics Review Committee (SU-ISERC). Consequently, a permit to collect data was also obtained from the National Commission for Science, Technology, and Innovation (NACOSTI).

3.10 Chapter Summary

This chapter presented the research methodology that guided the study. The chapter discussed research philosophy, research design, target population, sampling design and sample size, data collection methods, and research quality procedures including pilot testing, validity, and reliability assessment. The chapter further explained the data analysis procedures employed in examining the relationships among compliance requirements, risk management, stakeholder involvement, and dental supply chain performance using Structural Equation Modelling (SEM). The methodological procedures adopted ensured that the study findings were reliable, valid, objective, and appropriate for addressing the study objectives and hypotheses.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presented the findings obtained from the analysis of data collected from organizations operating within Kenya's dental supply chain. The analysis focused on responses obtained from public and private dental clinics, referral hospitals, importers and distributors of dental products, as well as regulatory agencies including the Kenya Bureau of Standards (KEBS), Kenya Medical Practitioners and Dentists Council (KMPDC), Kenya Revenue Authority (KRA), and the Pharmacy and Poisons Board (PPB). The chapter specifically presented the response analysis, demographic characteristics of the respondents and organizations, descriptive statistics, validity and reliability results, correlation analysis, regression analysis, and Structural Equation Modelling (SEM) results in line with the study objectives and hypotheses.

The analysis process involved the use of both Statistical Package for Social Sciences (SPSS) version 29 and LISREL version 8.8. SPSS version 29 was utilized for preliminary data analysis including data cleaning, coding, descriptive statistics, reliability testing, and Exploratory Factor Analysis (EFA). LISREL version 8.8 was subsequently utilized to conduct Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) because of its suitability in estimating latent constructs, assessing measurement models, and testing complex structural relationships involving moderation effects. The combined use of SPSS and LISREL therefore enhanced analytical rigor and improved the robustness of the study findings.

4.2 Response Analysis

The researcher distributed a total of 230 questionnaires to the sampled organizations involved in Kenya's dental supply chain. Out of the 230 questionnaires distributed, 218 questionnaires were returned, representing an initial response rate of 94.8%. However, six questionnaires contained substantial missing information and incomplete responses and were therefore excluded from the final analysis. Consequently, 212 questionnaires were considered complete and valid for analysis, resulting in an effective response rate of 92.17%.

The final sample of 212 respondents comprised two broad respondent categories. The first category consisted of 158 respondents drawn from operational organizations within the dental

supply chain, including public dental clinics, private dental clinics, referral hospitals, and importers/distributors of dental products. The second category consisted of 54 respondents drawn from regulatory institutions including KEBS, KMPDC, KRA, and PPB. The responses from the two categories were pooled during the main statistical analysis because all respondents operated within the same regulatory and operational environment and provided complementary perspectives relating to regulatory framework, compliance requirements, risk management practices, stakeholder involvement, and dental supply chain performance. The pooled analytical approach therefore enabled comprehensive examination of both operational and regulatory dimensions of the Kenyan dental supply chain.

The high response rate strengthened the reliability and credibility of the study findings because it minimized the likelihood of non-response bias and enhanced representativeness of the sampled organizations. Fincham (2008) noted that response rates above 60% are generally considered acceptable in survey research because they improve confidence in the stability and generalizability of findings. In the present study, the response rate of 92.17% considerably exceeded the recommended threshold, suggesting strong respondent participation and institutional willingness to provide information regarding regulatory compliance, risk management practices, stakeholder engagement, and supply chain operations within Kenya's dental sector. From the researcher's perspective, the high response rate further enhanced external validity because the findings were more likely to reflect prevailing operational realities across the Kenyan dental supply chain environment.

4.3 Profile of Firms and Informants

The section presented the demographic characteristics of the participating organizations and respondents. The study deliberately targeted respondents occupying senior managerial and technical positions because such individuals possessed adequate knowledge regarding regulatory compliance, procurement practices, stakeholder coordination, risk management, and supply chain performance within their organizations. The respondents therefore included dentists, procurement managers, supply chain managers, importers/distributors, compliance officers, inspection officers, and quality assurance officers. Where top-level managers were unavailable, the researcher selected experienced officers with at least ten years of professional experience because they were considered sufficiently knowledgeable about organizational operations and regulatory processes.

This approach minimized key informant bias by ensuring that responses were obtained from individuals directly involved in strategic and operational decision-making within the dental supply chain.

Table 4.1: Profile of users (Public Dental Clinic, Private Dental Clinics, Importers & Distributors and Referral Hospitals)

Variables	Count	Percent (%)
Role		
Dentist	55	34.9
Importer/Distributor	30	19.0
Procurement Manager	38	24.1
Total	**158**	**100.00**
Experience		
Less than 3 years	29	18.4
3 – 5 years	41	25.9
6 – 10 years	37	23.4
Total	**158**	**100.00**
Type		
Public Dental Clinics	42	26.6
Private Dental Clinics	49	31.0
Importers & Distributors	50	31.7
Total	**158**	**100.00**
Frequency of engagement		
Frequently	69	43.7
Occasionally	57	36.1
Rare	32	20.3
Total	**158**	**100.00**

Source: Survey Data (2025)

The findings IN Table 4.1 indicated that dentists constituted the largest proportion of respondents at 34.8%, followed by procurement managers at 24.1%, supply chain managers at 22.1%, and importers/distributors at 19.0%. From the researcher's perspective, this distribution strengthened the quality of the study because the respondents were directly involved in procurement, compliance, logistics coordination, and operational management activities associated with dental supply chains. Their positions therefore enabled them to provide informed responses regarding compliance requirements, risk management practices, and stakeholder interactions affecting supply chain performance.

The findings further showed that private dental clinics and importers/distributors each accounted for slightly over 31% of the participating organizations, while public dental clinics accounted for 26.6% and referral hospitals accounted for 10.8%. The dominance of private dental clinics and importers/distributors suggested that Kenya's dental supply chain was substantially driven by private-sector participation and import-dependent procurement systems. This observation was important because private-sector actors are often more directly exposed to regulatory approvals, import licensing procedures, customs compliance requirements, and supplier coordination challenges that influence supply chain performance.

Regarding work experience, the findings revealed that 32.3% of the respondents had over ten years of professional experience, while 23.4% had between six and ten years of experience. This implied that a substantial proportion of respondents possessed extensive institutional and operational knowledge regarding the Kenyan dental supply chain environment. From the researcher's assessment, the inclusion of experienced respondents enhanced the credibility of the responses because such individuals were more likely to understand organizational compliance practices, operational risks, procurement procedures, and stakeholder coordination mechanisms. The findings also reduced the likelihood of superficial responses associated with limited professional exposure.

The respondents were also asked to indicate their frequency of engagement with dental product suppliers and importers. The results showed that 43.7% frequently engaged suppliers/importers, while 36.1% engaged them occasionally. This finding suggested a relatively high level of interaction among supply chain actors within the dental sector. Frequent engagement was particularly important to this study because organizations that interact regularly with suppliers and regulators are more likely to experience the operational effects of compliance requirements, regulatory enforcement, risk mitigation procedures, and stakeholder collaboration practices.

Table 4.2: Profile of regulators

Variables	Count	Percent (%)
Role		
Compliance Officer	22	40.7
Inspection Officer	15	27.8
Total	**54**	**100.00**
Experience		
3 – 5 years	14	25.9

6 – 10 years	21	38.9
Total	**54**	**100.00**
Agency		
Kenya Bureau of Standards (KEBS)	12	22.2
Kenya Medical Practitioners & Dentists Council (KMPDC)	11	20.4
Kenya Revenue Authority (KRA)	15	27.8
Total	**54**	**100.00**
Frequency of engagement		
Frequently	35	64.8
Occasionally	19	35.2
Total	**54**	**100.00**

Source: Survey Data (2025)

The regulator profile in Table 4.2 indicated that compliance officers constituted the largest proportion of respondents at 40.7%, followed by quality and safety officers at 31.5% and inspection officers at 27.8%. The researcher considered these categories appropriate because they were directly responsible for enforcing regulatory standards, inspections, product approvals, quality assurance, and compliance monitoring within the dental supply chain. Their inclusion therefore strengthened the study's ability to capture regulatory perspectives regarding compliance requirements and operational risks affecting supply chain performance.

The findings further showed that most regulatory respondents possessed considerable professional experience, with 74.1% having more than six years of experience. This suggested that the regulatory respondents possessed substantial institutional knowledge regarding regulatory enforcement procedures, compliance challenges, and coordination practices within Kenya's healthcare supply chain environment. The agencies represented in the study including PPB, KRA, KEBS, and KMPDC collectively play central roles in import approvals, quality assurance, customs clearance, licensing, and regulatory inspections. Their representation therefore enhanced the comprehensiveness of the study findings regarding the influence of regulatory framework on dental supply chain performance.

4.4 Descriptive Statistics

This section presented the descriptive statistics for the study variables namely compliance requirements, risk management, stakeholder involvement, and dental supply chain performance. All measurement items were assessed using a five-point Likert scale ranging from 1 = "Strongly

Disagree" to 5 = "Strongly Agree." The descriptive statistics included the minimum score, maximum score, mean, standard deviation, skewness, and kurtosis. The mean values provided information regarding the central tendency of respondents' perceptions, while the standard deviation indicated the extent of variation in responses across organizations. Skewness and kurtosis statistics were further examined to assess the normality of the data distribution and determine the suitability of the data for subsequent multivariate analyses including regression analysis and Structural Equation Modelling (SEM).

4.4.1 Descriptive Statistics for Compliance Requirements

Table 4.3: Descriptive Statistics for Compliance requirements

Item code	*Statements*	*Min*	*Max*	*Mean*	*SD*	*Skewness*	*Kurtosis*
CR1	The compliance requirements for dental product procurement are clearly communicated to our facility.	1	5	4.25	.906	-1.393	1.898
CR2	Our facility can easily interpret and implement the regulatory documentation required during procurement.	1	5	4.03	.862	-1.005	1.141
CR3	The steps involved in meeting compliance requirements are streamlined and easy to follow.	1	5	4.12	.793	-1.143	2.156
CR4	The regulatory compliance process fits well with our internal procurement workflow.	1	5	4.15	.888	-1.193	1.561
CR5	The systems used for regulatory submissions (e.g., licensing, documentation uploads) are reliable and user-friendly.	1	5	4.22	.887	-1.140	1.091
CR6	Updates or changes to compliance requirements are communicated in a timely and accessible manner.	1	5	4.06	.912	-1.060	1.072
Overall Mean / SD				**4.14**	**0.87**		

Scale: 1 = "strongly disagree", 5 = "Strongly agree"

Table 4.3 presents the descriptive statistics for compliance requirements. The mean scores ranged between 4.03 and 4.25, with an overall mean of 4.14 and an average standard deviation of 0.87. The relatively high mean values indicated that respondents generally perceived compliance requirements within Kenya's dental supply chain to be clearly communicated, operationally integrated, and reasonably accessible across organizations. From the researcher's perspective, the findings suggested that organizations operating within the dental supply chain had established

moderate to strong compliance structures relating to licensing procedures, procurement documentation, regulatory submissions, and communication of regulatory updates.

The highest mean score of 4.25 was recorded for the statement that compliance requirements for dental product procurement were clearly communicated to facilities. This implied that most organizations were aware of existing regulatory expectations and procurement procedures within the Kenyan dental sector. Similarly, relatively high scores relating to regulatory submission systems and procurement workflow integration suggested that organizations had developed internal processes that supported operational compliance with regulatory agencies such as PPB, KEBS, and KMPDC. However, although the mean scores were high, the standard deviation values ranging between 0.79 and 0.91 indicated moderate variability in responses across organizations. This variation implied that some organizations experienced greater ease in implementing compliance requirements than others, possibly due to differences in organizational capacity, technological infrastructure, regulatory exposure, or institutional support mechanisms.

The findings further suggested that compliance implementation within Kenya's dental supply chain may not have been entirely uniform across all categories of organizations. For example, larger importers, referral hospitals, and well-established private dental clinics were more likely to possess stronger administrative systems and dedicated compliance personnel compared to smaller facilities. Consequently, while respondents generally perceived compliance systems positively, the observed variation indicated that challenges relating to regulatory interpretation, documentation procedures, and system usability still existed within certain segments of the dental supply chain.

The skewness and kurtosis values remained within the acceptable thresholds of less than |4| for skewness and less than |8| for kurtosis, with the highest absolute skewness and kurtosis values recorded at 1.393 and 2.156 respectively. These results suggested that the data approximated normal distribution and was therefore suitable for subsequent inferential analyses including regression analysis and SEM.

4.4.2 Descriptive Statistics for Risk Management

Table 4.4: Descriptive Statistics for Risk Management

Item code	*Statements*	*Min*	*Max*	*Mean*	*SD*	*Skewness*	*Kurtosis*

RM1	The regulatory checks in place help reduce the risk of substandard or counterfeit dental products entering the supply chain.	1	5	4.22	1.007	-1.487	1.822
RM2	Our organization receives sufficient guidance on managing risks related to dental product procurement.	1	5	4.23	1.010	-1.555	2.108
RM3	The procedures for reporting quality or safety issues with dental products are clear and easy to use.	1	5	4.22	1.026	-1.563	2.008
RM4	Risk-related inspections and compliance checks are conducted in a predictable and transparent manner.	1	5	4.14	.968	-1.363	1.689
RM5	Regulatory measures in place help ensure consistent quality across different brands and product categories.	1	5	4.20	.974	-1.597	2.551
RM6	Communication regarding product recalls, alerts, or safety risks is timely and effective.	1	5	4.17	1.022	-1.458	1.749
Overall Mean / SD				**4.20**	**1.00**		

Scale: 1 = "strongly disagree", 5 = "Strongly agree"

Table 4.4 presents the descriptive statistics for risk management. The mean scores ranged between 4.14 and 4.23, with an overall mean of 4.20 and an average standard deviation of 1.00. The findings indicated that respondents generally perceived risk management practices within Kenya's dental supply chain to be relatively strong and operationally effective. Specifically, respondents agreed that regulatory checks, procurement guidance, quality assurance procedures, and product safety communication mechanisms contributed positively toward reducing operational risks within the supply chain.

From the researcher's perspective, the findings implied that regulatory institutions and organizations operating within the dental sector had implemented risk mitigation mechanisms intended to reduce the circulation of counterfeit or substandard dental products, improve product traceability, and strengthen procurement reliability. The high mean scores further suggested that organizations considered risk-related inspections, compliance checks, and recall communication systems to be important components of supply chain continuity and patient safety. This observation was particularly important within the Kenyan healthcare environment where supply

disruptions, counterfeit medical products, and procurement inefficiencies continue to present operational challenges.

Nevertheless, the standard deviation values ranging between 0.97 and 1.03 indicated noticeable variation in organizational experiences regarding risk management implementation. The variation suggested that while some organizations perceived risk management systems to be highly effective and predictable, others experienced inconsistencies relating to inspection procedures, communication effectiveness, or access to regulatory guidance. Such inconsistencies may have arisen from differences in institutional capacity, technological adoption, organizational preparedness, and levels of interaction with regulatory agencies. Consequently, the findings implied that although risk management structures were generally perceived positively, the operational effectiveness of those systems varied across organizations within the dental supply chain.

The skewness and kurtosis statistics remained within acceptable thresholds, with the highest skewness and kurtosis values recorded at 1.597 and 2.551 respectively. The findings therefore confirmed that the data distribution satisfied assumptions of normality and supported the application of advanced multivariate analyses such as regression analysis and SEM.

4.4.3 Descriptive Statistics for Stakeholder Involvement

Table 4.5: Descriptive Statistics for Stakeholder Involvement

Item code	*Statements*	*Min*	*Max*	*Mean*	*SD*	*Skewness*	*Kurtosis*
SI1	Our facility is engaged early enough in decisions that affect dental product regulation and procurement processes.	1	5	3.68	.984	-.887	.660
SI2	Communication from regulators regarding requirements and procedures is clear and timely.	1	5	3.62	1.040	-.791	.057
SI3	We receive adequate information about updates that may affect procurement or product approval timelines.	1	5	3.61	1.026	-.946	.414
SI4	Regulators engage stakeholders when developing strategies to strengthen dental supply chain performance.	1	5	3.71	.977	-.934	.701
SI5	Regulators provide timely responses to inquiries or issues we raise regarding compliance or approvals.	1	5	3.72	1.005	-1.020	.810

SI6	Our input contributes meaningfully to shaping regulatory practices that affect the dental supply chain.	1	5	4.31	.836	-1.524	2.708
Overall Mean / SD				**3.78**	**0.98**		

Scale: 1 = "strongly disagree", 5 = "Strongly agree"

Table 4.5 presents the descriptive statistics for stakeholder involvement. The mean scores ranged between 3.61 and 4.31, with an overall mean of 3.78 and an average standard deviation of 0.98. The findings suggested moderate stakeholder involvement within Kenya's dental supply chain, particularly regarding communication, consultation, and stakeholder participation in regulatory and procurement processes.

The highest mean score of 4.31 was recorded for the statement indicating that organizational input contributed meaningfully toward shaping regulatory practices affecting the dental supply chain. This finding suggested that respondents perceived stakeholder contributions to be increasingly recognized within regulatory processes. However, relatively lower mean scores were observed for communication clarity, regulatory updates, and stakeholder engagement during procurement and approval processes. From the researcher's perspective, these findings implied that although stakeholder involvement existed within the Kenyan dental supply chain, the level of engagement and collaboration remained inconsistent across organizations and regulatory institutions.

The standard deviation values ranging between 0.84 and 1.04 further indicated moderate variability in stakeholder experiences. This variation suggested that some organizations experienced stronger collaboration and communication with regulators compared to others. The inconsistency may have reflected differences in organizational size, stakeholder influence, regulatory access, and institutional coordination mechanisms. The findings therefore implied that stakeholder engagement within Kenya's dental supply chain had not yet achieved full uniformity and remained dependent on organizational and institutional contexts.

The skewness and kurtosis values remained within acceptable thresholds, with the largest absolute skewness and kurtosis values recorded at 1.524 and 2.708 respectively. The data therefore satisfied normality assumptions necessary for subsequent inferential analyses.

4.4.4 Descriptive Statistics for Dental Supply Chain Performance

Table 4.6: Descriptive Statistics for Dental Supply chain Performance

Item code	*Statements*	*Min*	*Max*	*Mean*	*SD*	*Skewness*	*Kurtosis*
DSCP1	Our procurement processes help minimize the total cost of acquiring dental products.	1	5	3.91	1.080	-1.155	.871
DSCP2	Our supply chain adapts quickly to sudden changes in product demand.	1	5	3.94	.977	-1.149	1.282
DSCP4	The procurement process responds effectively to urgent clinical needs.	1	5	3.93	.957	-1.277	1.821
DSCP3	Dental products are delivered within expected timelines.	1	5	3.98	.910	-1.323	2.314
DSCP5	Products received meet the required quality and safety standards.	1	5	4.12	.936	-1.193	1.505
DSCP6	Overall satisfaction with the dental product supply process is high.	1	5	4.08	.864	-1.312	2.563
Overall Mean / SD				**3.99**	**0.95**		

Scale: 1 = “strongly disagree”, 5 = “Strongly agree”

Table 4.6 presents the descriptive statistics for dental supply chain performance. The mean scores ranged between 3.91 and 4.12, with an overall mean of 3.99 and an average standard deviation of 0.95. The findings indicated that respondents generally perceived dental supply chain performance within Kenya to be moderately strong, particularly regarding product quality, procurement responsiveness, and delivery reliability.

The highest mean score of 4.12 related to product quality and safety standards, suggesting that organizations generally perceived the dental products received to meet acceptable regulatory and clinical standards. Similarly, relatively high scores relating to procurement responsiveness and supply chain adaptability suggested that organizations had developed mechanisms for responding to operational and clinical supply needs. However, the mean values also indicated that supply chain performance had not yet reached optimal levels across all dimensions, particularly regarding cost minimization and responsiveness to sudden changes in demand.

The standard deviation values ranging between 0.86 and 1.08 indicated moderate variability in organizational experiences regarding supply chain performance. From the researcher’s perspective, the variation suggested that while some organizations experienced efficient procurement systems, timely deliveries, and high operational satisfaction, others continued to

experience challenges associated with delays, supply disruptions, and procurement inefficiencies. The observed variability may have reflected differences in organizational resources, supplier relationships, technological capability, and regulatory compliance capacity across the Kenyan dental sector.

The skewness and kurtosis statistics remained within acceptable limits, with the highest absolute skewness and kurtosis values recorded at 1.323 and 2.563 respectively. The findings therefore confirmed the suitability of the data for further multivariate analyses including regression analysis and SEM.

4.5 Bias Analysis

4.5.1 Non-response Bias Analysis

An assessment of non-response bias was conducted to determine whether significant differences existed between organizations that responded early and those that responded later in the data collection process. Consistent with prior survey-based studies, responses received within the first two weeks were categorized as early responses, while those received after the first two weeks were categorized as late responses. The underlying assumption was that late respondents are likely to share characteristics like non-respondents and therefore provide a reasonable basis for assessing the possibility of non-response bias. To assess whether systematic differences existed between the two groups, an independent samples t-test was performed. The test compared the mean responses for the study constructs between early and late respondents. The null hypothesis for each construct stated that no statistically significant difference existed between the two response groups. The results are presented in Table 4.7.

Table 4.7: Non-response bias results

Variables	*Early vs Late Responses*	*N*	*Mean*	*SD*	*Δ Mean*	*T*	*p*	*95% CI Interval of the Difference* *LCI*	*UCI*
Compliance	Early responses	112	4.08	.80	-.078	-.788	.432	-.273	.117
Requirements	Late responses	100	4.16	.62					
Risk Management	Early responses	4.11	1.01	4.11	-.161	-1.302	.194	-.405	.083

	Late responses	4.28	.76	4.28					
Stakeholder	Early responses	3.76	.79	3.76	.169	1.474	.142	-.057	.394
Involvement	Late responses	3.59	.87	3.59					
Dental Supply Chain	Early responses	3.99	.84	3.99	.031	.275	.783	-.191	.254
performance	Late responses	3.96	.80	3.96					

The results presented in Table 4.7 indicated that the differences between early and late responses across all study variables were statistically insignificant because all p-values exceeded the 0.05 significance threshold. Specifically, compliance requirements recorded a mean difference of -.078 ($t = -.788$, $p > .05$), risk management recorded a mean difference of -.161 ($t = -1.302$, $p > .05$), stakeholder involvement recorded a mean difference of .169 ($t = 1.474$, $p > .05$), while dental supply chain performance recorded a mean difference of .031 ($t = .275$, $p > .05$).

From the researcher's perspective, these findings suggested that early and late respondents shared relatively similar perceptions regarding regulatory compliance, stakeholder engagement, risk management practices, and dental supply chain performance. Consequently, the study concluded that non-response bias did not pose a significant threat to the validity of the findings. The absence of statistically significant differences implied that organizations which did not participate in the survey were unlikely to have provided substantially different responses from those included in the final analysis. The findings further strengthened the external validity and generalizability of the study because the high response rate of 92.17%, combined with the insignificant differences between respondent groups, reduced the likelihood that the results were systematically biased toward a particular category of respondents. This enhanced confidence that the findings reasonably reflected prevailing operational and regulatory realities within Kenya's dental supply chain environment.

4.5.2 Common Method Bias (CMB) Analysis

Common Method Bias (CMB) was assessed because the study relied primarily on self-reported questionnaire data collected from respondents within the same organizations. Common Method Bias may inflate or distort relationships among study variables and therefore threaten the validity of empirical findings if not adequately controlled (Podsakoff et al., 2003). To minimize the possibility of Common Method Bias during the questionnaire design and data collection stages,

several procedural remedies were implemented. First, predictor variables and the criterion variable were placed in separate sections of the questionnaire to reduce respondents' tendency to provide consistent or patterned responses. Second, the questionnaire employed simple, clear, and unambiguous language to minimize item misunderstanding. Third, respondents were assured of confidentiality and anonymity to encourage honest and independent responses. Respondents were also informed that there were no right or wrong answers, thereby reducing evaluation apprehension and social desirability bias.

Despite these procedural controls, additional statistical tests were conducted to establish whether Common Method Bias remained a threat to the measurement model. The study therefore employed Harman's single-factor test together with the trait-only, method-only, and trait-and-method Confirmatory Factor Analysis (CFA) approaches. Under Harman's single-factor approach, Exploratory Factor Analysis (EFA) was conducted in SPSS by constraining all measurement items to load onto a single factor. The analysis revealed that the single factor accounted for 33.256% of the total variance with an Eigenvalue of 7.649. Since the extracted variance was below the 50% threshold recommended in prior methodological studies, the results suggested that Common Method Bias was unlikely to significantly confound the study findings (Malhotra et al., 2006; Podsakoff & Organ, 1986).

Table 4.8: Common method bias using the trait-and method model

Models	χ^2	DF	χ^2/DF	RMSEA	SRMR	NFI	NNFI	CFI	IFI
Method only	2056.465	119	17.281	.278	.130	.624	.589	.641	.642
Trait only	255.567	113	1.996	.069	.046	.942	.961	.968	.968
Method-and Trait	170.865	92	1.857	.064	.040	.957	.968	.979	.979

The study further estimated three competing CFA models using LISREL version 8.8. The results are summarized in Table 4.8. The first model was a method-only model in which all measurement items loaded onto a single latent factor. The results produced poor model fit statistics (χ^2/DF = 17.281; RMSEA = .278; SRMR = .130; NFI = .624; NNFI = .589; CFI = .641; IFI = .642), indicating that a single common factor did not adequately explain the observed covariance among the variables. The second model was a trait-only model in which each measurement item loaded onto its respective theoretical construct. This model produced substantially improved fit indices

(χ^2/DF = 1.996; RMSEA = .069; SRMR = .046; NFI = .942; NNFI = .961; CFI = .968; IFI = .968), suggesting that the observed relationships were better explained by the intended latent constructs rather than by a single common factor. Finally, the study estimated a combined trait-and-method model that incorporated both trait and method effects simultaneously. The resulting model fit statistics were χ^2/DF = 1.857; RMSEA = .064; SRMR = .040; NFI = .957; NNFI = .968; CFI = .979; and IFI = .979.

4.6 Reliability and Validity Analysis

This section presented the analyses conducted to assess the reliability and validity of the study constructs and measurement items. The study employed both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to evaluate the adequacy of the measurement model. Reliability was assessed using Cronbach's alpha coefficients generated through SPSS version 29 and Composite Reliability (CR) values generated through LISREL version 8.8. Validity was assessed through factor loadings, Average Variance Extracted (AVE), convergent validity, and discriminant validity tests. The use of both SPSS and LISREL enhanced the rigor of the analysis by allowing preliminary data purification before confirmatory model testing.

4.6.1 Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) was conducted to examine the underlying factor structure of the study variables and assess the dimensionality of the measurement items. The study utilized Principal Component Analysis as the extraction method and Varimax rotation to achieve clearer factor separation. According to Watson et al. (1995), EFA assists in identifying latent constructs where the underlying structure of the data is not fully established. To improve the dimensionality and purity of the measurement model, one item under stakeholder involvement (SI6) exhibited high cross-loading across multiple components and was therefore removed from the analysis. Following the rotation process, four components with Eigenvalues greater than 1 were extracted. Collectively, the four components explained 71.818% of the total variance, which exceeded the minimum acceptable threshold of 50%, thereby indicating strong explanatory power of the retained factors.

The first component, Risk Management, explained 33.256% of the variance, followed by Compliance Requirements at 15.357%, Dental Supply Chain Performance at 13.262%, and Stakeholder Involvement at 9.943%. The findings suggested that the retained constructs

adequately represented the major dimensions influencing regulatory framework implementation and supply chain performance within Kenya's dental supply chain environment.

Table 4.9: Exploratory Factor Analysis

Constructs/items	1	2	3	4	Eigen value	% of variance explained	Cronbach's alpha (α)
Compliance Requirements					3.532	15.357	.910
CR1	.215	**.819**	.043	-.040			
CR2	.132	**.800**	.213	.005			
CR3	.243	**.799**	.107	-.004			
CR4	.163	**.799**	.186	.027			
CR5	.249	**.846**	.132	.063			
CR6	.229	**.707**	.090	.027			
Risk Management					7.649	33.256	.953
RM1	**.880**	.254	.118	.012			
RM2	**.876**	.179	.129	.030			
RM3	**.873**	.236	.149	.025			
RM4	**.858**	.166	.119	-.052			
RM5	**.904**	.195	.114	-.079			
RM6	**.800**	.282	.088	.056			
Stakeholder Involvement					2.287	9.943	.889
SI1	.001	.102	.006	**.762**			
SI2	.042	.034	.029	**.857**			
SI3	-.007	-.016	-.047	**.875**			
SI4	.039	-.012	.031	**.858**			
SI5	-.082	-.054	.078	**.804**			
SI6‡							
Dental SC Performance					3.050	13.262	.890
DSCP1	.095	.032	**.838**	-.030			
DSCP2	.116	.171	**.846**	.019			
DSCP4	.033	.230	**.801**	.054			
DSCP3	.074	.051	**.764**	-.006			
DSCP5	.139	.087	**.742**	.012			
DSCP6	.155	.157	**.733**	.072			
Total						**71.818**	
KMO = 0.883; χ^2 = 3588.001; df = 253; p = 0.000							

‡ Represents items dropped from the EFA

The EFA results revealed strong loadings across all retained items, with all loadings exceeding the recommended threshold of 0.50. This indicated that the retained items sufficiently represented their respective latent constructs. Additionally, Cronbach's alpha coefficients ranged between .889

and .953, exceeding the recommended threshold of .70 suggested by Hair et al. (2014). These results demonstrated high internal consistency and reliability among the measurement items. The Kaiser-Meyer-Olkin (KMO) value of .883 indicated meritorious sampling adequacy according to Dziuban and Shirkey (1974), implying that the sample size was sufficient for factor analysis. Furthermore, Bartlett's Test of Sphericity was statistically significant ($\chi 2 = 3588.001$; $p < .001$), suggesting that significant correlations existed among the variables and that the correlation matrix was appropriate for factor extraction.

From the researcher's perspective, the strong reliability coefficients and substantial variance explained suggested that the study constructs captured important operational and regulatory dimensions associated with Kenya's dental supply chain. The results further implied that respondents demonstrated relatively consistent perceptions regarding compliance requirements, stakeholder involvement, risk management practices, and supply chain performance across the sampled organizations.

4.6.2 Confirmatory Factor Analysis(CFA)

Following the EFA, Confirmatory Factor Analysis (CFA) was conducted using LISREL version 8.8 to validate the measurement structure identified during exploratory analysis and establish theoretical relationships between observed variables and their underlying latent constructs. The study employed covariance-based SEM using Maximum Likelihood Estimation because of its suitability in testing complex latent variable relationships and moderation effects (Jöreskog et al., 2001). The four-factor model identified during EFA was retained during the CFA stage. However, to improve overall model fit and achieve stronger construct validity, several items with weak loadings or high residuals were removed from the final model. Specifically, one item from Compliance Requirements (CR5), two items from Risk Management (RM3 and RM5), two items from Stakeholder Involvement (SI3 and SI6), and two items from Dental Supply Chain Performance (DSCP3 and DSCP6) were excluded.

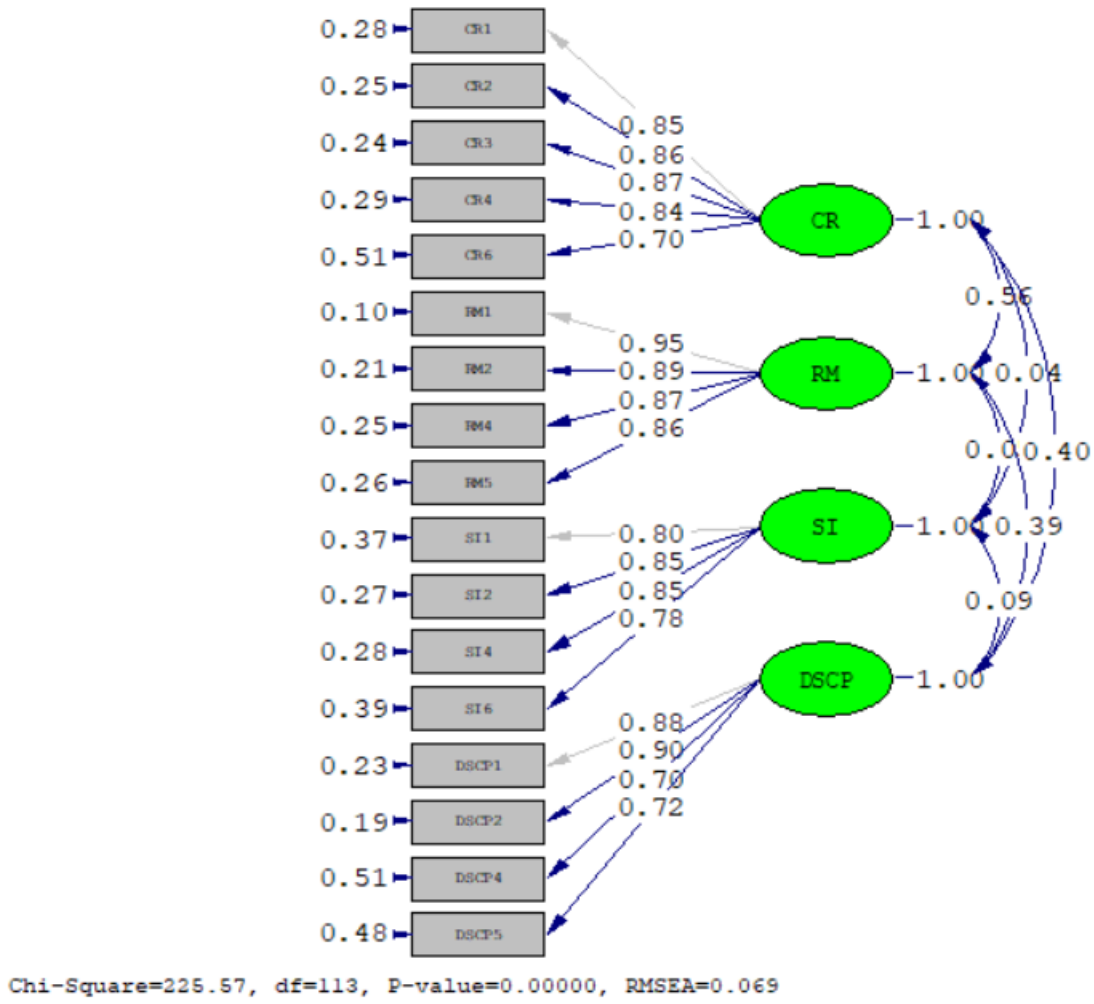

Figure 4.1: CFA measurement model

The final CFA model achieved acceptable goodness-of-fit indices. The model produced $\chi 2$ = 255.57 with 113 degrees of freedom, resulting in $\chi 2/df$ = 1.996, which was below the recommended threshold of 3. The RMSEA value of .0687 and SRMR value of .046 further indicated acceptable model fit. Incremental fit indices including NFI (.942), NNFI (.961), CFI (.968), IFI (.968), and RFI (.931) all exceeded the recommended threshold of .90, confirming that the measurement model adequately represented the observed data.

Table 4.10: Confirmatory Factor Analysis (CFA)

Constructs/items	**Loadings**	**T-values**
Compliance Requirements: CR = .915; AVE = .684; CA = .882		
CR1	0.846	***Fixed***
CR2	0.864	15.860
CR3	0.87	16.023

CR4	0.841	15.171
CR5†	****	****
CR6	0.703	11.595
Risk Management: CR = .940; AVE = .796; CA = .921		
RM1	0.948	***Fixed***
RM2	0.889	22.052
RM3†	****	****
RM4	0.867	20.510
RM5†	****	****
RM6	0.861	20.150
Stakeholder Involvement: CR = .891; AVE = .671; CA = .853		
SI1	0.796	***Fixed***
SI2	0.853	13.378
SI3†	****	****
SI4	0.848	13.305
SI5	0.778	12.020
SI6†	****	****
Dental SC Performance: CR = .879; AVE = .647; CA = .847		
DSCP1	0.876	***Fixed***
DSCP2	0.898	16.459
DSCP3†	****	****
DSCP4	0.703	11.680
DSCP5	0.721	12.102
DSCP6†	****	****
Chi-square (χ2) = 255.567, degrees of freedom (d.f) = 113, χ2 /df = 1.996; RMSEA = .0687; NFI = 0.942; NNFI = 0.961; CFI = 0.968; IFI = 0.968; RFI = 0.931; SRMR = 0.046		

† Represents items dropped from the CFA

The CFA findings demonstrated that all retained factor loadings exceeded the recommended threshold of 0.60 and were statistically significant, indicating strong relationships between the observed indicators and their respective constructs. Composite Reliability (CR) values ranged from .879 to .940, while Cronbach's Alpha values ranged from .847 to .921, confirming high reliability of the measurement scales. The Average Variance Extracted (AVE) values ranged between .647 and .796, exceeding the recommended threshold of .50 suggested by Fornell and Larcker (1981). This indicated that the constructs explained a substantial proportion of variance in their respective indicators, thereby supporting convergent validity.

From the researcher's perspective, the acceptable model fit statistics implied that the retained indicators adequately captured the theoretical dimensions of compliance requirements, risk management, stakeholder involvement, and dental supply chain performance within the Kenyan context. The removal of several items further improved model precision and minimized

measurement error, thereby strengthening the robustness of subsequent SEM and regression analyses.

4.6.3 Discriminant Validity Analysis

The study further assessed discriminant validity using the Fornell-Larcker criterion to determine whether each construct was empirically distinct from the others within the model. Discriminant validity assesses the extent to which a construct differs from other constructs in the same model (Hulland, 1999).

Table 4.11: Discriminant validity using Fornell-Larcker criterion

Constructs	1	2	3	4	**AVE**
1. Compliance Requirements	**(.827)**	.229	.001	.078	**.684**
2. Risk Management	.479**	**(.892)**	.001	.070	**.796**
3. Stakeholder Involvement	.030	.025	**(.819)**	.001	**.671**
4. Dental SC Performance	.279**	.265**	.043	**(.804)**	**.647**

Note: *Correlation (r) coefficients at the lower off-diagonal elements; shared variance (r^2) at the upper off-diagonal elements; square root of the AVE of each construct at the diagonal elements.*
**p < 0.01 (2-tailed).

The discriminant validity results showed that the shared variances between constructs ranged from .001 to .229, which were all lower than their corresponding AVE values ranging between .647 and .796. This satisfied the first Fornell-Larcker criterion and indicated that each construct shared more variance with its own indicators than with other constructs. Additionally, the square roots of the AVE values presented along the principal diagonal were all greater than the corresponding inter-construct correlations. These findings confirmed that the constructs were empirically distinct from one another and measured unique theoretical dimensions.

The researcher therefore concluded that the measurement model achieved adequate discriminant validity and that the study constructs captured separate but related aspects of regulatory frameworks, stakeholder involvement, risk management practices, and dental supply chain performance. This distinction among constructs strengthened confidence in the accuracy and interpretability of the subsequent regression and SEM findings.

4.7 Correlation Analysis

The study conducted Pearson correlation analysis to determine the direction, strength, and significance of the relationships among the study variables before conducting regression and Structural Equation Modelling (SEM) analyses. Correlation coefficients range between -1 and +1, where positive values indicate direct relationships while negative values indicate inverse relationships. Correlation analysis was important in establishing preliminary associations among compliance requirements, risk management, stakeholder involvement, and dental supply chain performance within Kenya's dental supply chain environment. Additionally, the correlation matrix assisted in assessing the possibility of multicollinearity prior to regression and SEM estimation. According to Hair et al. (2020), excessively high correlations among independent variables, particularly coefficients above 0.80, may indicate multicollinearity problems that can distort regression estimates and weaken the stability of structural models. The results presented in Table 4.12 indicated that all inter-construct correlations remained below the recommended threshold, suggesting that multicollinearity was unlikely to pose a significant threat to the subsequent regression and SEM analyses.

Table 4.12: Descriptive and correlation results

Constructs	**1**	**2**	**3**	**4**
1. Compliance Requirements	1.000			
2. Risk Management	.479**	1.000		
3. Stakeholder Involvement	.030	.025	1.000	
4. Dental SC Performance	.279**	.265**	.043	1.000
Descriptives				
Min	1.00	1.00	1.00	1.00
Max	5.00	5.00	5.00	5.00
Mean	4.121	4.190	3.682	3.976
SD	.720	.901	.834	.819
Skewness	-1.292	-1.675	-.813	-1.352
Kurtosis	2.443	3.048	.598	2.538

**. p< .01 level (2-tailed)

The correlation results revealed a statistically significant positive relationship between compliance requirements and risk management practices ($r = .479$; $p < .01$). This finding suggested that

organizations reporting stronger compliance practices also tended to report stronger risk management mechanisms within the dental supply chain. From the researcher's perspective, the moderate positive association implied that regulatory compliance frameworks within Kenya's dental sector may have contributed toward improving monitoring systems, product quality controls, and mechanisms aimed at reducing counterfeit or substandard dental products. The findings further revealed a statistically significant positive relationship between compliance requirements and dental supply chain performance ($r = .279$; $p < .01$). Although the relationship was moderate in magnitude, it suggested that organizations perceiving regulatory compliance procedures as clear and manageable also tended to report relatively better supply chain outcomes in terms of procurement efficiency, product quality, responsiveness, and operational effectiveness. Within the Kenyan dental supply chain context, the results implied that structured compliance procedures may have supported operational coordination and reduced disruptions associated with regulatory uncertainty.

Similarly, risk management practices exhibited a statistically significant positive relationship with dental supply chain performance ($r = .265$; $p < .01$). The positive relationship suggested that organizations with stronger risk mitigation mechanisms were more likely to experience improved supply chain outcomes. The researcher interpreted this finding to mean that predictable inspections, effective recall communication systems, and quality assurance mechanisms potentially enhanced operational reliability and reduced supply chain vulnerabilities within the dental sector. However, stakeholder involvement demonstrated weak and statistically insignificant relationships with compliance requirements ($r = .030$; $p > .05$), risk management ($r = .025$; $p > .05$), and dental supply chain performance ($r = .043$; $p > .05$). The findings suggested that stakeholder engagement practices within the sampled organizations were not strongly associated with the operational and regulatory outcomes captured in the study. From the researcher's perspective, the weak relationships may have reflected limited institutionalized stakeholder participation mechanisms within Kenya's dental regulatory environment, where regulatory decisions and compliance procedures could still be largely centralized within regulatory agencies.

The descriptive statistics further indicated relatively high mean scores for compliance requirements (Mean = 4.121) and risk management (Mean = 4.190), suggesting that respondents generally perceived the regulatory and risk management systems within the dental supply chain positively. Nevertheless, the standard deviation values, particularly for risk management (SD =

.901) and stakeholder involvement (SD = .834), indicated moderate variability in responses across organizations. This implied that experiences regarding compliance enforcement, stakeholder engagement, and risk management practices were not entirely uniform across the sampled dental facilities and regulatory agencies. Additionally, the skewness and kurtosis statistics fell within acceptable thresholds, indicating that the data approximated normal distribution assumptions required for regression and SEM estimation. Consequently, the correlation results provided sufficient justification for proceeding with multivariate analyses, including regression analysis and Structural Equation Modelling, to further examine the direct and moderating relationships among the study variables.

4.8 Regression Analysis and Hypothesis Test

The section presented the regression analysis results used to examine the effect of compliance requirements and risk management on dental supply chain performance as well as the moderating effect of stakeholder involvement. The analysis was conducted using hierarchical multiple regression in IBM SPSS version 29. The hierarchical approach was considered appropriate because it enabled the researcher to examine the incremental contribution of the moderator and interaction terms after accounting for the direct effects of the independent variables. The regression models were aligned with the specific objectives and hypotheses of the study.

The general regression equations estimated were specified as follows:

$DSCP = \beta_0 + \beta_1 CR + \beta_2 RM$ ----------**Model 1**

$DSCP = \beta_0 + \beta_1 CR + \beta_2 RM + \beta_3 SI$ ----------**Model 2**

$DSCP = \beta_0 + \beta_1 CR + \beta_2 RM + \beta_3 SI + \beta_3 CR \times SI + \beta_8 RM \times SI$ ----------**Model 3**

Where: CR = *Compliance requirements; RM = Risk management; SI = Stakeholder involvement; DSCP = Dental supply chain performance*.

Before estimating the regression models, the study assessed multicollinearity among the predictor variables using tolerance and Variance Inflation Factor (VIF) statistics. Multicollinearity occurs when predictor variables are highly correlated and may distort regression estimates. Existing literature suggests that VIF values above 10 indicate serious multicollinearity concerns.

Table 4.13: Test of multicollinearity

Predictors	Tolerance	Variance Inflation Factor (VIF)
Compliance Requirements (CR)	.769	1.301
Risk Management (RM)	.769	1.300
Stakeholder Involvement (SI)	.994	1.006
CR×SI	.753	1.328
RM×SI	.751	1.332

As presented in Table 4.13, all VIF values ranged between 1.006 and 1.332, while tolerance values were above the recommended threshold of 0.10. The findings therefore confirmed the absence of multicollinearity and demonstrated that the predictor variables could reliably be included in the regression and SEM models without compromising coefficient stability. The relatively low VIF values further suggested that compliance requirements, risk management, and stakeholder involvement captured distinct aspects of the Kenyan dental supply chain environment. This strengthened the suitability of the dataset for subsequent regression and SEM analyses because the predictor variables did not exhibit excessive overlap.

4.8.1 Effect of Compliance Requirements on Dental Supply Chain Performance

The first objective of the study was to examine the effect of compliance requirements on dental supply chain performance. The regression results presented in Table 4.14 indicated that compliance requirements had a positive and statistically significant effect on dental supply chain performance across all regression models.

In Model 1, compliance requirements produced a standardized beta coefficient of $\beta = .225$ with a t-value of 2.640 and a p-value of .009. The findings implied that improvements in compliance requirements were associated with improvements in dental supply chain performance. Specifically, a one-unit increase in compliance requirements was associated with a .225-unit increase in dental supply chain performance. The findings suggested that clear regulatory guidelines, effective communication of compliance procedures, and structured procurement requirements contributed positively to operational efficiency within Kenya's dental supply chain. From the researcher's perspective, the findings reflected the importance of regulatory clarity in minimizing procurement delays, reducing compliance uncertainty, and improving coordination

among supply chain actors such as dental clinics, importers, distributors, and regulators. The results also implied that organizations operating within the Kenyan dental sector perceived compliance systems as important operational mechanisms that enhanced quality assurance, procurement consistency, and accountability. Consequently, Hypothesis H1a, which proposed that compliance requirements positively influence dental supply chain performance, was supported.

4.8.2 Effect of Risk Management on Dental Supply Chain Performance

The second objective examined the effect of risk management on dental supply chain performance. The regression results revealed that risk management had a positive and statistically significant relationship with dental supply chain performance.

In Model 1, risk management produced a standardized beta coefficient of $\beta = .155$ with a t-value of 2.286 and a p-value of .023. The findings indicated that enhanced risk management practices significantly improved dental supply chain performance. The positive relationship suggested that organizations which implemented effective regulatory inspections, product quality monitoring, recall communication systems, and procurement risk mitigation mechanisms experienced better supply chain outcomes. Within the Kenyan dental supply chain context, the findings implied that effective risk management contributed toward minimizing the circulation of substandard dental products, reducing procurement uncertainties, and improving operational reliability. Although the magnitude of the relationship was moderate relative to compliance requirements, the findings nevertheless demonstrated that risk management remained an important determinant of supply chain efficiency and product quality assurance. Therefore, Hypothesis H1b, which proposed that risk management positively influences dental supply chain performance, was supported.

4.8.3 Moderating Effect of Stakeholder Involvement

The third objective examined whether stakeholder involvement moderates the relationship between regulatory framework dimensions and dental supply chain performance. Stakeholder involvement was introduced into Model 2 as a moderator and interaction terms were subsequently introduced in Model 3.

The inclusion of stakeholder involvement in Model 2 resulted in a marginal increase in the coefficient of determination from $R^2 = .100$ to $R^2 = .101$. This indicated that stakeholder involvement independently contributed very little additional explanatory power to the model. The

overall regression model nevertheless remained statistically significant ($F = 7.832$, $p < .001$). In Model 3, the interaction effect between compliance requirements and stakeholder involvement (CR × SI) produced a beta coefficient of $\beta = .010$ with a p-value of .934. Similarly, the interaction effect between risk management and stakeholder involvement (RM × SI) produced a beta coefficient of $\beta = .056$ with a p-value of .562. The findings indicated that stakeholder involvement did not significantly moderate the relationship between compliance requirements and dental supply chain performance. Likewise, stakeholder involvement did not significantly moderate the relationship between risk management and dental supply chain performance.

From the researcher's perspective, the insignificant moderation effects suggested that although stakeholder engagement existed within Kenya's dental supply chain, its influence had not yet become sufficiently institutionalized to significantly alter the effectiveness of compliance systems or risk management practices. The findings further implied that regulatory compliance and risk management mechanisms may have operated relatively independently of stakeholder consultation processes. The findings could also reflect structural limitations within the Kenyan dental regulatory environment where stakeholder engagement mechanisms remained largely consultative rather than decisional. Consequently, stakeholder involvement may not have substantially strengthened or weakened the direct influence of regulatory practices on supply chain performance. Therefore, Hypotheses H2a and H2b were not supported.

Table 4.14: OLS hierarchical regression results

	Dental Supply Chain Performance (DSCP)					
	Model 1		**Model 2**		**Model 3**	
	β (t-value)	*p-value*	*β (t-value)*	*p-value*	*β (t-value)*	*p-value*
Independent Variables						
Compliance Requirements (CR)	.225 (2.640) H1a	.009	.224 (2.625)	.009	.224 (2.620)	.009
Risk Management (RM)	.155 (2.286) H1b	.023	.155 (2.275)	.024	.156 (2.287)	.023
Moderating variable						
Stakeholder Involvement (SI)			.033 (.504)	.615	.030 (.462)	.645
Interaction effect						
CR*SI					.010 (.084) H2a	.934
RM*SI					.056 (.581) H2b	.562
Model fit:						
R^2	.100		.101		.104	
Adjusted R^2	.092		.089		.082	
ΔR^2			.001		.002	
F-Statistic	11.663		7.832		4.770	
ΔF-Statistic			.254		.260	
P	.000		.000		.000	

Source: Survey Data (2025)

The regression models explained between 10.0% and 10.4% of the variation in dental supply chain performance. Although the explanatory power appeared modest, the models remained statistically significant and meaningful within the context of organizational and behavioral research where supply chain performance is often influenced by numerous external operational, institutional, and environmental factors. The findings therefore suggested that compliance requirements and risk management constituted important predictors of dental supply chain performance within Kenya's regulated healthcare procurement environment.

4.9 Structural Equation Modelling (SEM) and Hypothesis Testing

Following the regression analysis, the study estimated the structural model using Structural Equation Modelling (SEM) in LISREL version 8.8 to simultaneously assess the relationships among latent constructs and confirm the conceptual framework of the study. SEM was considered appropriate because it enabled the researcher to estimate multiple relationships concurrently while accounting for measurement errors among latent constructs. The structural model retained the four latent constructs identified during Confirmatory Factor Analysis, namely compliance requirements, risk management, stakeholder involvement, and dental supply chain performance.

The SEM structural model achieved acceptable goodness-of-fit indices. The model produced a Chi-square to degrees of freedom ratio (χ^2/df) of 1.996, which was below the recommended threshold of 3.0, indicating good model fit. The RMSEA value of .0687 and SRMR value of .046 further indicated acceptable approximation error and residual fit. Incremental fit indices including NFI (.942), NNFI (.961), CFI (.968), IFI (.968), and RFI (.931) all exceeded the recommended threshold of .90, suggesting that the structural model adequately fitted the observed data. The acceptable fit statistics confirmed that the hypothesized relationships among compliance requirements, risk management, stakeholder involvement, and dental supply chain performance were consistent with the empirical data collected from organizations operating within Kenya's dental supply chain.

The SEM path coefficients further confirmed the regression findings. Compliance requirements demonstrated a positive and statistically significant effect on dental supply chain performance, while risk management also produced a positive and significant effect on dental supply chain performance. However, the moderation effects involving stakeholder involvement remained statistically insignificant. The SEM findings therefore validated the conceptual framework of the study by confirming that regulatory framework dimensions directly influenced dental supply chain performance, although stakeholder involvement did not significantly strengthen the identified relationships. From the researcher's perspective, the findings implied that regulatory enforcement mechanisms and operational risk controls currently played a more central role in determining supply chain performance outcomes than stakeholder participatory processes within the Kenyan dental sector.

Table 4.15: Summary of hypotheses test

Hypotheses	*B*	*t*	*p*	*Decision*
H1a+: CR → DSCP	.225	2.640	.009	Accept
H1b+: DR → DSCP	.155	2.286	.023	Accept
H2a+: CR × SI → DSCP	.010	.084	.934	Reject
H2b+: RM × SI → DSCP	.056	.581	.562	Reject

Source: Survey Data (2025)

Out of the four hypotheses tested, two hypotheses were supported while two hypotheses were not supported. The supported hypotheses confirmed that compliance requirements and risk management significantly improved dental supply chain performance. However, stakeholder involvement did not significantly moderate the relationships between the regulatory framework dimensions and dental supply chain performance.

4.11 Chapter Summary

This chapter presented the empirical findings of the study based on data collected from organizations operating within Kenya's dental supply chain. The chapter covered the response analysis, respondent profiles, descriptive statistics, bias analysis, reliability and validity assessment, correlation analysis, regression analysis, and Structural Equation Modelling (SEM) results. The findings indicated that the study achieved a high response rate, thereby strengthening the reliability and generalizability of the results. The reliability and validity tests confirmed that the measurement instruments satisfied the required statistical thresholds, while the bias analysis established that non-response bias and common method bias did not significantly affect the findings. Correlation, regression, and SEM analyses further revealed that compliance requirements and risk management significantly influenced dental supply chain performance, whereas stakeholder involvement did not significantly moderate these relationships. The next chapter presents the discussion of findings, conclusions, recommendations, limitations of the study, and suggestions for future research.

CHAPTER FIVE
DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presented the summary of the key findings, conclusions, recommendations, theoretical contributions, limitations of the study, and suggestions for future research based on the empirical findings obtained from organizations operating within Kenya's dental supply chain. The chapter specifically focused on how compliance requirements, risk management, and stakeholder involvement influenced dental supply chain performance within the Kenyan dental sector.

5.2 Summary of Findings

The study examined the influence of compliance requirements and risk management on dental supply chain performance in Kenya, as well as the moderating role of stakeholder involvement in these relationships. Specifically, the study assessed how compliance requirements and risk management practices influenced dental supply chain performance and whether stakeholder involvement strengthened these relationships within Kenya's dental supply chain environment. The analysis was based on responses obtained from 212 respondents drawn from public dental clinics, private dental clinics, referral hospitals, importers and distributors of dental products, and regulatory agencies including the Kenya Bureau of Standards (KEBS), Kenya Medical Practitioners and Dentists Council (KMPDC), Kenya Revenue Authority (KRA), and the Pharmacy and Poisons Board (PPB). The study employed descriptive statistics, reliability and validity analysis, correlation analysis, hierarchical regression analysis, and Structural Equation Modelling (SEM) to test the study objectives and hypotheses.

The descriptive findings indicated relatively high levels of agreement regarding compliance requirements, risk management practices, and dental supply chain performance among organizations operating within Kenya's dental sector. The findings suggested that most organizations had established compliance procedures, regulatory documentation systems, and risk management practices aimed at enhancing operational efficiency, product quality, and procurement reliability. However, moderate standard deviation values across several indicators revealed the existence of some inconsistencies in the implementation of compliance and risk management practices across organizations within the dental supply chain. The findings further

highlighted the importance of Kenya's regulatory environment in shaping procurement practices, quality assurance, and operational coordination within the dental sector.

The reliability and validity analyses confirmed that the study instruments satisfied the required statistical thresholds for internal consistency, convergent validity, and discriminant validity. The exploratory and confirmatory factor analyses established that the measurement items adequately represented the underlying study constructs. In addition, the bias analysis revealed that non-response bias and common method bias did not significantly threaten the validity of the findings, thereby strengthening confidence in the robustness and credibility of the empirical results.

The findings established that compliance requirements had a statistically significant positive influence on dental supply chain performance. Organizations that effectively implemented regulatory requirements, documentation procedures, licensing systems, and procurement compliance mechanisms reported better supply chain outcomes in terms of procurement efficiency, responsiveness, product quality, and operational reliability. The findings implied that compliance with regulatory requirements played an important role in minimizing procurement disruptions, reducing exposure to substandard dental products, and improving coordination within Kenya's dental supply chain.

The study further revealed that risk management had a statistically significant positive influence on dental supply chain performance. Organizations that implemented effective operational, regulatory, and supply-related risk management practices were more likely to achieve improved procurement stability, timely product delivery, enhanced quality assurance, and better responsiveness to supply chain disruptions. The findings underscored the importance of proactive risk identification, monitoring, and mitigation within Kenya's dental sector, where organizations frequently face operational uncertainties, counterfeit product risks, supply interruptions, and changing regulatory requirements.

However, the findings revealed that stakeholder involvement did not significantly moderate the relationship between compliance requirements and dental supply chain performance, nor the relationship between risk management and dental supply chain performance. Although stakeholder involvement was theoretically expected to strengthen regulatory implementation and risk management effectiveness, the empirical findings did not provide statistical support for these moderating effects. From the researcher's perspective, the insignificant moderation effect could

partly be attributed to limited variability in stakeholder involvement practices across organizations, centralized regulatory decision-making structures within the Kenyan dental sector, and possible differences in institutional priorities among regulators, suppliers, and healthcare facilities. The findings therefore suggested that compliance requirements and risk management practices independently influenced dental supply chain performance regardless of the degree of stakeholder involvement.

5.3 Discussion of Findings

This section discussed the findings of the study in relation to each specific research objective and situated them within relevant theoretical perspectives and existing empirical literature.

5.3.1 Compliance Requirements and Dental Supply Chain Performance

The first objective of the study examined the influence of compliance requirements on dental supply chain performance in Kenya. The findings revealed that compliance requirements had a statistically significant positive influence on dental supply chain performance. The regression and Structural Equation Modelling (SEM) results demonstrated that organizations that effectively implemented compliance procedures, adhered to regulatory standards, maintained proper procurement documentation, and complied with licensing and reporting requirements were more likely to experience improved supply chain performance outcomes. Specifically, compliance requirements were associated with better procurement efficiency, improved product quality assurance, enhanced responsiveness, and greater operational reliability within the dental supply chain. Within the Kenyan dental sector context, the findings suggested that regulatory compliance contributed to minimizing procurement disruptions, reducing the circulation of substandard or counterfeit dental products, and improving coordination among importers, distributors, dental facilities, and regulatory agencies. The findings further implied that compliance mechanisms played an important role in strengthening accountability and standardization across Kenya's highly regulated dental supply chain environment.

The findings were consistent with several empirical studies which established that compliance requirements improve operational performance and supply chain efficiency, particularly within regulated sectors such as healthcare, pharmaceuticals, and medical supplies. For instance, Zhang and Fan (2020) found that compliance requirements reduced operational variability and enhanced

accountability by ensuring that supply chain actors followed standardized procurement and quality assurance procedures. Similarly, Ali et al. (2017) reported that compliance with regulatory standards strengthened supply chain resilience by improving traceability, reducing operational disruptions, and enhancing supplier reliability within healthcare supply chains. In addition, Dubey et al. (2021) observed that organizations that consistently complied with regulatory and quality standards such as Good Manufacturing Practices (GMP) and ISO certifications experienced improved operational stability and stronger stakeholder confidence. Kusi-Sarpong et al. (2022) further argued that compliance systems improve coordination across supply chain networks through standardized documentation, procurement protocols, and quality control mechanisms, thereby reducing transaction costs and operational inefficiencies. These findings therefore supported the present study's conclusion that compliance requirements positively influenced dental supply chain performance within Kenya's dental sector.

Within the Kenyan context, the findings also aligned with studies emphasizing the importance of regulatory systems in strengthening healthcare and procurement performance. Kurgat (2021), for example, found that effective regulatory frameworks improved supply chain performance among commercial state corporations in Kenya by enhancing supplier accountability, procurement transparency, and compliance monitoring. Similarly, studies within Kenya's healthcare sector have shown that compliance with procurement regulations, licensing requirements, and quality standards contributes to improved availability of medical products, reduced procurement irregularities, and enhanced service delivery outcomes. In the dental sector specifically, compliance requirements appeared particularly important because dental products directly affect patient safety, infection control, and clinical outcomes. Consequently, organizations operating within Kenya's dental supply chain were likely to prioritize compliance practices in order to minimize operational risks associated with counterfeit products, delayed approvals, and non-compliance penalties imposed by regulatory agencies such as the Pharmacy and Poisons Board (PPB), Kenya Bureau of Standards (KEBS), and Kenya Medical Practitioners and Dentists Council (KMPDC).

However, some studies reported findings suggesting that excessive regulatory compliance requirements may negatively affect supply chain efficiency by increasing operational costs, slowing procurement processes, and creating bureaucratic delays. For instance, Chen et al. (2020) argued that highly rigid compliance systems may reduce organizational flexibility and delay

decision-making, particularly within industries operating under rapidly changing market conditions. Similarly, Dlamini and Banda (2023) observed that complex regulatory documentation and lengthy approval procedures sometimes created procurement bottlenecks within healthcare supply chains in developing countries. These contrasting findings suggested that while compliance requirements are necessary for ensuring safety and accountability, excessive or poorly coordinated regulatory procedures may create operational inefficiencies if not effectively managed. Nevertheless, the present study established that within Kenya's dental supply chain, the overall benefits of compliance requirements outweighed the associated operational challenges.

The findings of the study were strongly supported by Regulatory Compliance Theory, which formed one of the anchoring theories of the study. Regulatory Compliance Theory argues that organizations operating within regulated environments achieve legitimacy, operational stability, and long-term sustainability through adherence to established rules, standards, and legal frameworks (Parker & Nielsen, 2017). The theory further posits that compliance should not merely be viewed as a legal obligation but as a strategic organizational function that enhances accountability, reduces operational risk, and improves organizational performance. Within Kenya's dental supply chain, compliance requirements appeared to function as mechanisms for standardizing procurement practices, safeguarding product quality, and strengthening trust among regulators, suppliers, and healthcare providers. The findings also aligned with Contingency Theory, which suggests that organizational performance depends on the alignment between operational practices and environmental conditions. In highly regulated sectors such as healthcare and dental services, organizations that effectively align their procurement and operational systems with prevailing regulatory requirements are more likely to achieve improved performance outcomes. Consequently, the findings reinforced the argument that compliance requirements constitute a critical strategic capability for enhancing dental supply chain performance within Kenya's regulated healthcare environment.

5.3.2 Risk Management and Dental Supply Chain Performance

The second objective of the study examined the influence of risk management on dental supply chain performance in Kenya. The findings revealed that risk management had a statistically significant positive influence on dental supply chain performance. The regression and Structural Equation Modelling (SEM) results demonstrated that organizations that implemented effective risk

identification, monitoring, assessment, and mitigation practices were more likely to experience improved supply chain performance outcomes. Specifically, effective risk management practices contributed to procurement stability, timely delivery of dental products, improved product quality assurance, operational continuity, and better responsiveness to supply chain disruptions. Within the Kenyan dental supply chain context, the findings suggested that proactive risk management helped organizations minimize operational uncertainties associated with counterfeit dental products, procurement delays, supplier unreliability, regulatory changes, and disruptions in the importation and distribution of dental supplies. The findings therefore implied that risk management practices played a critical role in supporting continuity, safety, and efficiency within Kenya's highly regulated dental sector.

The findings were consistent with several empirical studies which established that effective risk management practices improve supply chain efficiency, resilience, and operational performance within healthcare and manufacturing sectors. For instance, Agyabeng-Mensah et al. (2020) found that proactive supply chain risk management practices such as supplier evaluation, contingency planning, and operational monitoring significantly improved organizational performance by enhancing product quality consistency, delivery reliability, and responsiveness to disruptions. Similarly, Queiroz et al. (2022) reported that healthcare organizations with robust risk mitigation mechanisms, including safety stock management, supplier diversification, and digital monitoring systems, demonstrated stronger resilience and operational continuity during periods of crisis and uncertainty. Paul et al. (2021) further observed that technological risk monitoring tools improved supply chain visibility, traceability, and decision-making capabilities, thereby reducing operational vulnerabilities within healthcare supply chains. These findings supported the present study's conclusion that effective risk management positively influenced dental supply chain performance.

The findings were also consistent with studies conducted within healthcare and pharmaceutical supply chains where risk management has increasingly become critical due to rising operational uncertainties and regulatory pressures. Golan et al. (2020) argued that effective risk management not only functions as a defensive mechanism against disruptions but also acts as a strategic capability that improves organizational efficiency, customer satisfaction, and cost effectiveness. Similarly, Kusi-Sarpong et al. (2021) found that healthcare organizations that proactively managed supply risks, regulatory uncertainties, and quality control processes achieved better operational performance and stronger service delivery outcomes. Within the dental sector specifically, the

findings implied that risk management practices were essential because dental healthcare services heavily depend on the consistent availability of high-quality dental instruments, consumables, medicines, and specialized equipment. In Kenya, disruptions arising from supplier unreliability, delayed import approvals, counterfeit products, logistical challenges, or regulatory non-compliance could significantly affect treatment quality, infection control standards, and patient safety. Consequently, organizations operating within the dental supply chain appeared to prioritize risk management practices in order to maintain operational reliability and continuity of dental healthcare services.

However, some studies suggested that the effectiveness of risk management practices may vary depending on organizational capabilities, resource availability, and environmental conditions. For example, some researchers argued that risk management systems may fail to produce significant operational improvements where organizations lack adequate technological infrastructure, managerial support, or financial resources to implement comprehensive risk mitigation mechanisms. Other studies observed that excessive focus on risk control procedures may sometimes increase operational rigidity and slow organizational responsiveness in dynamic supply chain environments. These contrasting findings suggested that although risk management generally improves supply chain performance, its effectiveness depends on the extent to which organizations integrate risk management practices into broader operational and strategic systems. Nevertheless, the present study established that within Kenya's dental supply chain, effective risk management practices significantly contributed to improved supply chain performance.

The findings of the study were supported by Regulatory Compliance Theory and Contingency Theory, which formed part of the theoretical foundation of the study. Regulatory Compliance Theory emphasizes that organizations operating within regulated environments must establish mechanisms for identifying, monitoring, and controlling operational and regulatory risks in order to maintain legitimacy, compliance, and operational stability. Within Kenya's dental supply chain, risk management practices appeared to function as important mechanisms for ensuring product quality, preventing regulatory violations, minimizing operational disruptions, and safeguarding patient safety. In addition, the findings aligned with Contingency Theory, which argues that organizational performance depends on the ability of organizations to adapt management practices to prevailing environmental conditions and operational uncertainties. Given the dynamic and highly regulated nature of Kenya's dental supply chain environment, organizations that effectively

aligned their procurement systems, operational procedures, and risk management strategies with emerging supply chain risks were more likely to achieve improved performance outcomes. The findings therefore reinforced the theoretical argument that proactive risk management constitutes a critical organizational capability for enhancing dental supply chain performance within complex and uncertain healthcare environments.

5.3.3 Moderating Effect of Stakeholder Involvement on the Relationship between Regulatory Framework and Dental Supply Chain Performance

The third objective of the study was to examine the moderating effect of stakeholder involvement on the relationship between regulatory framework and dental supply chain performance in Kenya. Specifically, the study examined whether stakeholder involvement strengthened the influence of compliance requirements and risk management on dental supply chain performance. However, the findings presented in Chapter Four revealed that stakeholder involvement did not significantly moderate the relationship between compliance requirements and dental supply chain performance or the relationship between risk management and dental supply chain performance. The hierarchical regression results further showed that the inclusion of the interaction terms produced only a marginal increase in the coefficient of determination ($\Delta R^2 = .002$), implying that stakeholder involvement contributed minimally to explaining variations in dental supply chain performance beyond the direct effects of compliance requirements and risk management. These findings therefore suggested that although stakeholder involvement remained an important governance and coordination mechanism within the Kenyan dental supply chain, its moderating influence on the relationship between regulatory framework and supply chain performance was statistically weak and insignificant.

The findings contrasted with several previous studies that emphasized the importance of stakeholder participation in strengthening regulatory effectiveness and supply chain performance. For example, Dubey et al. (2020) found that stakeholder collaboration enhanced supply chain adaptability and operational performance by improving information sharing, coordination, and responsiveness among supply chain actors. Similarly, Queiroz et al. (2022) reported that stakeholder engagement strengthened organizational resilience during supply chain disruptions by facilitating collaborative decision-making and coordinated responses to emerging risks. Kusi-Sarpong et al. (2021) further argued that involving suppliers, regulators, and operational managers

in compliance and risk management activities improves transparency, accountability, and implementation efficiency within healthcare supply chains. These studies therefore suggested that stakeholder involvement would ordinarily strengthen the effectiveness of compliance requirements and risk management practices in improving supply chain outcomes.

However, the present findings were consistent with studies that questioned the automatic effectiveness of stakeholder involvement in highly regulated operational environments. For instance, Mulligan et al. (2022) observed that stakeholder participation may not always improve operational performance when institutional interests conflict or when coordination structures are weak. Similarly, Bäckstrand (2006) argued that stakeholder involvement processes sometimes become symbolic rather than operationally effective, particularly where participation mechanisms are poorly structured or where stakeholders possess unequal influence and technical capacity. Within healthcare systems, Li and Wang (2021) further noted that involving multiple actors in regulatory and procurement processes may slow decision-making and create implementation inconsistencies, especially in resource-constrained environments. These studies therefore supported the present finding that stakeholder involvement may not necessarily strengthen the effectiveness of regulatory practices under all institutional conditions.

One possible explanation for the insignificant moderation effect was reflected in the descriptive findings presented in Chapter Four, where stakeholder involvement recorded comparatively lower mean scores and relatively higher variability across organizations compared to compliance requirements and risk management. This suggested that stakeholder engagement practices were inconsistent across dental clinics, distributors, referral hospitals, and regulatory agencies operating within Kenya's dental supply chain. In practice, some organizations may have maintained strong consultation and collaboration mechanisms with regulators and suppliers, while others may have operated with limited coordination structures. The uneven implementation of stakeholder engagement practices may therefore have weakened the ability of stakeholder involvement to significantly strengthen the regulatory framework–performance relationship.

The findings also suggested that the direct influence of compliance requirements and risk management on dental supply chain performance may already have been sufficiently strong to operate independently of stakeholder involvement. The regression and SEM results in Chapter Four established that compliance requirements and risk management directly and significantly

influenced dental supply chain performance. This implied that organizations could improve procurement efficiency, product quality assurance, operational reliability, and supply continuity primarily through structured compliance systems and proactive risk management practices even in situations where stakeholder engagement remained moderate. Within the Kenyan dental sector, regulatory institutions such as Kenya Bureau of Standards, Pharmacy and Poisons Board, and Kenya Medical Practitioners and Dentists Council already enforce mandatory compliance requirements that organizations must follow irrespective of the extent of stakeholder consultation. Consequently, the regulatory environment itself may have exerted stronger influence on supply chain performance than stakeholder interaction mechanisms.

From a theoretical perspective, the findings provided important insights regarding Stakeholder Theory and Contingency Theory. Stakeholder Theory argues that organizations achieve improved outcomes when they actively involve relevant stakeholders in decision-making processes and operational activities (Freeman, 1984). However, the findings of the present study suggested that stakeholder involvement does not always produce significant performance-enhancing effects, particularly in contexts where participation mechanisms are fragmented, inconsistent, or weakly institutionalized. The findings therefore extended Stakeholder Theory by demonstrating that the effectiveness of stakeholder participation depends not only on the existence of engagement mechanisms but also on the quality, consistency, and operational integration of stakeholder contributions within organizational processes.

Similarly, the findings supported the assumptions of Contingency Theory, which posits that organizational effectiveness depends on the alignment between management practices and contextual conditions (Donaldson, 2001). In the context of Kenya's dental supply chain, the effectiveness of stakeholder involvement appeared to depend on contextual factors such as institutional coordination, technical competence, resource availability, and alignment of stakeholder interests. The findings therefore implied that stakeholder involvement may only strengthen the relationship between regulatory framework and dental supply chain performance when favorable organizational and environmental conditions exist to support effective collaboration and coordinated implementation of regulatory practices.

5.4 Conclusion

The study concluded that compliance requirements significantly enhanced dental supply chain performance in Kenya. Organizations that effectively adhered to procurement regulations, licensing procedures, quality standards, and reporting requirements experienced improved operational efficiency, product quality assurance, procurement reliability, and supply continuity. The findings demonstrated that compliance requirements were not merely legal obligations but strategic operational mechanisms that strengthened accountability, standardization, and coordination across Kenya's dental supply chain. Within the highly regulated dental healthcare environment, compliance practices contributed to reducing procurement irregularities, minimizing circulation of counterfeit dental products, and improving overall service delivery. The findings therefore confirmed that effective compliance systems constitute a critical determinant of dental supply chain performance within Kenya's healthcare sector.

The study further concluded that risk management significantly improved dental supply chain performance in Kenya. Organizations that implemented proactive risk identification, monitoring, mitigation, and contingency planning practices were better positioned to manage operational uncertainties associated with supplier unreliability, delayed procurement processes, counterfeit products, and regulatory disruptions. The findings established that effective risk management enhanced operational continuity, responsiveness, product quality assurance, and supply chain resilience within the dental sector. In the Kenyan context where dental healthcare services heavily depend on timely availability of safe and high-quality dental products, risk management emerged as an essential strategic capability for safeguarding procurement efficiency and maintaining stable healthcare service delivery. Consequently, the study concluded that risk management practices played a fundamental role in strengthening operational stability and performance within Kenya's dental supply chain.

Finally, the study concluded that stakeholder involvement did not significantly moderate the relationship between regulatory framework and dental supply chain performance in Kenya. Although stakeholder involvement remained important for consultation, coordination, and information sharing within the dental supply chain, the findings showed that it did not significantly strengthen the influence of compliance requirements and risk management on performance outcomes. The study established that the direct effects of compliance requirements and risk

management on dental supply chain performance remained strong regardless of the level of stakeholder involvement. The findings further suggested that inconsistencies in stakeholder engagement practices, differences in institutional priorities, and weak coordination mechanisms across supply chain actors may have limited the effectiveness of stakeholder participation in strengthening regulatory outcomes. The study therefore concluded that while stakeholder involvement remains relevant within the regulatory environment, effective compliance systems and proactive risk management practices were more critical drivers of dental supply chain performance in Kenya.

5.5 Study Recommendations

This section presents recommendations derived from the findings of the study. The recommendations are organized into managerial recommendations, policy recommendations, theoretical contribution, and recommendations for future research.

5.5.1 Managerial Recommendations

The findings of the study established that compliance requirements and risk management significantly improved dental supply chain performance in Kenya. Consequently, managers of dental clinics, referral hospitals, distributors, and suppliers should strengthen internal compliance systems by ensuring adherence to procurement regulations, product quality standards, licensing requirements, and reporting procedures established by regulatory agencies such as Kenya Medical Practitioners and Dentists Council, Pharmacy and Poisons Board, and Kenya Bureau of Standards. Organizations should also invest in continuous staff training on regulatory compliance, quality assurance, and procurement procedures to minimize operational disruptions and improve accountability across the dental supply chain. In addition, managers should integrate digital compliance monitoring systems to improve traceability, inventory control, procurement transparency, and reporting efficiency.

The findings further demonstrated that risk management significantly enhanced dental supply chain performance. Therefore, managers should establish proactive risk management systems focusing on operational risks, regulatory risks, supply disruption risks, and product quality risks that commonly affect Kenya's dental sector. Dental supply chain organizations should strengthen supplier evaluation mechanisms, diversify sourcing channels, maintain adequate stock levels, and adopt contingency planning practices to minimize shortages and procurement delays. In addition,

organizations should invest in digital inventory management and risk monitoring systems to improve supply chain visibility, responsiveness, and continuity of dental healthcare services.

Although stakeholder involvement did not significantly moderate the relationship between regulatory framework and dental supply chain performance, the findings suggested that stakeholder coordination remains important for improving communication and operational alignment within the dental supply chain. Managers should therefore strengthen structured engagement mechanisms involving suppliers, regulators, procurement officers, healthcare professionals, and distributors to reduce conflicting interests and improve coordination during implementation of compliance and risk management practices. However, stakeholder participation should be guided by clearly defined roles, technical competence, and operational accountability to ensure that engagement processes contribute meaningfully to supply chain performance outcomes.

5.5.2 Policy Recommendations

The study established that regulatory compliance and risk management significantly influenced dental supply chain performance within Kenya's healthcare sector. Consequently, government agencies and regulators should strengthen enforcement of quality assurance standards, procurement regulations, importation controls, and licensing procedures governing dental products and services. Regulatory agencies should also streamline approval and inspection processes to reduce bureaucratic delays that may disrupt procurement and distribution of dental supplies. In addition, policymakers should promote harmonization of regulatory requirements among healthcare oversight agencies to minimize duplication of compliance procedures and reduce operational inefficiencies within the dental supply chain.

The findings further suggested that operational and supply risks significantly affect continuity and efficiency within Kenya's dental supply chain. Therefore, policymakers should support development of national supply chain risk management frameworks for healthcare and dental products by promoting digital procurement systems, centralized monitoring platforms, and emergency supply coordination mechanisms. Government should also collaborate with private sector actors to strengthen local capacity for storage, distribution, and quality monitoring of dental products to reduce vulnerabilities associated with import dependence and supply disruptions. Furthermore, policy interventions aimed at reducing counterfeit and substandard dental products

should be strengthened through enhanced market surveillance, supplier verification systems, and stricter penalties for non-compliance.

5.5.3 Theoretical Contribution

The study contributed to theory by extending the application of Regulatory Compliance Theory, Stakeholder Theory, and Contingency Theory within the context of Kenya's dental supply chain. The findings confirmed the assumptions of Regulatory Compliance Theory by demonstrating that compliance requirements and risk management practices significantly improved supply chain performance within a highly regulated healthcare environment. The study also supported Contingency Theory by showing that organizational performance depends on the ability of organizations to align operational practices with prevailing environmental and regulatory conditions. However, the insignificant moderating effect of stakeholder involvement extended Stakeholder Theory by suggesting that stakeholder participation alone may not automatically strengthen organizational performance outcomes unless supported by effective coordination structures, technical competence, and institutional alignment. Consequently, the study contributed to existing literature by providing empirical evidence from Kenya's dental healthcare sector, an area that has remained relatively underexplored in supply chain and healthcare management research.

5.5.4 Recommendations for Future Research

Future studies should examine additional dimensions of regulatory framework beyond compliance requirements and risk management, including regulatory enforcement mechanisms, digital regulatory systems, and policy coordination within healthcare supply chains. Future researchers may also consider examining other moderating or mediating variables such as organizational culture, technological capability, institutional support, or supply chain integration in order to better explain variations in dental supply chain performance.

In addition, future studies should consider adopting longitudinal research designs to assess how regulatory changes and risk management practices influence dental supply chain performance over time. Comparative studies involving other healthcare sectors such as pharmaceutical, laboratory, or medical equipment supply chains may also provide broader insights into the role of regulatory systems in healthcare supply chain management. Finally, future researchers may employ mixed methods approaches to generate deeper qualitative insights regarding stakeholder dynamics,

operational challenges, and regulatory implementation experiences within Kenya's dental healthcare sector.

5.6 Limitations of the Study

Although the study made important theoretical and practical contributions to understanding regulatory framework and dental supply chain performance in Kenya, several limitations should be acknowledged when interpreting the findings. First, the study adopted a cross-sectional research design, where data were collected at a single point in time. Consequently, while the findings established significant relationships among the study variables, the design limited the ability to make strong causal inferences regarding the long-term influence of compliance requirements and risk management on dental supply chain performance. Second, the study focused specifically on organizations operating within Kenya's dental supply chain environment. Therefore, the findings may not be fully generalized to other countries or healthcare systems characterized by different regulatory structures, institutional environments, technological capabilities, and cultural contexts. In addition, the study relied primarily on self-reported perceptions from respondents, which may have introduced subjective bias despite the statistical tests conducted to minimize common method bias and enhance validity of the findings.

5.7 Chapter Summary

This chapter presented the discussion of findings, conclusions, recommendations, limitations of the study, and suggestions for future research based on the empirical findings obtained in Chapter Four. The chapter discussed how compliance requirements and risk management significantly influenced dental supply chain performance within Kenya's dental sector, while stakeholder involvement did not significantly moderate the relationship between regulatory framework and dental supply chain performance. The chapter further linked the findings to existing literature and the underpinning theories, namely Regulatory Compliance Theory, Stakeholder Theory, and Contingency Theory. In addition, the chapter presented managerial and policy recommendations, theoretical contributions, limitations of the study, and directions for future research aimed at strengthening understanding of regulatory systems and supply chain performance within healthcare environments.

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APPENDICES

Appendix I: Letter Of Introduction

LETTER OF INTRODUCTION

Strathmore University

P.O. Box 59857-00200

Nairobi, Kenya

Dear Sir/Madam

RE: REQUEST FOR PARTICIPATION IN DATA COLLECTION

My name is Adan Ali, a Master of Commerce (MCOM) student at Strathmore University. In partial fulfillment of the Master of Commerce degree, I am required to carry out a research project on a contemporary subject within my field of specialization. Among other activities, the project involves data collection and analysis. To collect data for my study, I will need to access data from you. I will ensure that the data collection process will not interfere with the normal operations. I will also follow the ethical guidelines of Strathmore University for conducting research involving human subjects. I am therefore requesting to gather information to be used in my research. The information I obtain from you will be used for the academic purposes only and will be kept confidential. The results of the survey will be in summary form and will not disclose any of the information given in any way. The research study is entitled "THE MODERATING EFFECT OF STAKEHOLDER INVOLVEMENT ON THE RELATIONSHIP BETWEEN REGULATORY FRAMEWORK AND DENTAL SUPPLY CHAIN PERFORMANCE IN KENYA"

I have attached a copy of a sample questionnaire for your review. I appreciate your time and consideration of my request. I hope to receive a positive response from you soon. I hope that you can assist by providing me with information. Thank you so much for your support, and may God bless you abundantly.

Yours faithfully,

Adan Ali

Appendix II: QUESTIONNAIRE

Dear Participant,

My name is Adan Ali, a Master of Commerce student from Strathmore University. I am conducting research to investigate the influence of regulatory frameworks and stakeholder involvement on the performance of the dental product supply chain in Kenya. This study is purely for academic purposes. I assure you that all the information provided in this survey will be kept confidential and anonymous. Your cooperation is highly appreciated. Thank you.

Kindly answer the questions by ticking the appropriate box or writing in the space provided.

Section A: Background Information

1. Role in the organization:
   ☐ Dentist
   ☐ Procurement Manager
   ☐ Supply Chain Manager
   ☐ Importer/Distributor
2. Years of experience in your role:
   ☐ Less than 3 years ☐ 3–5 years ☐ 6–10 years ☐ Over 10 years
3. Type of institution:
   ☐ Public Dental Clinics
   ☐ Private Dental Clinics
   ☐ Importers & Distributors
   ☐ Referral Hospitals
4. Frequency of engagement with dental product suppliers/importers:
   ☐ Frequently
   ☐ Occasionally
   ☐ Rarely
   ☐ Never

Survey Questionnaire for Users

Users (Units of Analysis)**:** Public Dental Clinic, Private Dental Clinics, Importers & Distributors and Referral Hospitals
Target respondents: Senior dentists / clinic managers, Procurement managers, and Supply chain managers.

Regulatory Framework

Instruction: Please indicate your level of agreement with the following statements regarding Regulatory framework and stakeholder involvement in your organization.

By ticking on the boxes provided ☑ based on your level of agreement and disagreement with the statement.
(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Compliance Requirements Statements	**1**	**2**	**3**	**4**	**5**
The compliance requirements for dental product procurement are clearly communicated to our facility.					
Our facility can easily interpret and implement the regulatory documentation required during procurement.					
The steps involved in meeting compliance requirements are streamlined and easy to follow.					
The regulatory compliance process fits well with our internal procurement workflow.					
The systems used for regulatory submissions (e.g., licensing, documentation uploads) are reliable and user-friendly.					
Updates or changes to compliance requirements are communicated in a timely and accessible manner.					

Risk Management Statements	**1**	**2**	**3**	**4**	**5**
The regulatory checks in place help reduce the risk of substandard or counterfeit dental products entering the supply chain.					
Our organization receives sufficient guidance on managing risks related to dental product procurement.					
The procedures for reporting quality or safety issues with dental products are clear and easy to use.					
Risk-related inspections and compliance checks are conducted in a predictable and transparent manner.					

Regulatory measures in place help ensure consistent quality across different brands and product categories.					
Communication regarding product recalls, alerts, or safety risks is timely and effective.					

Stakeholder Involvement

Instruction: Please indicate your level of agreement with the following statements regarding stakeholder involvement in your organization/project.

Please tick (✓)

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Stakeholder Involvement Statements	**1**	**2**	**3**	**4**	**5**
Participation in Decision-Making					
Our facility is engaged early enough in decisions that affect dental product regulation and procurement processes.					
Communication from regulators regarding requirements and procedures is clear and timely.					
We receive adequate information about updates that may affect procurement or product approval timelines.					
Regulators engage stakeholders when developing strategies to strengthen dental supply chain performance.					
Regulators provide timely responses to inquiries or issues we raise regarding compliance or approvals.					
Our input contributes meaningfully to shaping regulatory practices that affect the dental supply chain.					

Dental Supply Chain Performance

Instruction: Please indicate your level of agreement with the following statements regarding stakeholder involvement in your organization/project.

Please tick (✓)

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Dental Supply Chain Performance	**1**	**2**	**3**	**4**	**5**
Our procurement processes help minimize the total cost of acquiring dental products.					
Our supply chain adapts quickly to sudden changes in product demand.					
The procurement process responds effectively to urgent clinical needs.					
Dental products are delivered within expected timelines.					
Products received meet the required quality and safety standards.					
Overall satisfaction with the dental product supply process is high.					

QUESTIONNAIRE for Regulators (PPB, KRA, KEBS)

Dear Participant,

My name is Adan Ali, a Master of Commerce student from Strathmore University. I am conducting research to investigate the influence of regulatory frameworks and stakeholder involvement on the performance of the dental product supply chain in Kenya. This study is purely for academic purposes. I assure you that all the information provided in this survey will be kept confidential and anonymous. Your cooperation is highly appreciated. Thank you.

Kindly answer the questions by ticking the appropriate box or writing in the space provided.

Section A: Background Information

1. Role in the organization:
   ☐ Compliance Officer
   ☐ Quality and Safety Officer
   ☐ Inspection Officer
2. Years of experience in your role:
   ☐ Less than 3 years ☐ 3–5 years ☐ 6–10 years ☐ Over 10 years
3. Agency you work for:
   ☐ Pharmacy & Poisons Board (PPB)
   ☐ Kenya Bureau of Standards (KEBS)
   ☐ Kenya Revenue Authority (KRA)
   ☐ Kenya Medical Practitioners & Dentists Council (KMPDC)

4. Frequency of engagement with dental product suppliers/importers:
   ☐ Frequently
   ☐ Occasionally
   ☐ Rarely
   ☐ Never

Survey Questionnaire for Regulators (PPB, KRA, KEBS)

Target respondents: Compliance & inspection officers

Regulatory Framework

Instruction: Please indicate your level of agreement with the following statements regarding Regulatory framework and stakeholder involvement in your organization.

By ticking on the boxes provided ☑ based on your level of agreement and disagreement with the statement.
(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Compliance Requirements Statements	**1**	**2**	**3**	**4**	**5**
The compliance requirements for dental product procurement are clearly communicated to our facility.					
Our facility can easily interpret and implement the regulatory documentation required during procurement.					
The steps involved in meeting compliance requirements are streamlined and easy to follow.					
The regulatory compliance process fits well with our internal procurement workflow.					
The systems used for regulatory submissions (e.g., licensing, documentation uploads) are reliable and user-friendly.					
Updates or changes to compliance requirements are communicated in a timely and accessible manner.					

Risk Management Statements	**1**	**2**	**3**	**4**	**5**
The regulatory checks in place help reduce the risk of substandard or counterfeit dental products entering the supply chain.					
Our organization receives sufficient guidance on managing risks related to dental product procurement.					
The procedures for reporting quality or safety issues with dental products are clear and easy to use.					
Risk-related inspections and compliance checks are conducted in a predictable and transparent manner.					
Regulatory measures in place help ensure consistent quality across different brands and product categories.					

Communication regarding product recalls, alerts, or safety risks is timely and effective.					

Stakeholder Involvement

Instruction: Please indicate your level of agreement with the following statements regarding stakeholder involvement in your organization/project.

Please tick (✓)

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Stakeholder Involvement Statements	**1**	**2**	**3**	**4**	**5**
Participation in Decision-Making					
Our facility is engaged early enough in decisions that affect dental product regulation and procurement processes.					
Communication from regulators regarding requirements and procedures is clear and timely.					
We receive adequate information about updates that may affect procurement or product approval timelines.					
Regulators engage stakeholders when developing strategies to strengthen dental supply chain performance.					
Regulators provide timely responses to inquiries or issues we raise regarding compliance or approvals.					
Our input contributes meaningfully to shaping regulatory practices that affect the dental supply chain.					

Dental Supply Chain Performance

Instruction: Please indicate your level of agreement with the following statements regarding stakeholder involvement in your organization/project.

Please tick (✓)

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Dental Supply Chain Performance	**1**	**2**	**3**	**4**	**5**
Our procurement processes help minimize the total cost of acquiring dental products.					
Our supply chain adapts quickly to sudden changes in product demand.					
The procurement process responds effectively to urgent clinical needs.					
Dental products are delivered within expected timelines.					
Products received meet the required quality and safety standards.					
Overall satisfaction with the dental product supply process is high.					

Appendix III: Introductory Letter from Institution

Ole Sangale Rd, Madaraka Estate
P. O Box 59857 - 00200, Nairobi, Kenya
Cell: +254 703 034 414/6/7
X/Twitter/Tiktok: @SBSKenya
Facebook/Linkedin: Strathmore University Business School

Email: **sbsinfo@strathmore.edu** or visit **www.sbs.strathmore.edu**

Strathmore UNIVERSITY BUSINESS SCHOOL

18th December 2025

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – ABDI, ADAN ALI

This is to introduce Abdi, Adan Ali who is a Master of Commerce (MCOM) Student at Strathmore University Business School, admission number MCOM/171784. As part of our MCOM Programme, Adan is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MCOM course. To this effect, Adan would like to request appropriate data from your organization.

Adan is undertaking a research paper on **"The Moderating Effect of Stakeholder Involvement on the Relationship Between Regulatory Framework and Dental Supply Chain Performance in Kenya."** The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MCOM Programme seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Njoki Kiagiri
Manager – Graduate Programmes
Strathmore University Business School.

Strathmore Business School is a Proud member of:

Association of African Business Schools AABS EFMD AACSB

Appendix IV: Ethics Approval Letter

Strathmore UNIVERSITY

21st January 2026

Mr Abdi Adan,
adan.abdi@strathmore.edu

Dear Mr Abdi,

RE: The Moderating Effect of Stakeholder Involvement on the Relationship Between Regulatory Framework and Dental Supply Chain Performance in Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC3269/25.** The approval period is from **21st January 2026 to 20th January 2027.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, and MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification
iv. Any changes, anticipated or otherwise, that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix V: NACOSTI Permit