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Nexus Between Green Financing Initiatives and the Financial Performance of Listed Banks in Kenya

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LIST OF ABBREVIATIONS

AFD	French Development Agency
AGF	African Guarantee Fund
AUR	Asset Utilization Ratio
CBK	Central Bank of Kenya
CRM	Climate Risk Management
CSR	Corporate Social Responsibility
FP	Financial Performance
GAHF	Green, Affordable Housing Finance
GAI	Green Financing Awareness Initiatives
GFI	Green Financing Initiatives
GBI	Green Banking Initiatives
ICAAP	Internal Capital Adequacy Assessment Process
IETA	International Emissions Trading Association
IFC	International Finance Corporation.
KES	ISO Code of Kenyan Shilling currency
KGFT	Kenya Green Finance Taxonomy
MSMEs	Micro, Small, and Medium-sized Enterprises
OMFIF	Official Monetary and Financial Institutions Forum
PLS-SEM	Partial Least- Structural Equation Modelling
RBV	Resource-Based View Theory
ROA	Return on Assets
ROE	Return on Equity
SFI	Sustainable Financial Initiative
UNFCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
IFRS	International Financial Reporting Standard

1. INTRODUCTION

1.1 Research Background

Climate change continues to pose a significant threat to the global economy, compelling financial institutions such as banks to actively integrate sustainability into their business models. Amid this shift, green financing, which for the purpose of this dissertation I define simply as the practice of allocating capital towards environmentally sustainable activities has emerged as a pivotal strategy for banks aiming to align profitability with environmental responsibility. While banks across the globe are embracing these practices, limited and inconsistent empirical evidence exists regarding their actual financial implications particularly within emerging economies such as Kenya. This dissertation seeks to investigate how green financing initiatives impact the financial performance of banks listed on the Nairobi Securities Exchange (NSE), providing crucial insights into whether environmental responsibility translates into enhanced financial success. This chapter focus on laying a solid background for this study, clearly identifying the research context by exploring the development of green financing including its underlying key principles, how it relates to the banking context cascading down to its practice in the Kenyan Banking contexts, the existing research problem, study significance and the research hypotheses this study seeks to test.

1.1.1 Development of Green Finance

The climate change crisis as one of the notable market failures the world has witnessed, has been a long-lasting challenge confronting humanity across the globe (XIE et al., 2023; GEBBISA and BACSI, 2025). The accelerating increase in greenhouse gases can be attributed majorly to the increased consumption of fossil fuels and massive industrialization (BOZSIK et al., 2024; SALEEMI et al., 2024). SYED and ALOLA (2023) notes that as a result, economies and international organizations globally, have resolved towards development approaches that are linked to sustainable growth.

The United Nations seeks lower the global temperature below to 1.5 degrees Celsius above the pre-industrial levels by the end of this century (JHA and DEV, 2024). Pursuant to this goal, UN member countries across the globe have continued to engage into eco-friendly initiatives to As a result, various nations in both

developed and developing economies have taken initiatives that align with this goal (PROSKURYAKOVA, 2024).

In the endeavor to build resilient economies and support the green transition, significant investments are needed from both public and private sectors (LUI et al., 2021). The financial resources needed in pursuing environmentally friendly sustainable developments is what is referred as green finance (HO et al., 2024). Climate finance, carbon financing, environmental finance among others are some of other alternative words used interchangeably (MUCHIRI et al., 2022b). Based on the (UNEP, 2018) definition, however, in addition to climate adaptation and mitigation, green financing incorporates other financial flows meant for other environmental benefits such as biodiversity, waste and pollution management. While Climate finance primarily focuses on mitigation and adaptation projects, green financing covers a wider scope of other environmentally conscious investments. Green financing is, however, broader as it incorporates other financial investments that provide environmental benefits beyond adaptation and mitigation projects. It encompasses various mechanisms and instruments, including green bonds (NEHMET and BINYAT, 2024), green credit and securities, green investments and insurance (RASHEED et al., 2023). According to OUYANG et al. (2023), green financing is considered the intersection between the environment and economic growth. RASHEED et al. (2023) and GUO et al. (2024) add that green financing enhances and builds resilient economies by integrating sustainable practices into the financial system.

GUANG-WEN and SIDDIK (2022) note that environmental responsibility is considered a critical aspect of Corporate Social Responsibility. Various studies including MAJEAN (2022) and TSAI (2020) identify the 3 major pillars of Corporate Social Responsibility (CSR) as economic, social and environmental responsibility. Previous studies including GUANG-WEN and SIDDIK (2022), COELHO et al. (2022) and MUCHIRI et al. (2022a) among others established that CSR is positively related to bank's financial performance. Others have examined CSR and Green financing together. LI and YANG (2022) argues that green financing and CSR are promoted mutually. A study by DAI et al. (2022) examined the effect of CSR and Green Financing dimensions on the environmental performance of Private Banks in Bangladesh. Using the SEM approach, the study established a positive relationship between CSR, green financing and environmental performance. Green financing is, therefore, considered a critical aspect of CSR.

1.1.2 Key Principles of Green Financing

To further enhance better understanding of the concept of green financing, it is important to note the key principles of green financing that previous literature has highlighted. Multiple studies identify environmental protection and sustainability as a key concept of green financing (VESNA, 2023; TANEJA and REEPU, 2023; XIONG and DAI, 2023). SAHOO et al. (2024) emphasizes green investments must be geared towards reducing carbon footprint or promote environmentally friendly activities such as those related to conservation, pollution management and investments in renewable energy, among others. AKOMEA-FRIMPONG et al. (2022) add that such can be achieved by exploring diverse financial instruments including green investment funds, green bonds and climate risk insurance.

KAUR (2023) and DADABADA (2024) emphasize the integration of financial evaluations into ESG (Environmental, Social and Governance) factors as a key principle of green financing. YE and TIAN (2025) argue that the integration of ESG enhances both sustainability and financial outcome. The importance and relevance of sustainability reporting is growing in the wake of green compliance (GOMBKÖTŐ, et al., 2025). BAŞARIR and BAŞARIR (2023) and SHARMA et al. (2023) point out the alignment of green finance with sustainable development goals that foster long-term economic growth without compromising environmental integrity as a key characteristic. XIONG and DAI (2023) and SAHOO et al. (2024) add that such is highly effective when green finance supports technological advancements and innovation that contributes to environmental sustainability such as resource-saving technologies and advancements in renewable energy. MAHOMED and MOHAMAD (2025), and ALEKNEVIČIENĖ and BENDORAITYTĖ (2023) argue that for green financing to be effective, it must be supported by robust regulatory oversight and policy frameworks to prevent greenwashing and promote compliance.

1.1.3 Green Financing in the Banking Context

Financial institutions like banks across the globe are at the center of allocating resources for green investments. A survey by OMFIF (s.a.) revealed that 70% of regulators and central banks consider climate change as a major threat to financial stability. As a result, it is expected that more banks are likely to incorporate climate-related stress testing into the routine stress tests for loans. A study by KHUDYAKOVA and URUMOV (2021), seeking to investigate national green initiatives among BRICS economies revealed that all countries have integrated

green financing into their national strategies through financial regulators and central banks. A study by CHENGUEL and MANSOUR (2023) revealed that banks across the globe including banks such as Deutsche Banks, BNP Paribas, Hong Kong-Shanghai Banking Corporation and Society in general have not only encouraged the adoption of green practices but also have funded businesses directly.

Banks, however, must evaluate the risks associated with green credit including physical, transition, and liability risks. Based on their internal strategies, banks must evaluate how much green credit to offer to borrowers and such decisions must involve striking the balance between supporting environmentally sustainable projects and mitigating exposures to financial losses. A study by TARA et al. (2015) suggests that banks must apply sustainability criteria in their lending practices to exploit opportunities that come along with green credit, manage environmental risks, and enhance their reputation.

Banks occupy a unique position as far as the fight on climate change is concerned. Banking institutions play a critical role influencing customers' behaviour and decisions. Based on the PLS-method, a study by STAUROPOULOU et al. (2023) analyzed 1,084 questionnaires and established a positive relationship between banks SDG and customers loyalty, trust and perceived fairness in pricing policies. Banks like other institutions would seek to pursue strategies that lead them to optimal profitability. They must be highly accountable in their lending activities as they use customers' deposits. Commercial banks earn their revenue from the interest income from loans but must also pay costs for holding capital, fixed costs as well as the cost of bad debts. Among other factors, banks must enhance their ability to reduce the cost of bad debts to achieve optimal profitability. THOMPSON and COWTON (2004) points out that in the era of escalating climate change, environmental risk is currently recognized as one of the most important factors that banks must take into consideration as it influences the overall credit risk.

On the other hand, climate change has also opened business opportunities for the banking sector. The growing interest across the globe to mitigate climate change has given rise to a new target group of green entrepreneurs which banks can target to expand their market. BAO and HE (2022) add that, with government incentives, commercial banks across the globe are likely to grow their interest in financing energy efficient and renewable projects in an endeavor to make profits while still addressing the climate change challenge. A study by PAULET et al. (2015) however argues that, like other institutions, banks seek to enhance their reputation as

such increases their revenues and market share. The authors also add that banks' responsibilities go beyond financial gains and extend to environmental and social concerns, especially after increased concerns about bank ethics following the financial crisis of 2008. The demand for more environmental and social responsibility for banks has increased the pressure for banks to be more accountable for their decisions and actions as the banks decisions affects their reputation (KHAN et al., 2023).

YAMEEN et al. (2024) notes that on matters of green financing for banks, the critical question is how to balance between the opportunities and risks involved. It is argued that environmental goals rank behind profitability goals for businesses and, therefore, government subsidies and incentives need to be in play to encourage banks to focus more on potential opportunities than risks.

1.1.4 Green Financing in the Kenyan Banking Sector

Kenya, among other nations in Africa and globally, has scaled up its climate actions both at national and sectoral levels. The leadership of the Kenyan banking sector is cognizant of the devastating impacts of climate change and has provided the necessary leadership on this issue. This section highlights some of the major milestones achieved in green financing in the Kenyan banking sector.

On 15th October 2021, the Central Bank of Kenya (CBK) issued guidance on the management of climate-related risks by the banks to help Kenyan banks to integrate risk management into their strategies, governance, disclosure requirements and risk management frameworks. In a report issued by the current CBK governor (2021), Patrick Njoroge stipulates that the Kenyan banking sector leadership is cognizant of the major climate risks the banking world across the globe is facing, including physical risks, transition risks and the liability risks associated with climate change.

Physical risks arise from losses or damage caused by events that are weather- or climate-related, such as droughts and floods (SARRAF, 2022). Transition risk emanates from changes towards a low-carbon economy, rendering some bank assets obsolete or stranded, while liability risks arise from banks being litigated for financing projects or companies whose activities damage the environment.

Nevertheless, some of the opportunities related to climate change available for exploitation by Kenyan banks include access to new markets, development of new green financing products and services, resilient infrastructure, and housing. In this regard, the vision of the Kenyan banking sector is to have a banking sector

which not only provides banking services to the customers but also takes into consideration governance and social and environmental welfare. Kenya looks forward to a state where all financial services are green. In this regard, notable milestones have been achieved.

In the year 2015, the Kenya Bankers Association (KBA) launched the Sustainability Finance Initiative (SFI), which is an online training program aiming at promoting awareness on governance, social and environmental risks, as well as related financing within the banking sector. Currently, 44 banks in Kenya are enrolled on the program, and more than 44,000 bankers have participated so far. The training is still ongoing.

In January 2020, Acorn Group, a Nairobi-based real estate company, became the first one in Central and East Africa to issue the first corporate green bond worth KES 4.3 billion. The bond was admitted to the London Stock Exchange (LSE), an international market for securities and listed at the Nairobi Security Exchange (NSE). The proceeds of the bond were utilized in constructing environmentally friendly hostels for university students. Later in November of 2020, Kenya Commercial Bank (KCB), the largest bank in Kenya, was accredited by the Global Climate Finance (GCF) as the intermediary bank for the implementation of green finance in the East African Region. Currently, the Kenyan banking sector is working towards enhancing the banking capacity to integrate climate-related risk management into daily banking operations.

1.1.5 Climate-Related Risk Management Actions Among Kenyan Banks

The financial risk related to climate change has continued to increase the credit risk in the Kenyan banking sector, particularly due to increased cases of landslides, severe floods, droughts, and forest fires, which impair supply chains and destroy assets that borrowers use as collateral for loans. Kenya is one of the emerging markets in Sub-Saharan Africa, and most lenders heavily rely on physical collateral to access credit. The extreme weather conditions also increase banks' operational risks due to disruption on business continuity that may result from negative effects on bank systems, staff, processes, and infrastructure. In light of these risks, the Kenyan Banking sector, under the guidance of the Central Bank, has taken several initiatives in managing this risk (CBK GUIDANCE, 2021).

In 2013, CBK introduced the Internal Capital Adequacy Assessment Process (ICAAP) for the banking sector, where banks are required to maintain sufficient capital that is commensurate with their material risk, including climate-related risks. Later in 2015, the Kenya Bankers Association (KBA) introduced the SFI e-

learning program to educate the bank staff to embrace banks' sustainable practices. In 2019, CBK introduced the Kenya Banking Sector Charter, which is anchored on four main pillars, including ethical banking, transparency, risk-based credit pricing and consumer centricity. Although banks, among other institutions, traditionally approached climate change from a CSR approach, some banks in Kenya today publish sustainability reports disclosing their progress on the management of climate risk. Through the CBK guidance, banks' attention is drawn to implementing a comprehensive risk management framework that makes them ready to respond to the climate-related risks, including physical risks, liability risks and transition risks. At the same time, banks are called upon to identify and exploit opportunities that arise as a result of the climate change transition as a result of shifts in producer and consumer preferences.

1.2 Problem Statement

The world has continued to experience rising global temperatures due to increased carbon-intensive industrial activities. Kenya is part of the Sub-Saharan Africa that is least responsible for emission of carbon footprint to the environment yet the highly vulnerable region to the impact of climate change. Kenya is already experiencing cases of extreme weather conditions including recurring cases of floods and prolonged droughts, landslides, and forest fires especially in the highland's parts of the country.

The banking sector, given its nature, is at the heart of facilitating industrial activities that damage the environment through lending activities. Previous studies have pointed out that banks participate indirectly in damaging the environment by facilitating industrial activities that harm the environment (JULIA and KASSIM, 2016). The banking sector across the globe has however shown their willingness to promote green transition by introducing green banking practices and green financial products even in light of limited standardized regulation across different regions. The Kenyan banking sector is one of those which have embarked into green financing initiatives at the national and sector level.

Although there are many studies conducted on green finance, there is less focus on the role of the banking sector in the fight against climate change. Majority of the previous studies focus on examining the relationship between green financing and banks' overall financial performance but there is a scarcity of studies seeking to examine the current progress of implementation of green financing initiatives and how such relate to environmental performance. Despite the major initiatives taken by the Kenyan banking sector including

issuing of green bonds, implementation of the SFI program, introduction of the Internal Capital Adequacy Assessment Process (ICAAP) as well as the Kenya Banking Sector Charter, publication of the Kenyan Green Taxonomy, the current implementation of the IFRS S1 and S2 to standardize sustainability and climate financing reporting, there is no single study conducted regarding the examination of the current implementation status, the effect such initiatives has on the banks environmental and financial performance, or studies seeking to provide insights on the current challenges and opportunities the Kenyan banking sector is facing. In addition, previous studies have focused on examining the nexus between green financing and overall financial performance. It is, however, my argument that the overall financial performance of banks is affected by many factors other than their green initiatives and correlating green financing initiatives with the overall financial performance metrics could be ambiguous and can lead to misleading results.

As such this study seeks to add to the existing body of knowledge on the bank's green financing practices by examining the nexus between the bank's progress on green financing initiatives and the financial implications as a result of the green financial initiatives undertaken by the listed banks. The predictor variables included in the conceptual model of this study include the green financing Awareness Initiatives, integration of climate risk management into the bank's risk management framework and adoption of in-house green banking practices. The bank's financial performance of the banks will be measured by the growth rate of green loans, cost savings associated with green financing strategies, improvements in credit risk management, bank reputation, improved financial position, and strategic initiatives that are taken by the banks likely to enhance their future financial performance.

1.3 General Research Objective

The general objective of this study is to examine if the green financing initiatives undertaken by the banks influence their financial performance positively and if the size or type of banks alter this relationship while at the same time comparing the outcome of the observed Kenyan context to the global observed pattern on how green financing initiatives interacts with banks financial performance.

1.4 Specific Research Objectives

The dissertation was guided by the following specific objectives.

1) Examining the extent to which green financing awareness influence the banks' green financing strategy and how it influences the banks' financial performance.
2) Assessing the extent to which green banking practices influence the collective green financing strategy of the banks and how it influences the bank's financial performance.
3) Exploring how the integration of the CBK guidance on Climate Related Risk Management contributes to the overall green financing strategy of the banks and how it influences the bank's financial performance.
4) To examine if there is any statistically significant difference between how green financing initiatives interact with banks' financial performance for different bank sizes and types of ownership.
5) Comparing how the relationship between green financing and banks financial performance in Kenya compares to the global context based on a quantitative approach.

1.5 Research Hypothesis

The study sought to pursue the following study hypothesis.

1) 1a. Climate Risk Management (CRM) contributes significantly to the collective Green Financing Initiatives.
2) 1b. Climate Risk Management (CRM) positively impacts Financial Performance (FP).
3) 2a. Green Banking Initiatives (GBI) contribute significantly to Green Financing Initiatives (GFI).
4) 2b. Green Banking Initiatives (GBI) positively impact Financial Performance (FP).
5) 3a. Green Financing Activities (GFA) contribute significantly to Green Financing Initiatives (GFI).
6) 3b. Green Financing Activities (GFA) positively impact Financial Performance (FP).
7) 4a. Green Financing Initiatives (GFI) collectively positively impact Financial Performance (FP).
8) 5a. The impact of Green Financing Initiatives (GFI) on Financial Performance (FP) is significantly different between small and large banks.
9) 5b. The impact of Green Financing Initiatives (GFI) on Financial Performance (FP) is significantly different between foreign and locally owned banks.
10) 6. The impact of green financing on banks' financial performance in Kenya significantly differ from the global observed outcome as measured by effect sizes.

1.6 Significance of the Study

This paper adds to the existing body of empirical evidence literature on the financial implications of green financing, especially in filling the existing African context gap. The study provides great insights regarding the role of banks in fighting climate change. The findings of the research also provide useful scientific insights for policymakers, especially in developing economies such as Kenya and beyond, on the development of green financing strategies as well as the financial implications of such activities on the banks. Given the increased emphasis on climate finance across the globe, the findings of this study can inform policy frameworks seeking to accelerate green investments and sustainable banking practices. By exploring the interaction between green financing practices and banks' financial performance, this study provides valuable insights with potential to shape policies that promote the integration of sustainable banking practices without compromising financial stability. Besides, the findings of this study can be useful for scholars interested in exploring this area.

1.7 Dissertation Organization

This study is organized into five chapters. Chapter 1 creates the research context and identifies the research problem, research purposes, objectives, hypotheses, and significance of the study. Chapter 2 entails a review of literature by other authors on the subject matter under study, providing a theoretical foundation and empirical evidence of the previous studies. Chapter 3 details the research design, materials and methods adopted in the study. The chapter expands on the philosophical orientation adopted, sampling techniques, development of the questionnaire tool and statistical techniques for analysis. Chapter 4 presents the study results accompanied by a detailed discussion of the research findings, which include quality criteria tests and results for model and structural models, hypothesis testing and multi-group analysis. Chapter 5 describes the findings and discussions. Chapter 6 captures the major conclusions drawn from the study's key findings and discussion and also identifies the study's limitations and scope for future research recommendations. Chapter 7 presents the novel new scientific insights aligned to the study's objectives and hypothesis results.

1.8 Conceptual Framework

The main predictors of financial performance as depicted in the conceptual framework include bank's green financing awareness initiatives (GAI), in-house green banking practices and climate-related risk management initiatives. The three major categories of green practices inform the banks collective green financing initiatives

(GFI). The impact of the green financing initiatives was assessed based on how they affected banks' business opportunities in terms of enhancing their reputation, efficient management of operational expenses and cost savings, access to international market, diversification of banks' portfolio and improvement of banks' financial position. In addition, the study also examined if bank size and type of bank ownership mattered in determining how the collective green financing initiatives influenced banks financial performance. Table 1 below shows the variable operationalization table while Figure 1 below shows the research framework adopted.

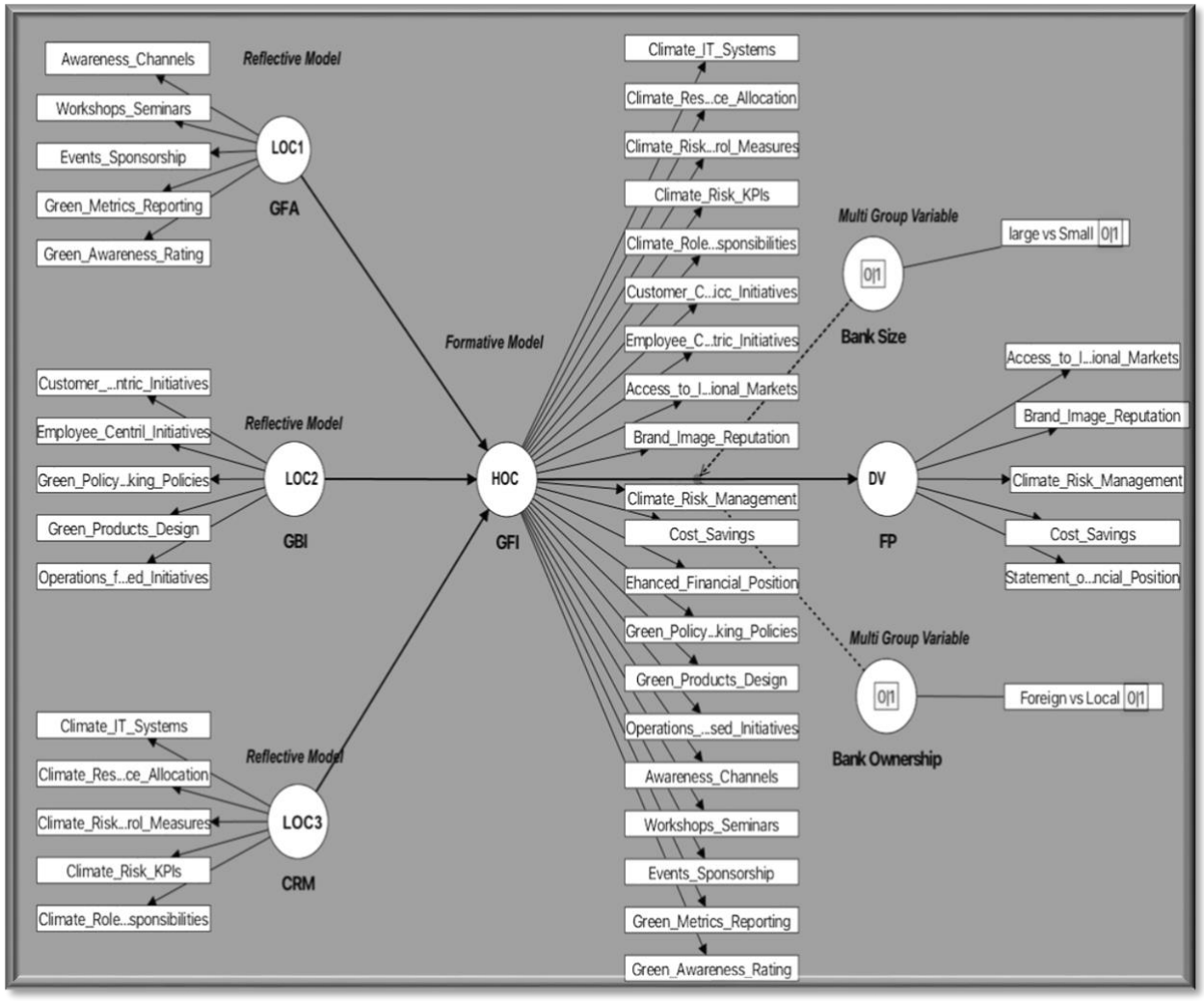

Figure 1: Conceptual Framework

Source: Author's work

Table 1: Variable Operationalization Table

Variable	Operationalized Items	Authors
GFA	• Training banks employees on green financing. • Availability and utilization of effective channels for creating awareness on green financing products. • Banks partnerships and collaborations with other stakeholders in promoting green financing. • Initiatives to educate investors about green financing products.	SFI (2015), SIEMIONEK-RUSKAŃ et al. (2022)
GBI	• Reduction of paper usage in banking activities. • Support for technologies that help customers access banking services online. • Use of green credit cards. • Issuing green loans. • Reducing usage of equipment by emitting high volumes of carbon footprint. • Burning usage of high carbon-intensive equipment. • Green banking practices into their investment policies, financial strategies, and daily operations and promoting CSR activities. • Employee Related Practices • Customer Related Practices • Operations Related Practices • Banks Policy Related Practices	CHEN et al. (2022a), SHAUMYA and ARULRAJAH (2016), CHARIRI et al. (2018), RISAL and JOSHI (2018)
CRM	• Setting of banks climate-related financial risk appetite. • Policy related initiatives and developments concerning climate-related issues. • Clearly defined roles and responsibilities for each business and functional unit. • Availability of documented policies and procedures which enable climate-related risks to be managed in a proactive manner. • Adaptation of IT systems that comprehensively collect and aggregate the necessary data to facilitate effective assessment of risk exposures. • Availability of control measures for sectors which do not align with the banks' climate strategy or risk appetite, such as imposing limitations, setting lending thresholds. • Banks have climate-related information disclosure framework.	CBK GUIDANCE (2021), CHEN and ZHAO (2022), TARA et al. (2015), SARRAF (2022)
FP	• Increased financial position due to green financing loans. • Better management of banks expenses. • Effective management of credit risk and uncertainties • Strategic investments in green financing are likely to result in future financial future growth. • Banks have gained a diversified portfolio of their financial products. • Increased banks' reputation due to implementation of sustainability initiatives.	STAUROPOULOU et al. (2023), PAULET et al. (2015), XU et al., (2020), BIMHA and NHAMO (2017), MIROVIC et al. (2023), TRUMPP et al. (2015), DE VILLIERS et al. (2022)

Source: Author's work

2. LITERATURE REVIEW

This chapter reviews empirical and theoretical literature that informs the proposed study model. The first section lays down the theoretical foundation which informs the nature of the relationship between green financing and financial performance.

2.1 Theoretical Review

This section focuses on presenting theories anchoring the main objectives of the study. The resource-based view (RBV) and the legitimacy theory are presented. Arguments by other authors on the theories concerning how they inform the study is presented.

2.1.1 The Resource-Based Theory (RBT)

This theory was introduced by Barney in the year 1991 as a management framework theory based on the premise that the capability of firms to remain competitive over other players in the industry is determined by the firm's ability to acquire or create resources that are un-substitutable (BARNEY et al., 2011). KHANRA et al. (2021) argue that with the growing interest by multiple stakeholders towards sustainable practices and investments, green financing and innovation could become a valuable resource that firms can explore in enhancing their competitive advantage. ZHOU et al. (2020) note that the RBV theory has been widely used in examining the role capabilities and resources play on product innovation and how such affects the overall firm's financial performance.

Although majority of studies have focused on technological capabilities and human capital as the most valuable resources for an organization, some have argued that financial resources is one of the most important internal resources that firms can optimize to gain competitive advantage over their competitors. NGUYEN et al. (2023) argue that based on the perspective of this theory, firms with idle financial resources are better placed to utilize the financial resources to finance sustainable investments, especially with the growing international and national pressure for sustainable practices by various stakeholders including governments, investors, and customers.

In addition, international organizations, including the World Bank, the United Nations and the European Union, require member countries to integrate sustainability goals into their financial systems. Engaging in green projects such as those in the renewable energy sector, climate adaptation, mitigation,

biodiversity and other related climate change projects, therefore, provides opportunities for firms to gain more economic benefits while at the same time pursuing social and environmental goals (KHATTAK, 2021). The RBV theory therefore supports the notion that banks can leverage on climate risk management and green banking practices to develop strategic capabilities that can enhance their financial outcomes and competitive positioning, especially in light of the prolonged need to manage transition and physical risks the banks are exposed to.

2.1.2 The Legitimacy Theory

The legitimacy theory is based on the premise that companies strive to maintain their legitimacy by aligning their strategies, policies and values to community values (DOWLING and PFEFFER, 1975). In this context, green financing by banking institutions can be seen as banks' strategies in maintaining their legitimacy, especially in the modern business environment where customers and other stakeholders are conscious of the effect of a firm's activities on sustainability. KHAN et al. (2023) argue that through financing green investments, banks impact the environment positively by reducing the carbon footprint to the environment. Through such initiatives, banks can enhance their reputation and therefore increase their competitive advantage. Successful positive impact on the environment will eventually reflect in the bank's value, as argued by (CHARIRI et al., 2018). This theory especially supports the notion that banks can gain more social acceptance and maintain their legitimacy among various stakeholders through engaging in green lending activities and green awareness campaigns to build public trust which more likely reflects on banks financial performance in the long run.

2.1.3 Stakeholders and CSR Theories

The stakeholder theory was proposed by Edward Freeman in 1984 and stipulates that the decision-making process of organizations should not only consider shareholders interest alone but also other stakeholders such as government, community, environment, suppliers' customers among others (KIVITS and SAWANG, 2021). Based on this premise, the theory suggests that the long-term success of a company should focus on maintaining a positive relationship with a wide range of stakeholders through engaging in sustainable business practices, ethical and environmentally responsible behaviour (MELÉ, 2009). The stakeholder's theory agrees with the

CSR theory by Carroll (1991) which emphasizes that firms have duty to integrate social and environmental concerns into their business interactions and operations with stakeholders (OKADA, 2017). These two theories provide a strong conceptual lens to this study as banks do not operate in a vacuum but rather serve multiple stakeholders including customers who are either borrowers or depositors, investors, regulatory bodies such as KBA, CBK, employees, the community and the environment in which they operate. The bank's engagement in green financing activities is therefore not only an environmentally and ethically driven initiative but is also strategically aligned to long-term profitability. By addressing all stakeholders' interests, banks strengthen their legitimacy, foster trust and enhance their long-term performance. This theory, therefore, supports the argument that banks ought to take into consideration the interests of all the stakeholders not only the shareholders including the employees through inhouse green banking activities, the environment through ethical sustainability and green lending practices.

2.2 Empirical Review

This section entails an in-depth evaluation of the existing literature relevant to the current study. The relevant studies are summarized in a tabular format at the end.

2.2.1 Role of Banks in Climate Change

Banks are well-placed to create a positive change in the environment. Banks can increase the momentum to fight climate change in various ways, such as funding and adopting green banking practices, such as reducing paper usage, investing in renewable energy for buildings and investing in IT technologies that support access to remote banking services (TANEJA and ÖZEN, 2023). Banks can also play a great role in creating awareness among their customers and encouraging them to protect the environment by adopting sustainable practices. The banks can achieve this by embedding sustainability into their products, such as customized loans for green products such as electric and hybrid cars, green mortgages, green bonds and offering loyalty points to customers as incentives to engage in low-carbon lifestyles and low-carbon farming practices (CUI, 2017).

Banks' response across the globe to the COVID-19 pandemic demonstrated that they can be adaptive and flexible to address the current challenges that affect their customers (KRALL, 2022). If banks would adopt a net-zero emissions balance sheet by financing investments aligned to the transition of greener economies,

such strides would stimulate customers to opt for sustainable projects while seeking banks' financial mechanisms (BANKTRACK, 2023).

Past literature reveals that consumer behaviour accounts for 70% of CO_2 emissions. A study by AHMAD et al. (2022) explored that the financial inclusion, energy use, and gross domestic product seem to have driven the increase in CO_2 emissions in ASEAN countries. CHENGUEL and MANSOUR (2023) argue that consumption is enabled by money, which is handled by financial institutions such as banks, placing financial institutions in a strategic position to gather information about customer preferences and consumption patterns. Such transaction data can be leveraged to show the customers how their lifestyle choices contribute to climate change by calculating carbon emissions based on their lifestyle behavior. Besides, the banks can provide advice to their customers on how they can reduce their carbon emissions through integrating sustainability practices into their financial management. LIIKAMA (2021) argues that banks can entice their customers to consumer environmentally friendly products and services through offering loyalty schemes for cutting carbon footprint. In addition to such loyalty schemes, banks can also utilize digital tools that integrate customers' sustainability scores in the calculation of credit interests.

2.2.2 Green Financing in Sub-Saharan Africa (SSA)

Green financing has gained popularity as an effective resource in combating the negative effects of climate change especially after the Paris Agreement of 2015. PHAM et al. (2019) argued that the Paris global agreement increased the risk of return for the stocks of polluting sectors. CONLON et al. (2024) note that globally countries are committed to pursuing their national environmental goals which they have published publicly as NDC reports. RASHEED et al. (2023) add that green financing facilitates long-term growth and sustainable development while ATTWELL (2023) notes that sustainable bonds have played an important role in bridging Africa's green financing gap although the continent still faces scalability handles.

A study by HUANG and LUAN (2024) argue that green investments have proved effective in combating carbon emissions at both national and international scales while another study by XU et al. (2020) established a positive relationship between green financing and green performance of enterprises. HÁGEN and AHMED (2024) investigated the complex link between carbon emissions, firm value, and financial choice. Following the spirit of the Paris agreement, countries across the globe have taken initiatives to allocate more

financial resources to adaptation and mitigation projects and investments although these initiatives have experienced huge green financing gap (SAHOO et al., 2024).

Based on the UNEP report of 2015, the world is striving to achieve a global temperature of below 2 ˚C with a specific goal of achieving a temperature level of 1.5 ˚C above pre-industrial levels by the end of 2030. In this endeavor, the SSA region has been receiving financial support from developed nations through the global climate finance fund. Based on the Paris Agreement of 2015, developed nations pledged to contribute 100 billion USD annually to the global climate finance fund to support developing economies in Africa which glares at unimaginable trouble should the climate change problem continue to escalate.

HISHAMUDDIN et al. (2024) highlights that insufficient financial resources have been a pressing challenge for the global economy as countries engage in activities seeking to achieve the UN SDGs, but this problem is more prevalent in developing economies such as Africa. This agrees with the argument of EDENHOFER et al. (2011) who argued that Africa due to her weak institutions is at a great risk as the climate crisis continues to worsen.

Sub-Saharan Africa (SSA) region is the least responsible for global climate change yet the most vulnerable to its consequences. According to a report by the Global Funds Update (2021), the SSA region contributes about 4% of global greenhouse emissions (GHG). Many countries in this region are struggling with extreme weather conditions which affect their food security. This situation is made even worse by the fact that 95% of the SSA agriculture is rain-fed yet the agricultural sector in the region contributes significantly to their share of GDP (WATSON and SCHALATEK, 2020). This does not only put the SSA population vulnerable to the challenge of food security but also threatens employment opportunities for agriculture-related activities. Developing nations still, are highly dependent on the international climate funds in implementing their mitigation and adaptation projects exposing them more to potential severe consequences of climate change as the mobilization of these funds is highly vulnerable to political dynamics making the global climate fund an unreliable source of climate financing (MUCHIRI et al., 2022b). The UNFCC estimates that a total of USD 125 trillion in direct capital investments are needed by 2050 in transforming the global economy to be environmentally friendly. Out of the USD 125, USD 32 trillion is needed by 2030. Sub-Saharan Africa alone requires USD 1.7 trillion of these investments by 2030 to transition its economy to be climate resilient which

is roughly 100% of its SSA's GDP as of 2020. Based on these estimates, it means that SSA requires USD 170 billion every year which is more than the annual pledge mobilized through the Global Climate Finance Fund. The renewed pledges at COP 26 by 2025 totaled USD 40 billion, which is lower than the UNEP estimated cost of USD 70 billion for adaptation in developing countries. The current levels of green finance challenges channeled to the SSA region are insufficient in meeting this demand, exposing the SSA population to great potential danger of climate change.

Furthermore, there exist regulatory handles that the region faces in accessing climate change funds. Countries are required to align their economic development plans and climate change agendas to become eligible to access the funds. This has been a major hindrance to some countries in the region which have tried to access these funds without success.

According to WATSON and SCHALATEK (2020), there is a global consensus among the leading world donors to stop the financing of projects that are carbon-intensive, especially those that are coal or upstream oil powered. For instance, China withdrew its financing for a coal power plant based in the Limpopo province of South Africa. KALU et al. (2022) argue that moving forward, fossil fuel projects are more likely to face difficulties in getting guarantees for investments and experience high political insurance risk.

Some countries such as Kenya, the Democratic Republic of Congo, South Africa, Ghana, Zambia, and Gabon however are set to benefit from de-carbonization and climate change mitigation in key sectors such as agriculture, natural gas, construction, transport, mining, and power. Despite the huge green financing gap, still, some countries in the region managed to secure important transition deals. South Africa, which is Africa's most industrialized economy and the highest CO_2 emitter in the region, secured a USD 8.5 billion climate finance swap deal under an energy transition partnership with the European Union, the United States, and other individual countries in the EU to close some of its coal-powered plants and replace them with renewable projects.

COP26 opened more opportunities for SSA countries to tap more green financing opportunities in voluntary carbon markets (ADEDOYIN et al., 2023). The International Emissions Trading Association (IETA) estimates that the total cost of climate change can be weighed down by about USD 250 billion a year by 2030 if countries implement their Nationally Determined Contributions.

2.2.3 Green Financing as a Key Pillar of CSR

Corporate Social Responsibility has evolved over time from mere philanthropic activities to being embedded as strategic actions in business models. Green financing which seeks to provide financial flow to environmental activities is a critical pillar of meaningful CSR (CHRISTELLE, 2022). According to PENG and CHEN (2023), the mobilization of financial capital to sustainable projects through green bonds, green banks and innovative green financing mechanisms enhances CSR efforts. SAADAOUI et al. (2024) observed that green financing plays a positive moderating role between CSR and financial performance. Green financing has been identified as a key enabler of CSR goals across industries as observed in the banking sector (WANG et al., 2022) and the automotive industry (CAI and SONG, 2024). HEGEDŰS (2024), GAO et al. (2024) and LIU and LI (2025) however notes that the effectiveness of green financing may vary across different regions depending on the corporate governance structures and the regulatory environment. Through green investments, institutions become proactive in environmental stewardship going beyond compliance and investing in future sustainability (DIMRI and SRIVASTAVA, 2024).

2.2.4 Green Banking Practices

Green banking is a key aspect of sustainable finance that involves integrating societal and environmental responsibilities into banking operations providing financial solutions to eco-friendly initiatives that promote sustainability efforts in the financial sector (BANSAL et al., 2025). The growing world consensus on the need to address environmental risks associated with climate change has exerted pressure on every economy and sector to engage in environmentally friendly practices (ANJALIDEVI et al., 2024). SHARMA and CHOUBEY (2022) argue that this trend has equally created more obligations and opportunities for financial institutions such as banks. Banks occupy a very special position in influencing the nature of economic activities across the globe. In this regard, banks readiness, the level of environmental awareness and the availability of a regulatory framework that support green banking is fundamental (BURHANUDIN et al., 2021).

Previous literature has identified several activities as green banking activities by the banks. Such activities include but not limited to the use of green credit cards (HUANG and FITZPATRICK, 2018), online banking (KHAN et al., 2022), affinity cards and green securities (SHERSHNEVA and KONDYUKOVA, 2020) paperless transactions (SHERSHNEVA and KONDYUKOVA, 2020) less usage of equipment emitting high

levels of carbon footprint, reduced financial support for high carbon intensive projects while increasing financial support for environmental friendly projects (BUKHARI et al., 2019). Another study by RISAL and JOSHI (2018) classified green banking practices as including employee related, daily operational, customer related and banks policy related practices.

According to REHMAN et al. (2021) banks can be more environmentally resilient by adopting digital technologies and promoting in house projects that help reduce the emission of greenhouse gases to the environment to a significant extent. ALSHEBAMI (2021) adds that commercial banks can go a long way in reducing adverse environmental effects by integrating green banking practices into their investment policies, financial strategies, and daily operations and promoting CSR activities in developing economies. BANSAL et al. (2024) emphasize that green banking activities play a crucial role in advancing SDGs especially climate action, clean energy, responsible consumption and sustainable cities. According to a study by CHEN et al. (2022b), the transition to green banking practices not only result to social, corporate and environmental benefits but also improves the reputation of the banks. SESHACHALAM and ASIF ALI (2020) note that today, consumers are very interested in working with institutions that not only focus on maximizing profits but also takes into consideration social and environmental welfare. Institutions that integrate environmental welfare into their operations and business activities are more likely to retain their customers and gain competitive advantage.

REHMAN et al. (2021) argue that since banks play the influencing role as economic agents, environmental accountability in their lending activities must be a prime responsibility. If the banks finance projects that harm the environment, such decisions raise high ethical concerns from the baking perspective. DIKAU and VOLZ (2021) note that green banking policy instruments compose policies relating to credit allocation, market, macro, and micro prudential policies. The effectiveness of these policies is, however, yet immature due to the lack of appropriate data and methodologies for measurements and comparison among various economies.

The adoption of green banking practices in Africa, Sub-Saharan Africa gained momentum in 2012 after the establishment of the Sustainable Banking Network (SBN) by the International Finance Corporation (IFC). This initiative was meant to promote the green banking practices among developing economies (REHMAN et al., 2021). Based on the IFC report, many countries have initiated their green banking principles, guidelines,

and policies at the national levels. The scope of green banking practices tends to be different across different economies, especially between developed and developing economies.

According to REHMAN et al. (2021), the implementation process in most developing countries involved making mandatory regulations for banks through countries' national regulators and central banks while the majority of the developed economies adopted a voluntary approach in encouraging banks to manage the environmental risk management risks.

AFRIDI et al. (2021) argue that green banking practices provide both internal and external benefits. Banks can gain increased operational efficiency thus promoting social and economic developments. At the same time, such practices can also be a source of competitive advantage and improve a bank's reputation image. Several studies link green banking activities to enhanced performance e.g. green credit was found to enhance the financial performance of the Chinese commercial banks (CHEN, 2025) while green banking disclosure was found to enhance the Return on Equity (ROE) of Asean region banks (RAHMA and WEDARI, 2024).

Nevertheless, the implementation of green banking practices in developing countries is still a young endeavor and is faced with multiple challenges. Such barriers include difficulties in contextualizing it to a specific country, scarcity of global measurement tools, technological advancements, lack of up to date knowledge and adoption handles. REHMAN et al. (2021) argues that these challenges may be discouraged many developing economies in implementing green practices.

ALSHEBAMI (2021) adds that green banking practices influence the impact of banking activities directly and indirectly through transforming internal operations and encouraging green projects. The Institute of Development and Research (IDR) defines green banking as the adoption of bank guidelines and practices that promote both the economic and health environment. CHEN et al. (2022b) however, notes that green banking is not a one-party initiative but must involve multiple stakeholders for a healthy environment.

2.2.5 The State of Green Financing Implementation and Awareness

Various studies have been conducted regarding the implementation of various aspects of green finance. A study by ZHANG et al. (2022) seeking to investigate the major challenges and benefits of green financing among private banks in Bangladesh revealed interesting results. The study identified some of the major hindrances to the development of green financing as lack of competent and capable staff in appraising green loans, technical

obstacles, and complexities of accessing green credit, insufficient awareness about green loans by customers, and high investment costs as the major factors affecting the growth and development of green financing among commercial banks in Bangladesh.

ORABI (2020) sought to examine the level of green financing awareness among commercial banks in Jordan. The study established a significant level of green financing awareness among the bank's employees. The issued questionnaire sought to examine respondents' opinion on green financing as a way to prevent market failure, is an opportunity to address climate change, facilitator of low carbon transition, as a solution to multiple financial crises and as an alternative to the falling global economic system.

SIEMIONEK-RUSKAŃ et al. (2022) conducted a study seeking to compare the level of green financing awareness among Polish and Romania respondents. Using a survey (n=363), the study identified a huge discrepancy between Polish and Romania respondents on the level of awareness on green financing. Respondents from Poland were more aware green financing practices and products compared to Romanian respondents. The study, however, found similarities between respondents from both areas on their perception on the importance of green finance as being improving the company's reputation image and cutting costs.

FENG et al. (2023) examined the current status of green financing in China. The study revealed that China has made significant progress in the development of green finance but still experiences various challenges including less growth of green insurance, information asymmetry on matters green finance and lack of a unified green financial system.

Several studies focusing on risk management have been conducted as well. For instance, CHEN and ZHAO (2022) examined the role of intelligence services in enhancing the risk management of green financing. The study recommended the establishment of intelligence centers that can help in updating intelligence cases, enhancing digital technology and facilitating sharing of intelligence resources as a way of improving the risk management framework for green finance. Another study by SCHOLTENS (2006) focusing on finance as a major driver of CSR, identified lack of experience on climate risk as a major social and environmental problem.

A study by AZAD et al. (2022) examined the implementation status of green financing in the Bangladesh banking sector. The study revealed that the Bangladesh banking policy requires that all NBFIs, and banks disburse at least 5% of their loan portfolio as green loans and at least 20% as sustainable finance. The

study established that the Bangladesh central bank has so far made great progress in greening the country's banking sector as 3.16% of the 5% recommended for green finance, 9.32% of the recommended 20% on sustainable finance had been accomplished as well.

DURRANI et al. (2020) carried a study which involved surveyed 18 central banks in the Asian Pacific region seeking to find out their thoughts on their role in promoting green financing in the region. The study concluded that majority of central banks believe the interventions in the existing regulatory frameworks, encouraging the instruction of green products by introducing new climate change considerations in their fiscal and monetary policies is the way to go in promoting the growth and development of green finance in the region.

Regarding the implementation status of green financing across economies, previous studies reveal that the role of central banks is critical. A study by DIKAU and VOLZ (2021) examined the objectives and mandates of central banks in relation green financing. The study adopted the approach of comparing the IMF central bank legislation database with 135 central bank's related policies. The study revealed that only about 12% of the selected banks have explicit sustainability mandates. It was also revealed that 40% of the central banks, however, are mandated to support their government's priorities, most of which are sustainability-related goals.

There are few green financing studies focusing on the role of banking and green financing in Africa. SINHA et al. (2021) observe that the attention on green financing has gained momentum recently majority of which are from the Western developed countries. Previous studies focusing on green financing in Africa have also provided insights into the existing challenges and opportunities for the region.

A study by FONTA et al. (2018) concluded that, the capacity building of the African continent is constrained by high reliance on international assistance and limited support for her readiness. On the other hand, the study concluded that such challenges can be addressed by leveraging on the government systems and cascading downwards to strengthening institutions to increase access accreditation and secure more funding.

2.2.6 Climate Risk Management and Banks Financial Performance

Several previous studies have highlighted adverse effects of climate risks on banks' financial performance. A study by LEE and ALAM (2024) for instance, observed a negative relationship on banks profitability among the G7 countries. Similar observations were made among the Chinese banks where climate change increased

the credit risk for rural and small-scale commercial banks (LIU et al., 2024). LIAN et al. (2025) adds that banks with high climate risk exposure are forced to increase their loan loss provisions.

Other studies however emphasize on the argument that proactive management of climate risks in highly effective in protecting the financial institutions from these impacts. BIRINDELLI et al. (2024) argues that banks engaged in green practices has less exposure to systemic risks which enhances their financial stability. Further, DOAN et al. (2025) adds that climate adaptation initiatives help banks to reduce their exposure to credit risks and enhances their profitability.

Moreover, banks with robust green credit policies and foster environmental transparency benefit from long term sustainability (AL FRIJAT et al., 2025). The role of regulatory framework in enhancing transparency in climate risk exposure is highly emphasized (GALLAS and BOUZGARROU, 2024).

2.2.7 Green Financing and Performance

Majority of the previous studies have also explored the nexus between green banking practices and the overall financial performance. BUKHARI et al. (2022) note that based on previous literature there are multiple definitions of green banking practices, but past research studies are dominated by the view of green banking as a philanthropic approach. Most studies, however, acknowledge the greater good of society for green banking as promoting the social well-being of society. A study by JAN et al. (2019), established a positive relationship between sustainability practices of Islamic banks and their financial performance. Another study by HUMMEL et al. (2021) involving 50 European banks also established a positive relationship between management topic and sustainability performance. These findings were similar to the results of NIZAN et al. (2019) who established a positive relationship between management quality and loan growth. Another study by JEBARAJAKIRTHY and SHANKAR (2021), argued that banks must focus on encouraging adopting and encouraging online transactions.

A study by JULIA and KASSIM (2016), investigated the nexus between green financing and banks profitability based on a sample of 30 selected banks in Bangladesh. Banks' performance was measured by four major ratios of financial performance including Return on Equity (ROE), Asset Utilization Ratio (AUR) and Return on Equity (ROA). The study established that there was a significant positive relationship between green

financing and the profitability of the banks particularly as indicated by the ROA and the AUR ratios. The study however found no significant relationship between green financing and ROE ratio of the selected banks.

RISAL and JOSHI (2018) conducted a study investigating the impact of green banking practices on the environmental performance of banks in Nepal. The study adopted a causal research design and utilized stepwise and simple multiple regression. The study concluded that investments in green equipment and adoption of green policies among the selected banks were associated with positive financial performance.

While the majority of the studies found a positive relationship between green financing and financial performance, others found different results. A study by BOSE et al. (2021) seeking to find out whether green banking pays off established a positive relationship between green banking and the financial performance of the sampled firms. However, the study also established that this relationship is negatively affected by banks' political connections. Another study by SINHA et al. (2021) seeking to determine whether green financing help in improving environmental and CSR, concluded that green financing mechanisms might have a gradual negative transformation impacts on both social responsibility and the environment.

2.2.8 Measuring Bank's Environmental Performance

In the green transformation process, enhancing transparency in relation to the sustainability of economic activities and financial products for both financial and non-financial undertakings is very important (BRÜHL, 2023). Some initiatives to measure the effect of green financing are evident. For instance, the EU has proposed the Green Asset Ratio (GAR) as a new Key Performance Indicator (KPI) for measuring the percentage of taxonomy aligned balance sheet exposure as a proportion of the total assets for credit institutions. So far, this information is yet to be disclosed by credit institutions, but initial assessments indicate that the GAR for EU credit institutions could go below 10% (EBA, 2021). Such indicators could establish good ground to push for a minimum GAR threshold to push financial institutions in the EU region towards a higher level of green financing.

Previous studies attempting to measure environmental performance for banks have used different approaches. For instance a study by BIMHA and NHAMO (2017) measured the environmental performance of the selected banks based on the Carbon Disclosure Project (CDP) questionnaire. The study constructed a scoring index for environmental management performance (EMP) which was correlated with the

Environmental Operational Performance (EOP) indicators of the banks. The study found a negative significant relationship between EMP and EOP, concluding that the implementation of the bank's environmental policies did not yield positive improvements on the bank's EOP in the short run. The study utilized data from 68 banks distributed in 26 countries within the period of 2011 and 2014.

Another study by MIROVIC et al. (2023) sought to examine the moderating effect of green loans on banks' profitability measured by ROE and ROA. The study adopted a panel fixed effects approach and concluded that the presence of green loans in the bank's loan portfolio improved banks' profitability and liquidity.

Besides measurement models developed by other authors, other studies have relied on questionnaires developed by other relevant databases which track the ESG activities of organizations across regions. A good case in point is the ASSET4 ESG framework is one of the most adopted databases for studies related to ESG. ASSET4 is a leading CSR database with cross-country coverage and was founded by Henrik Steffensen and Peter Ohnemus in 2003 (INTEGRITY RESEARCH ASSOCIATES, 2009). ASSET4 was later integrated into the Thomson Reuters after an acquisition process and later rebranded as Thomson Reuters for ESG scores after significant changes were made on the rating process (BIMHA and NHAMO, 2017).

A study by DE VILLIERS et al. (2022) reviewed a total of 285 studies published high quality ranking journals including Web of Science, Google Scholar, EBSCOhost and ProQuest using data from ASSET4 indicators. The study found out that 30 out of the 285 articles published were published in CSR and Environmental Management journals, 27 were published in Business Strategy and the Environments while 19 were published in the journal of Business Ethics. The above were the top three journals with the highest publications that were based on the ASSET4 database.

Out of the 285 studies revealed, 197 articles were cross country, 35 from the United States and 21 from the UK. The above were the geographical distributions with the highest number of publications. Additionally, majority of the studies used the agency theory, stakeholder's theory, institution theory, legitimacy theory, resource-based theory, and natural resource-based view, resource dependency theory, Slack resource theory and the signaling theory among others.

TRUMPP et al. (2015) carried a study seeking to conceptualize and measure environmental performance management. The study adopted the five ASSET4 major indicators for measuring environmental performance (EMP), including environmental policy, environmental objectives, environmental processes, organizational structure, and environmental monitoring. This study was based on the questionnaire developed and used in gathering data on environmental management performance in the ASSET4 database.

2.2.9 Bank Size and Type of Ownership

Previous literature has also explored how the relationship between green and financial performance might be influenced by bank size or type of ownership. ZHOU et al. (2020, 2025) argue that large banks are better placed in managing risks, including climate-related risks, than smaller banks due to their ability to access better expertise and information regarding green lending.

ZHOU et al. (2025) gives an example that large banks, for instance, are better placed in underwriting green bonds, therefore efficiently mitigating such negative financial outcome than smaller banks. DEL GAUDIO et al. (2022), however, brings another perspective that while large banks with a high propensity to green lending tend to experience low profitability, they achieve long-term stability.

Regarding the type of ownership, some previous literature argues that the type of bank ownership and governance structure influence a bank's green lending practice. HOQUE et al. (2024) argues that state-owned banks are more likely to engage in green lending practices due to government mandates and regulatory support, while foreign-owned banks are less inclined to do so.

SISWANTI et al. (2024) established that the type of bank ownership moderates the interaction between green financing and banks' financial performance. The study concluded that foreign ownership of the 47 listed banks in the Indonesian stock exchange strengthened the financial benefits of green their banking practices.

2.3 Research Gap Identified in Literature

The literature review has revealed research gaps in current literature. For instance, regarding the examination of the relationship between green financing and the financial outcome on financial institutions, the majority of the studies including JAN et al. (2019), HUMMEL et al. (2021), NIZAN et al. (2019), JULIA and KASSIM (2016), RISAL and JOSHI (2018) revealed a positive relationship between green financing and banks' financial performance.

The studies of VALENCIA and CALABUIG-TORMO (2023), ZHANG et al. (2022) and CHEN et al. (2022a) revealed that green financing positively influences banks' environmental performance which indirectly improves banks brand reputation and competitiveness. Other studies however, such as BOSE et al. (2021) and SINHA et al. (2021), identified a negative relationship between green investments and the financial performance of the selected banks. A study based on banks in Iraq by (MOHAN and MUHAMMAD, 2024), revealed that although green financing supports risk management and sustainable activities, their impact on the bank's profitability is minimal.

Another study by RAHMA and WEDARI (2024), revealed no significant effects on Return on Equity among the Asean banks from their green financing activities. The study noted that the relationship between green financing and ROE for large banks was negative.

Some studies in China have revealed mixed outcomes. While one study based on the Chinese banking sector revealed that green credit negatively impacts bank's profitability, the study established that green financing was helpful in reducing the chances of insolvency especially for small banks. Conversely, another study based on the same banking context, established that green credit promotes better financial performance among Chinese banks under high regulatory pressure (CHEN, 2025).

Notably, most of the studies on green financing are done based on the Asian Pacific region, Europe and the Western economies with limited studies on the subject matter in Africa. Particularly, to the best knowledge of the researcher, there is no single study seeking to assess the implementation of green financing initiatives among listed banks in Kenya and how such influences the banks financial outcome.

This study, therefore, provides an opportunity for valuable comparative insights on how different banking models e.g. Islamic and conventional banking, regions and regulatory environments influence the financial outcome of green financing initiatives. Further, grey literature from credible sources such as government reports, the World Bank and the Central Bank of Kenya reveals that Kenya is making great strides in promoting green financing and supporting other sectors in transitioning to greener economies. Notably, Kenya is among the few countries in the East African region and Sub-Saharan Africa that has successfully issued green bonds.

Additionally, Kenya Commercial Bank (KCB) one of the largest banks in Kenya, was appointed as the UN intermediary bank for the East Africa region on matters of green finance. The Central Bank of Kenya (CBK) has provided specific guidance and support for green financing and climate risk management within the banking sector. Notable initiatives include the implementation of the Sustainable Financial Initiative (SFI) that is ongoing across all 46 registered commercial banks in Kenya and more than 41,100 staff in the banking sector are already beneficiaries. Besides, the CBK has provided a detailed risk management framework guidance to commercial banks to support them in integrating climate risk into their normal risk management framework.

More so, CBK introduced the ICAAP for the banking sector, where banks are required to maintain sufficient capital that is commensurate with their material risk, including climate-related risks. Lastly, through the Kenya Banking Sector Charter, which is anchored on four main pillars, including ethical banking, transparency, risk-based credit pricing and consumer centricity, the CBK has encouraged the commercial banks to publish sustainability reports disclosing their progress on the management of climate risk.

Kenya, being one of the emerging economies in the SSA region, has many borrowers who heavily rely on physical assets as collateral, which exposes banks to high credit risk. Besides, the country has already experienced the impact of extreme weather conditions including prolonged droughts, floods, landslides, and forest fires leading to loss of lives, property, increased threat to food security and adverse effects on the country's GDP especially taking into account the high contribution of the agriculture and tourism sector to the country's Gross Domestic Product which are worst affected by extreme weather conditions that affect rain and destroy the countries ecosystems.

As pointed out above, the past research on the subject matter reveals contradictory results, therefore creating a scholarly gap. Also, few studies focus on Africa and the SSA region where Kenya belongs. Particularly, there is no known research on this matter conducted in the Kenyan Banking sector, clearly showing the big geographical gap.

Given the great milestone the Kenyan banking sector has undertaken so far, coupled with the current trends of increasing interest by various stakeholders, including investors, regulators, consumers, producers, international organizations, and governments across the globe, it is evident that the current sector initiatives need to be supported through relevant research.

This study, therefore, seeks to fill the identified scholarly and geographical gap to provide support to the current sectoral initiatives of bridging the existing green financing gap through examining how the green financing initiatives by the banks influences their financial performance.

3. MATERIALS AND METHODS

This chapter describes the methodology adopted in carrying out the study, testing the set hypothesis, and pursuing the research objectives. It details the philosophical orientation adopted in this study, the research design, research strategy, data collection method, the design of the data collection tool adopted, the population of study and selection of the sample, and the method of data analysis used.

3.1 Philosophical Orientation

The research orientation in a study is crucial in informing the assumptions and the mindset that a researcher makes in relation to the study design and methodology adopted, analysis and interpretation of results (JACKSON, 2013). While there exist multiple philosophical mindsets including positivist, interpretivist, pragmatic and critical orientations as noted by LUKASIAK (2020), this study adopts the positivism philosophical orientation which according to MCLEOD (2023), refers to a way of looking at research based on facts, objectivity and measurements. This study focused on collecting facts through questionnaires and measured them empirically to objectively uncover existing patterns of variable relationships under study. The main aim was to uncover what bank practices informed the overall green financing strategy by the banks and how such influenced the financial performance of the banks.

3.2 Study Location and Context

This study was carried out in Kenya, which is an emerging economy within the sub-Saharan Africa region and notably among the leading countries in undertaking sustainable financial sector developments. Its financial system is characterized by a robust mobile money system and accelerated integration of green financing initiatives into the banking mainstream operations. The Kenyan banking sector has made notable strides that align its financial intermediation practices to environmental sustainability in the last decade, which provides the context for which this study was necessary to carry out. Some notable initiatives for promoting green financing initiatives include the introduction of the sustainable financing training initiative (SFI) by KBA in 2015 to align banks' goals with environmental and societal priorities where more than 50,000 bank employees have been trained so far. KCB, one of the leading banks in the country, was accredited by the UN Green Climate Fund as the channel bank for green projects within the East Africa Region. A survey done in 2023 indicated that 67% of the Kenyan banks have policies for promoting sustainable bank lending, revealing the high

integration of ESG into their banking operations. Numerous international partnerships with international partners such as the European Investment Bank and CBK among others have played a major role in enhancing the Kenyan banking sector's capacity to align with the world's best green global practices and mobilization of green finance, not to mention the notable financial innovations on green products e.g. sustainability linked loans, green bonds and tailored payment mechanisms such as pay as go, kilometer-based payments etc. Besides, there are notable government fiscal initiatives that seek to encourage the transition, production and consumption of green products, which promotes the demand side for green products, providing more opportunities for banks' green products. These initiatives collectively showcase the commitment by the banking industry to foster environmental performance and, therefore, this research is highly timely and has great potential in providing relevant insights that could benefit policymakers, investors, and other relevant stakeholders.

3.3 Data Collection Tool

Structured questionnaires were distributed to 500 bank employees working across the ten listed banks as of December 2023 in credit sections, managerial positions and sustainability departments for the few banks with dedicated sustainability departments. Each variable was measured in five items which were carefully selected based on two major criteria; first, the item informed one of the currently ongoing initiatives by the Kenyan banking sector in greening the financial system as the major focus of this study and secondly, the items were justified as an appropriate measure for the respective variables as evidenced by previous empirical studies conducted in other geographical locations across the globe. The items were identified following an extensive but focused literature review process. In designing the questionnaire, the operationalized or observable items of the variables were used to construct at least five questions for each variable as a metric for measuring the three main independent variables and the dependent variables. The items were measured in scaled responses of (1-5).

The questionnaires also captured relevant information on the respondents' demographic characteristics considered relevant to explore in the study and such characteristics included information on the respondents' gender, the banks they were affiliated to, their levels of education and the number of years of experience they have accumulated working in the banking sector. Related questions for each latent variable (GFA, GBI, CRM, FP) were asked sequentially in the same category to avoid ambiguity. The study concentrated on three

independent variables and one dependent variable, each of which was measured in five observable items. Other similar studies that have adopted this approach include CHEN et al. (2022a), DE VILLIERS et al. (2022), BIMHA and NHAMO (2017) and TRUMPP et al. (2015). Brevity was considered important while structuring the questionnaire to increase the chances of successful responses, given that bank employees are generally busy due to the demanding nature of the banking sector and may not have much time to spare. Nevertheless, each item was accompanied by brief explanations and specific examples to further enhance the clarity of each item. The questionnaire is attached in Appendix 2.

On the meta-analysis part, a search strategy was applied in the web of science and Scopus databases and an inclusion and exclusion criteria applied to filter only studies that answered the question "what is the impact of green financing on banks financial performance?" quantitatively and reported the necessary information required for the calculation of the combined effect sizes. The research process was summarized in the Prisma flow chart as demonstrated in Figure 5.

3.4 Research Design

Research design acts as a blueprint for the researcher and provides a detailed outline on how data is gathered and analyzed (DANNELS, 2018). It informs the decision on the research plan a study adopts, the definition of the operationalized items as well as how the research constructs are measured (GANESHPURKAR et al., 2018). While there exist several research designs researchers can adopt in conducting their studies, this study applied two major techniques i.e. the Partial Least Square (PLS) Structural Equation Modelling (SEM) available in smart PLS 4 which was majorly used to test the ten hypothesis along with meta-analysis technique which was used to pursue the fifth research objective and test the tenth research hypothesis on situating the study outcomes of the Kenyan local context on the global scale to understand how the interaction between green financing initiatives and banks financial performance compare to other banks across the globe amid different social culture, economic and market dynamics based on a quantitative approach. According to REHMAN et al. (2021), SEM is a powerful quantitative tool for analyzing theoretical relationships in structural models containing latent variables and can also be tested in factor analysis.

PLS-SEM was considered due to its ability to analyze multiple latent variables even when dealing with complex models and is considered highly robust for handling small to medium-sized samples (PETTER and

HADAVI, 2021). Besides, it does not require strict assumptions such as multivariate normality as it is a variance-based technique making it a more practical alternative to traditional regression models (HAIR and ALAMER, 2022; AHMED et al., 2024). Also, unlike the Covariance Based-SEM which mainly focus on model fitness and most appropriate for theory confirmation, PLS-SEM focuses more on predictive accuracy and variance explanation making it more appropriate for this study. The model design adopted in this study included three low-order constructs (IVs), a high order construct (GFI), and reflective and formative models, which the PLS-SEM is designed to handle easily through the pls algorithm and bootstrapping techniques as argued by (KONO and SATO, 2023). Traditional regression models are not designed to handle complex models such as those involving high order and low order constructs or even reflective and formative models.

Moreover, the PLS-SEM model does not require the data to be normally distributed making it highly suitable for real world circumstances as highly often finance and business-related datasets deviate from the ideal statistical conditions. Comparing the model with the family of other SEM techniques such as CB-SEM, the PLS-SEM offers a highly flexible and prediction-oriented option which is highly appropriate for this study especially because of its exploratory nature seeking to uncover underexplored relationship between green financing and banks profitability within the Kenyan banking sector.

While the same design could be implemented in other platforms such as R, AMOS and Stata, Smart PLS 4 was preferred due to its intuitive and user-friendly interface (CHEAH et al., 2024). After data was thoroughly cleaned and imported into the smart PLS 4, pls algorithm was run to assess the models' validity and reliability using Cronbach Alpha, AVE and Composite Reliability. After these criteria were met, evaluation of the structural model's path co-efficient, predictive power, R-squared values, et cetera was carried out, after which bootstrapping was carried out to test the hypotheses. Model fitness was examined through Q-squared values and SRMR and lastly, a multi-group analysis on bank size and type of ownership was examined.

Cohens D and z-transformations were used to calculate the effect sizes necessary for running the meta-analysis. Publication bias was examined through forest plot, funnel plot and egger regression while heterogeneity was tested using Q, PQ, I^2, T^2 and T. The meta-analysis was conducted based on the user data manual for meta-analysis essentials as guided by (VAN RHEE et al. 2015).

3.4.1 Target Population

The target population refers to the entire set of units upon which the study may collect data and make inferences on (IBRAHIM and MARCACCIO, 2023). This study targeted bank employees working among the 10 listed banks in the Nairobi Stock Exchange (NSE). It was difficult to determine the total number of employees among the selected banks, as some banks have not provided such details online. As such, the Cochran formula was used to calculate the appropriate sample size. Listed banks were selected because of their great involvement in promoting the green transition in Kenya. Additionally, these banks are at the forefront in implementing the green financing initiatives as guided by the Central Bank of Kenya as well as the Kenya Bankers Association (KBA), which work together in promoting the green transition endeavor of the Kenyan financial system.

The researcher considered that the banking sector suffers a problem of insufficient, inconsistent or unstandardized reporting of the green financing initiatives by the banks in countries such as Kenya where such is not a mandatory requirement (OZILI, 2022). Preliminary search indicated that all listed banks have a way of reporting their sustainability initiatives either through their websites, integrated annual reports or individual sustainability reports as guided by the CBK, but such was not the case with the smaller banks. For that reason, the researcher could access important information from the listed banks on the ongoing green financing initiatives from the published information, which was important for the study. Reporting on sustainability endeavors, especially on green financing activities, was not highly prevalent among the small and emerging banks. Besides, it was cost effective and a reasonable scope to complete within the limited timeline of the PhD. program. Some of the sampled banks have branches throughout the country while others have branches in most parts of the country. Permission was sought to conduct the research in seven counties as required by the Science, Technology and Innovation Act of 2013 (Rev. 2014). The seven counties selected included Embu, Kajiado, Kiambu, Kirinyaga, Murang'a, Nairobi and Nyeri. These counties were selected because they were easily accessible to the researcher and affordable as most of the questionnaires were administered physically and physically to the bank employees at their respective branches. The approval was granted and a license no. NACOSTI/P/24/22257 awarded. The license is attached in Appendix 3.

3.4.2 Sample Design

A sample design defines the methods a researcher seeks to adopt in estimating the sample and addresses important research questions regarding the study population, the sampling technique adopted and the sample size. The present study sought to first examine the implementation of the green financing initiatives currently undertaken by the listed banks in Kenya and later examine their impact on the financial performance of listed banks in Kenya. The determination of the sampling procedure should be anchored on the specific study objectives (LO, 2009). This study adopted convenient sampling as this would increase the chances of asking the research questions to the most appropriate respondents (SPOLARICH, 2023). While each sampling technique has its pros and cons, there's always a trade-off between cost and accuracy (LO, 2009). Convenient sampling was therefore considered as the most appropriate sampling technique among the available options.

3.4.3 Data Collection

The study deployed 500 questionnaires to collect data from the 10 listed banks. The questionnaire targeted bank officers working in the bank's credit section, management or sustainability departments. Questionnaires were mainly administered physically, and a few were administered through Google Forms to the respondents. To increase the success rate for gaining more responses, a physical follow-up was very helpful as many bank employees are very busy.

In some instances, the bank managers helped me distribute the questionnaires to the relevant employees in some branches. The most helpful event that aided the high success rate for questionnaire response, however, was the 13th Annual Research Conference on "Banking Sector Resilience" with a sustainability focus on the integration of ESG into banking practices, which happened on 26th and 27th September 2024. This conference was very appropriate as it gathered bank employees from all the banks, especially those working in sustainability-related banking practices, who were the main target of this study. Through attending this conference for two full days, it was easier to network easily with the bank employees who helped me fill the questionnaires and referred me to their colleagues. This event resulted in a remarkable increase in the number of responses. The data collection exercise took at least 5 months, and in the end, a total of 387 responses were collected. Studies included in the metadata analysis were retrieved from the web of science and Scopus.

3.4.4 Sampling Technique and Sample Size

While there are many other ways of selecting a sample, this study adopted a purposeful sampling technique as it allows the researcher to select the population based on a given criteria that increases the chances of selecting the right participants. In this case, the main aim was to select participants who were more likely to have the information needed to respond to the questionnaire. The study targeted bank staff working in credit, management level or sustainability-related departments.

Consequently, there are various approaches for determining the sample size of a population. These include the thumb rule, use of statistical software and the empirical formulae. The recommended sample size for SEM analysis ranges from 150 to 400 responses (WOLF et al., 2024). Similarly, another study by LONG and VIET-ANH (2021) used a sample size of 128 and was considered reasonable for conducting a significant statistical analysis. Other studies used sample sizes of between 100 to 150 including KONO and SATO (2023), AFTHANORHAN (2020), GOODHUE et al. (2012). The COCHRAN (1977) formula was adopted to determine the appropriate size for the study for large and unknown populations and the calculations are presented as follows.

$$n_0 = \frac{z^2 \times p \times (1-p)}{e^2} \qquad [1]$$

Where;

n_0 = Sample size

z = Z-score (1.96 for 95% confidence level)

p = Estimated proportion of the population with the characteristic of interest (usually the default is 0.5 if unknown)

e = Margin of error (commonly 0.05 for 5%)

$$\mathrm{n}_0 = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{0.05^2} = \frac{3.8416 \times 0.25}{0.0025} = \frac{0.9604}{0.0025}$$

$$\mathrm{n}_0 = 384.16$$

Based on this criterion, a sample of 384 respondents was recommended as sufficient. This study analyzed a total of 387 valid respondents, which is more than the minimum responses required and way above the threshold recommended by previous literature.

3.5 Questionnaire Tool Validation

It is necessary to conduct a pilot study to stay abreast of potential issues such as item difficulty, response rates, possibility of item discrimination, et cetera (KUNSELMAN, 2024). Although it is not a full assurance of success in conducting a full investigation of the study, it helps in determining if the study procedures and data collection are workable and practical (JANGHORBAN et al., 2014). The questionnaire was reviewed by two academic experts, i.e. my two supervisors and several other sustainability banking experts. My two supervisors helped me to validate the questionnaire instruments by ensuring the alignment of indicators with theoretical constructs. To further validate the appropriateness of the research instrument to the target population, I incorporated feedback from several banking experts especially from KCB and Equity bank headquarters which coordinate their sustainability efforts through their bank foundations which are situated at their headquarters offices in Nairobi. Also, I incorporated feedback from other few operations and branch managers from other counties outside Nairobi County especially in Kirinyaga and Embu County and this helped in enhancing relevance, clarity, and contextual appropriateness for the questionnaire to the Kenyan banking sector. Based on their feedback, several refinements were made especially to improve wording, provide explanations for the measured items. The aim of this pretest phase was to help in improving the clarity, structure, and relevance of the items, thereby enhancing content validity and minimizing ambiguity to the respondents. The refined instrument was then used for final data collection.

3.6 Data Analysis and Model Design

Data was cleaned using Excel and then imported into smart PLS 4. The first step was to create the study model that connected latent constructs to latent variables. The lower-order constructs i.e. the Green Financing Awareness (GFA), Green Banking Initiatives (GBI), Climate Risk Management (CRM), and Financial Performance (FP) are modeled as reflective constructs since their observed indicators are manifestations of the underlying latent variable. Changes in the constructs are expected to cause consistent changes across all indicators and the indicators are assumed to be interchangeable and highly correlated. In contrast, the HOC i.e. Green Financing Initiatives (GFI) is modeled as formative, as it is conceptualized as a composition of distinct but complementary dimensions of (GFA, GBI, and CRM), each contributing uniquely to the broader green financing strategy of the banks. Conceptually, the formative specification follows a cause-to-effect logic, where

the sub-dimensions define the construct rather than being outcomes of it. This measurement approach aligns with established PLS-SEM guidelines, where reflective indicators are used for unidimensional latent constructs and formative indicators for multidimensional constructs composed of distinct facets (HAIR et al., 2019). This distinction ensures conceptual clarity, accurate estimation, and valid interpretation of the structural model.

The HOC is formative as it's caused by the three main LOCs, i.e. the Green Financing Initiatives are informed by the cumulative banks' efforts in promoting green awareness, green banking practices and climate risk management. As such, the arrows point from the three LOCs to the HOC making this relationship reflective formative. The graphical output of the new model is illustrated in Figure 2.

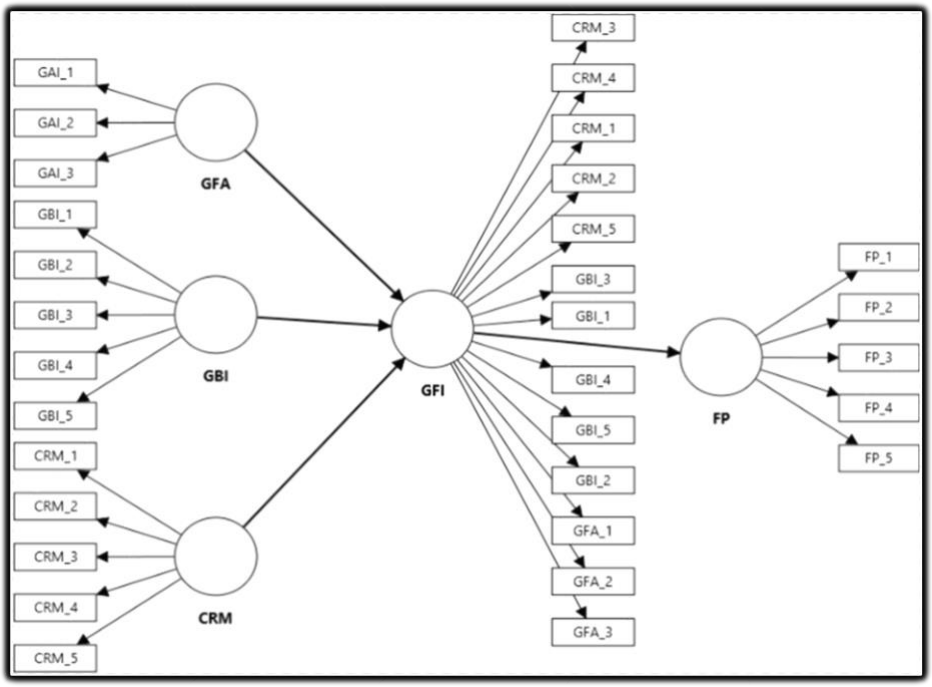

Figure 2: Model Design

Source: Author's work

The PLS-SEM technique was used to run the analysis. The PLS-SEM entails selecting the model, screening data, estimating the model parameters, analyzing the model fitness, and interpreting the model parameters (CHEN et al., 2022a). PLS algorithm was used to evaluate the quality criteria of the model, while pls bootstrapping was used to test the first six hypotheses, and the multi-group pls algorithm was used to test the eighth and ninth hypotheses. Cronbach alpha, composite reliability (rho_a, rho_c), the Average variance extracted (AVE), collinearity tests by Variance Inflation factor (VIF), outer weights/loadings, explained

variance (R^2), Q^2 and predictive relevance were used to assess the quality criteria of the model. Figure 3 shows the research framework adopted in conducting the study.

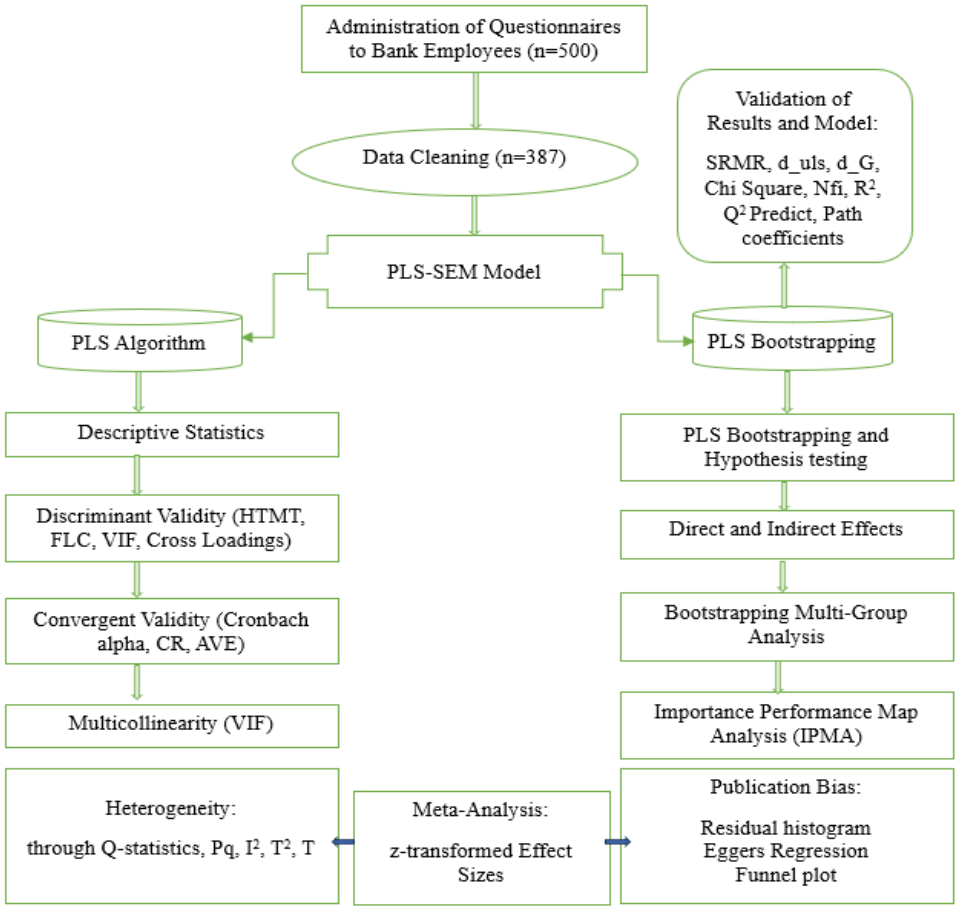

Figure 3: Research Framework Adopted

Source: Author's work

3.7 Scholarly Work in Support of the Study

Table 2 below summarizes selected previous studies which support the selected methodology.

Table 2: Studies which support the selected methodology

Study Title	Methodology	Authors
Customer awareness on Green Banking Practices	Questionnaires were issued PCB bankers in Bangladesh and analyzed using the EFA and CFA techniques.	(CHEN et al., 2022a)
Definition, Conceptualization, and Measurement of Corporate Environmental Performance: A Critical Examination of a Multidimensional Construct	Factor analysis provided evidence for the multi-dimensional nature of the focal construct. Environment Management Factors were correlated with Environmental Performance.	(TRUMPP et al., 2015)
Adoption of Green banking Practices and Environmental Performance in Pakistan; a demonstration of structural equation modelling	Adopted a 2-step procedure involving the CFA as the first step for model measurement then tested SEM	(REHMAN et al., 2021)

Source: Author's work

4. RESULTS AND DISCUSSION

The main aim of this study was to establish the financial implications of the current green financing initiatives undertaken by the listed Kenyan banks. The major green financing initiatives under study included banks' current initiatives to enhance green financing awareness and green banking practices, especially those that are employee-focused, customer-centric, operations-efficiency-focused and policy-focused, as well as initiatives focused on managing banks' exposure to climate risk, i.e. physical and transition risk. All these initiatives informed the bank's green financing strategy upon which the main purpose of the study was evaluated by establishing how the bank's green financing strategy influenced various aspects of the bank's financial performance including cost savings associated with the adoption of green operations, access to the international market, enhanced bank's balance sheet, brand image and reputation as well as banks long-term capacity to manage climate-related risks. This chapter presents descriptive and inferential statistics exploring the study objectives and testing the study hypothesis, their interpretation and critical discussions.

4.1 Notable GFI's Undertaken by the Sampled Banks

To enhance a better understanding of the current implementation state of the green financing initiatives undertaken by the selected banks, a thorough secondary research was conducted targeting all the sampled banks to unravel the various green financing activities they were engaged in, the milestones they have achieved so far, the specific projects they have undertaken, the partners they are working with in their green financing endeavors, current policies and future plans regarding their commitments towards greening their banking activities. It was revealed that all the banks were highly engaged in various green initiatives with already ongoing and complete projects most of banks committing significant portions of their loan portfolios to green financing and setting ambitious targets on their future environmental performance and commitments to green their loan portfolios within the range of between 10% to 25%. The findings reveal the serious steps the Kenyan banking sector is undertaking in greening the Kenyan financial system and promises more future environmental performance not only within the banking sector but also within other line sectors especially in renewable energy, climate smart agriculture, forestry, blue economy and the transport sector.

4.1.1 Kenya Commercial Bank (KCB)

- In 2020, KCB was accredited by the Green Climate Fund (GCF) as the main channel bank for mitigation and adaptation funds within the EAC (Fund 2020).
- As of 2024, KCB had approved approximately $180 million, which is about 15.5% of its loan portfolio, to finance climate adaptation projects, e-mobility, energy efficiency and renewable energy (KCB Sustainability, 2025).
- KCB set a new target of growing its green loans up to 25% of its loan portfolio by the end of 2025 (KCB, 2025).
- Run massive tree planting campaign, 300,000 in 2023 and 1.2 target for 2024.
- KCB and three other local banks, including ABSA, Stanbic, and Standard Chartered Kenya, financed a $117 million sustainability loan to Safaricom in 2024 to assist the corporation in converting its transmission stations to renewable solar energy (REUTERS, 2024).
- Integration of the banks' business strategy with the UN SDGs on both banks' businesses with clients and the bank's operations.

4.1.2 Equity Bank

Equity facilitates its green financing initiatives through its Equity Group Foundation which runs the following programs:

- Renewable Energy
- Energy Efficiency
- Climate Smart Agriculture
- Water resource management – Finances water harvesting and storage, development of water plans, dams and boreholes.
- Green Building
- Circular Economy – The bank provides access to biodigesters which produce both biogas and bio-slurry that serves as an organic fertilizer and a good alternative to chemical fertilizers.
- Agriculture waste conversion is converted into briquettes that replace firewood and charcoal.

- Equity works with technical partners such as Mr. Green Africa which is also co-funded by the Global Innovation Fund to collect and recycle plastics for both international and local markets (GITOGO, 2019).
- E-mobility – Finances the adoption of electric vehicles (EV's) and related infrastructures to both businesses and individuals (EGF, 2025).
- The bank runs an EcoMoto Program which provides clean energy for both lighting and cooking. Started in 2017 and aims to benefit 1 million households with EcoMoto convenient digital loans. Applicants can apply for this loan via their mobile devices, and its approval is within minutes. The funds are transferred directly to the vendors who supply the clean energy products. In its first phase, already more than 6000 households have already benefited from modern and efficient cook stoves (EGF, 2025).
- Funding transition to clean energy by learning institutions in Kenya who consume about 10 million trees per year for firewood
- In Dec 2023, the bank was recognized by IFC for its excellence in climate financing reporting. As at then, the bank had supported more than 47,000 businesses and households and disbursed KES 24.7 billion on climate related financing
- Equity Bank collaborated with the Greens of Africa Foundation and the Kenya Defense Forces (KDF) to plant 35 million trees; as of 2024, the bank had already planted more than 25 million trees. In the agreement, the bank purchases mangrove seedlings from Mida Creek Conservation Community, an umbrella group for more than 30 CBOs in the Sokoke and Watamu Community Forest Associations (STAR, 2024).
- The bank started its second phase, which involves planting more than 43,000 indigenous trees on Uganda's Mwiri Hill and a 10-acre orchard to restore the hills' forest cover, in partnership with the Kenya High Commission (EGH, 2024).
- As of July 2024, Equity Green Loans accounted for 17% of the total loan portfolio. The bank targets growing the proportion of green loans to 25% by the end of 2025 (EUROMONEY, 2024).

4.1.3 Cooperative Bank

- The Cooperative Bank promotes financing green energy initiatives through developing innovative financial solutions not only for typical renewable sources such as solar and wind but also for micro hydropower plants,

energy efficiency projects, and biomass plants. The bank provides tailored financial solutions, including conditional liquidity support, results-based financing tailored to the water sector, and partial guarantee coverage for renewable energy projects. It also collaborates with international banks through project finance syndications to support large-scale energy sector investments (COOPERATIVE BANK, s.a.).

- In cooperation with other partners such as the Sunref Program, the Kenya Association of Manufacturers, and the French Development Agency (AFD), the bank finances the production of off-grid solar solutions, energy efficiency initiatives, and biomass waste-to-energy projects. Under the Sunref program, the bank could provide loans for longer tenors at a discounted rate, allowing for easier payment for capital-intensive projects.
- In 2021, the Cop Bank partnered with eco. business Fund which provided a USD 10 million subordinated loan for supporting sustainable agribusinesses. This investment aimed at conserving biodiversity, promote the sustainable use of natural resources and tackle climate change challenges. The loan is deployed to certified agribusinesses in coffee, tea, and horticulture, e.g., solar and hydroelectric installations in tea factories or cold storage solutions to reduce post-harvest losses (eco.business Fund, 2021).
- Partnership with African Guarantee Fund (AGF): To boost green energy and solar installation project financing, the bank and AGF signed a KES 750 million loan portfolio guarantee agreement. This partnership helps the Bank overcome issues related to collateral for credit in the solar energy sector to finance solar energy programs and subsequently save on energy costs for MSMEs as well as the entire sector (KOIGI, 2021).

4.1.4 Absa Bank

- Absa Bank Kenya has committed to dedicate at least 10% of its capital to climate finance. This allocation focuses on promoting green energy, green building and sustainable agribusiness sectors (ABSA, 2025).
- To guide the origination and raising of green, social, and sustainable assets, the bank has developed a Sustainable Finance Issuance Framework. This framework proposes a three-step process for aligning asset origination and liability-raising efforts with sustainability goals. It entails screening and classifying potential eligible green and social assets or projects for presentation for approval and holding a Sustainable Asset Register.

- At the end of 2023, Absa Bank Kenya had deployed KES 59.8 billion in sustainable finance. Of this, climate and sustainability-linked finance comprises KES 22.3 billion, with KES 14.1 billion replicated in renewable and clean energy projects, KES 2.9 billion in green building initiatives, and KES 2.2 billion in climate-smart agriculture and other sustainability-linked loans (MUIGAI, 2024).
- Absa Bank Kenya plans to double its credit portfolio advanced under climate financing to KES 120 billion by 2025 (MUIRURI, 2023).
- Absa has implemented the Environmental and Social Risk Assessment (ESRA) guidelines to assess and incentivize customers with sustainable practices. The bank prioritizes capacity building to overcome challenges in advancing sustainable banking practices. It views regulatory frameworks like the Green Finance Taxonomy as crucial enablers that align the entire industry toward a common goal of sustainability (CNBC AFRICA, 2016).
- Absa Participated in a Sustainability-Linked Loan Program with a consortium of other local banks, including KCB, Standard Chartered Kenya, and Stanbic, in September 2024, raising KES 15 billion for Safaricom to invest in sustainability goals (REUTERS, 2024).
- Anchored into a strategic sustainability approach, Absa has a Sustainable Finance Issuance Framework stipulating how green, social, and sustainable assets should be raised. Through this framework, the bank has issued green bonds, with their proceeds redirected to projects for solar and wind renewable energy (ABSA, 2021).

4.1.5 NCBA Bank

- By 2030, NCBA has committed to mobilize KES 30 billion for green and sustainable financing as part of its broader sustainability agenda to continue supporting projects that promote environmental conservation and sustainable development (BUSINESS DAILY, 2023).
- In March 2024, NCBA secured a USD 50 million facility from Proparco, a private sector development subsidiary of the AFD Group that assists SMEs and financial inclusion. The funds will be used under NCBA's "Change The Story" sustainability agenda geared towards green financing and women’s economic empowerment in Kenya (BUSINESS DAILY, 2023).

- The bank, in conjunction with multiple stakeholders, had already planted over 7 million trees across many parts of Kenya by 2023. In June 2023, for example, NCBA donated and planted over 20,000 trees in Bungoma County to mark the World Environment Day.
- In collaboration with Boreka Group and Kitui County, NCBA planted 40,000 seedlings in November 2023 to create the NCBA Forest. It is part of their effort to plant 10 million trees by 2030 and further promote their environmental conservation works.
- By 2030, NCBA wants to cut 50% of its direct emissions. The bank has committed to leading a group-wide carbon audit to align its financed emissions with the 2015 Paris Agreement, a commitment to mitigate the impacts of climate change (BUSINESS DAILY, 2023).
- In 2023, NCBA launched a 2 billion program to finance borrowers who wanted to buy personal or public electric vehicles.
- In 2024, through a partnership with EVChaja, the bank installed 5 EV charging stations across Kenya and Rwanda (TECHSPACE AFRICA, 2024).
- Standard Chartered Bank
- In 2023, Standard Chartered Bank Kenya reported doubling revenue from sustainable finance activities, receiving KES 1.29 billion (approx. USD 8.9 M from KES 129 million) in 2022. A tenfold increase from its corporate clients, whose 90% of their activities are considered green (BUSINESS DAILY, 2024).
- Standard Chartered Bank has stated that it will lend significant funding to Chinese firms that follow green principles and are expanding their business in Africa. The idea is to take advantage of this and promote the sustainable improvement of the African continent’s consumption and production technologies, building a green transition in African economies.
- The bank has incorporated ESG into its operations and client services and its pursuit of sustainable business practices and responsible financing. In collaboration with ESG research providers, the bank has developed sustainability frameworks where criteria for 'sustainable' and 'green' products are defined so that capital flows toward environmentally sustainable economic activities.

- Together with a consortium of other banks, Standard Chartered financed a KES 15 billion sustainability-linked bank loan for Safaricom to help it pursue its sustainability goals (STANDARD CHARTERED, 2025).

4.1.6 Stanbic Bank

- Eco-loans portfolio at Stanbic Bank has grown by a huge measure of KES 16 billion. These loans go to fund renewable energy projects, sustainable agriculture, and energy-efficient infrastructure that helps businesses and communities switch to green practices.
- Stanbic is part of the Standard Bank Group and has helped mobilize more than $3 billion for renewable energy projects throughout Africa. This funding helps with solar, and wind projects, makes healthy energy efficiency investments and fosters the creation of efficient green buildings, and encourages the continent's sustainable growth and energy independence.
- Stanbic Bank aims to finance adaptation and mitigation projects such as green agriculture and energy transition. To provide accountability and transparency in its operations consistent with its aspirations under its sustainability, the bank has built frameworks and governance structures.
- As captured in its sustainability report, Stanbic has set out to allocate 10% of its total loan book to green financing by December 2023 and create a climate risk framework by August 2023. These goals reflect the bank's commitment to considering the environment when designing its financial services.
- The bank financed Kwenantle Farmers in Botswana with BWP 27 million to develop an additional 1MW solar plant. This project provides power to irrigation systems on a 264-hectare farm expansion as an example of the bank's support for sustainable agricultural practices (BOTSUNPLUGGED, 2024).

4.1.7 Diamond Trust Bank

- DTB plans to plant 10 million trees by 2030 through its MuchMoreThanTrees campaign. This is an effort to attenuate climate change and to conserve the environment (DTB AFRICA, 2023).
- DTB group bank has pledged to reach net zero carbon emissions by 2030 and raise its green project loans to 25% of its loan book.

- DTB is now a formal signatory to the UN Principles for Responsible Banking, which means DTB's business strategy is aligned with the SDGs and Paris Climate Agreement. This commitment also shows the bank is commitment to integrating sustainability into its core operations.
- DTB won the best bank case study (operations) category in 2024 – the awards honored institutions for their efforts in sustainable finance. The accolade is for the bank's innovative financial solutions to Kenya's socio-economic and environmental challenges (OBURA, 2024).

4.1.8 Housing Finance Company of Kenya (HFCK)

- To fuel green housing projects, HFCK secured up to a $16 million senior loan from the IFC. This funding is targeted for developing environmentally friendly residential properties having high energy efficiency and sustainability (IFC, 2025).
- HFCK is a partner in the GAHF program, an innovative financial instrument created by Reall and supporting the Global Innovation Lab for Climate Finance. The program seeks to promote sustainable low-income mortgage lending to help increase access to affordable green homes. Kenya is being piloted, which requires developing climate-smart housing solutions (REALL, 2025).
- To encourage eco-friendly construction practices, HFCK has also embraced sustainable real estate financing options such as green bonds and green mortgages. These financing products benefit the development of eco-friendly housing projects, lessening carbon emissions and creating higher energy efficiency in the real estate arena.
- HFCK has shaped a green finance ecosystem in Kenya to leverage the attraction, deployment and retention of green finance at scale. Through HFCK's financing model, environmental, social, and governance (ESG) considerations are incorporated into projects supporting sustainable development, particularly in the housing sector.

4.1.9 National Bank of Kenya

- 2019: NBK partnered with African Guarantee Fund (AGF) partnership
- To create a KES 1.13 billion loan portfolios guarantee to support the financing of Micro, Small, and Medium-sized Enterprises (MSMEs) in WASH, women-led businesses, and green enterprises in 2022. AGF provides

a 7-year guarantee on up to 50 percent of collateral requirements for qualifying facilities –70 percent for women and green SMEs alike – to unlock financing for sustainable projects.

- NBK has adopted Kenya Bankers Association (KBA) Sustainable Finance Guiding Principles in collaboration with IFC and WWF Kenya which constitute a framework for incorporating ESG concerns into the banking operations.
- Besides, NBK has embedded ESG practices while outlining its business strategy and operations, where it is keen to engage in sustainable financing with its customers and, in turn, encourage the customers to adopt more environmentally friendly practices. The bank's sustainability strategy is built upon strong governance, policies, and processes and is based on globally recognized environmental standards.
- To support its green financing activities, NBK applies the Kenya Green Finance Taxonomy (KGFT) as a classification system jointly developed by the Central Bank of Kenya (CBK) to categorize environmentally sustainable investments. While the KGFT aims to guide banks in green investment, it aims to do so by offering them a means to make informed green investment decisions, create consistency and transparency in green financing (NATIONAL BANK, 2025).

4.1.10 I&M Bank

- I&M Bank set up a Green Energy Fund in 2019 to support renewable energy projects, committing KES 6 billion (about USD 42.4 million). As of December 2022, more than 40 percent of this fund had already been disbursed to support different renewable energy ventures, including solar and biomass energy projects
- Over KES 2 billion loans have been disbursed by the bank to MSMEs under the green energy funding scheme which sums up to more than 33 per cent of the allocated funds. The use of this financing has allowed businesses to embrace clean energy solutions to decrease their carbon footprint and keep up a higher availability of energy.
- In seeking more green financing, I&M Bank has partnered with international agencies, including the International Finance Corporation (IFC) and FMO. These partnerships seek to enhance the bank's backing of its sustainable investments and expand its green financing bucket.

- In response to the rising demand for sustainable financial solutions, I&M Bank committed to adding KES 6 billion to its green energy fund. This expansion will support renewable energy projects, energy conservation projects, and green transportation projects in Kenya and across the region.
- I&M integrates ESG values into its lending activities.

4.2 Demographic and Descriptive Statistics

This section presents descriptive and inferential statistics exploring the study objectives and testing the study hypothesis, their interpretation and critical discussions.

4.2.1 Demographic Statistics

The results are based on a total of 387 responses collected through the research questionnaire which was a response rate of 77.4%. Table 3 presents a summary of descriptive results.

Table 3: Demographic Statistics

	Characteristics	Frequency	Percentage
Response Rate	Questionnaires Issued	500	
	Questionnaires Filled	387	
	Response rate		77.4%
Gender	Male	175	45%
	Female	212	55%
		387	**100%**
Education Background	Diploma	39	10%
	Bachelor's Degree	232	60%
	Master's degree	108	28%
	PhD. and above	8	2%
		387	**100%**
Work Experience	Less than 5 years	77	20%
	Between 6 to 10 years	120	31%
	Between 11 to 15 years	135	35%
	Between 16 to 20 years	39	10%
	21 years and above	16	4%
		387	**100%**
Bank Ownership	Foreign Owned	136	35%
	Locally Owned	251	65%
		387	**100%**
Bank Size	Large	171	44%
	Small	216	56%
		387	**100%**
Work Experience	Less than 5 years	77	20%
	Between 6-10 years	120	31%
	Between 11-15 years	135	35%
	Between 16-20 years	39	10%
	21 years and above	16	4%
		387	**100%**

Source: Author's work

The questionnaires were administered both physically and online to bank employees working at the management level, credit sections and sustainability departments for the banks with dedicated departments for sustainability-related operations. There was a good balance between both male (45%) and female gender (55%) and above 80% of the respondents have sufficient banking experience of over 6 years with majority (35%) ranging between 11 to 15 years. 44% of the respondents worked in what was classified as large banks (market share equal or greater than 9%) while 56% were from small banks, i.e. those with the market share of below 9%). The respondents were purposely selected to increase chances of getting feedback from respondents more likely informed about the bank's green financing initiatives.

4.2.2 Constructs Descriptive Statistics

Construct descriptive statistics measured in the form of measures of central tendencies, standard deviation, skewness and kurtosis were conducted to check if the dataset suffered from the possibility of outliers. According to COOKSEY (2020), a dataset exhibits a normal univariate distribution if its skewness and kurtosis values lie within the ±2 range. As shown in Table 4, all values for kurtosis and skewness are within the recommended range, and the data did not suffer from any extreme outliers.

Most of the constructs have a median of 4 indicating that generally the respondents agreed with the statements placed to them regarding the implementation of the green financing initiatives except for the question on whether banks have set green banking policies that restrict certain thresholds lending to polluting sectors where majority of the respondents were unsure. The standard deviation range from (0.85 to 1.07) indicating that the responses were moderately spread but still clustered around the mean. Majority of the latent constructs are negatively skewed towards the values 4 and 5 further confirming high level agreeableness among the respondents. The negative skewness (-0.3 to -1.2) indicate a flatter distribution showing that the responses are relatively spread out while the Cramer-von Mises p-value (0.000) indicate that the distribution of response significantly deviates from a uniform distribution.

Table 4 summarizes results for mean, median, standard deviation, excess kurtosis and skewness.

Table 4: Constructs Descriptive Statistics

Name	Mean	Median	Std. D	Excess kurtosis	Skewness	Cramer-von Mises p value
Communication Channels	4.158	4.000	0.871	-0.322	-0.736	0.000
Workshops_Seminars	4.093	4.000	0.910	-0.473	-0.680	0.000
Events_Sponsorship	4.158	4.000	0.874	-0.065	-0.825	0.000
Green_Metrics_Reporting	4.217	4.000	0.856	0.003	-0.879	0.000
Awareness_Rating	4.168	4.000	0.838	0.067	-0.812	0.000
Emp_Init_Employee_Initiatives	4.199	4.000	0.917	-0.333	-0.848	0.000
Ops_Init_Operations_Initiatives	4.163	4.000	0.913	-0.471	-0.757	0.000
Cust_Init_Customer_Initiatives	4.199	4.000	0.892	-0.240	-0.841	0.000
Green_lending_Banking_Policies	2.535	3.000	0.983	-0.480	-0.008	0.000
Green_Products_Design	4.147	4.000	0.884	-0.335	-0.743	0.000
Climate Risk Policies	4.039	4.000	1.007	-0.736	-0.672	0.000
Climate_Risk_KPIs	4.036	4.000	1.011	-0.867	-0.615	0.000
Climate_IT_Systems	4.021	4.000	0.985	-0.765	-0.611	0.000
Climate_Resource_Allocation	4.021	4.000	1.029	-0.724	-0.698	0.000
Climate_Roles_Responsibilities	4.036	4.000	0.966	-0.815	-0.573	0.000
Cost Savings	3.974	4.000	1.051	-0.983	-0.564	0.000
Statement_of_Financial_Position	3.964	4.000	1.075	-1.010	-0.579	0.000
Access_to_International_Market	3.961	4.000	1.047	-1.083	-0.492	0.000
Brand_Image_Reputation	3.995	4.000	1.064	-0.988	-0.597	0.000
FP_Climate_Risk_Management	3.982	4.000	1.077	-1.024	-0.587	0.000
Bank_Ownership	0.000	0.000	0.000	0.000	0.000	0.000
Bank_Size	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's work

4.3 Instrument Reliability and Validity

While determining the relevant quality criteria to carry out, it is important to identify the type of model used i.e. whether it is reflective or formative to determine the relevant quality criteria checks associated with the model (BYON and JANG, 2024). This study adopted a type II hierarchical component model where the relationship between the low-order constructs (LOCs) i.e. (GFI, GBI, CRM) and financial performance (FP) was reflective-reflective while the relationship between the high-order constructs (HOC) i.e. GFI and financial performance was formative-reflective.

As such, it was important to check for the validity of the measurement model (reflective model) for the three LOCs and financial performance and afterwards assess the validity of the reflective-formative model i.e. HOC and Financial performance. The construct and convergent reliability of the measurement model (reflective-reflective) was assessed using Cronbach alpha, composite reliability (rho_a, rho_c), the Average variance extracted (AVE), Variance Inflation factor (VIF) for assessing multicollinearity, outer weights/loadings, explained variance (R^2) and predictive relevance. The quality criteria for the formative-

reflective model, i.e. HOC and FP were assessed by checking collinearity through VIF, significance of the p-values for the outer weights and standard values through bootstrapping. To enhance readability, easier presentation and interpretation of results, Table 5 summarizes the full meaning of the codes/acronyms used to refer to the latent variables and item constructs.

Table 5: Acronyms and Full Meaning

	Acronym	Full Meaning
Latent Variables	GFA	Green Financing Awareness
	GBI	Green Banking Initiatives
	CRM	Climate Risk Management
	FP	Financial Performance
	GFI	Green Financing Initiatives
Latent Constructs	GFA_1	Awareness Channels
	GFA_2	Workshops and Seminars
	GFA_3	Events and Sponsorships
	GFA_4	Green Metrics Reporting
	GFA_5	Green Awareness Rating
	GBI_1	Employee-Centric Green Banking Initiatives
	GBI_2	Operations-Centric Green Banking Initiatives
	GBI_3	Customer-Centric Green Banking Initiatives
	GBI_4	Policy-Centric Green Banking Initiatives
	GBI_5	Green Loan Products
	CRM_1	Climate Risk Control Measures
	CRM_2	Climate Risk KPI's
	CRM_3	Climate IT systems
	CRM_4	Climate Resource Allocation
	CRM_5	Climate Roles and Responsibilities
	FP_1	Access to International Market
	FP_2	Enhanced brand Image and Reputation
	FP_3	Long-term Capacity for CRM
	FP_4	Cost Savings from Green Banking Activities
	FP_5	Enhanced Financial Position due to Green Products

Source: Author's work

4.3.1 Construct Reliability

Construct reliability is the degree to which a variable is consistent with what it intends to measure (ABURUMMAN et al., 2023). This test is important in establishing dependability and reliability while applying Structural Equation Modelling (SEM) and similar techniques such as Confirmatory Factor Analysis (CFA). Composite Reliability (CR) and Cronbach's Alpha (CA) are the two most popular tests for construct reliability. CR focuses on the average variance among the observed items, is based on factors loadings and does not assume the tau-equivalence of the items. It accounts for the fact that some items may contribute more to measuring a given construct than others and, therefore, allows for different factor loadings for each of the observable items. This assumption makes the CR measure more realistic and flexible for real-world applications.

Cronbach's Alpha (CA), on the other hand, focuses on the average correlation among the observed items and assumes tau-equivalence. Unlike CR, Cronbach's Alpha does not require the creation of a structural model for calculation. To calculate both easily in smart PLS, the first step was to create a PLS-SEM model clearly defining the relationship between three independent variables as the low-order latent constructs, the green finance strategy (GFS) as the high-order construct (HOC) and the relevant financial performance metric as the dependent variable. Combining both measures boosts the dependability of the construct's reliability results, as the two methods evaluate the validity and reliability differently, leveraging on the advantages of each of them. Also, it is argued that the Cronbach Alpha is more conversant and has been used widely for many years, while Composite Reliability (CR) is more flexible due to the tau-equivalence assumption. In both CR and CA, the acceptable threshold is 0.7 (ABURUMMAN et al., 2023; BYON and JANG, 2024).

4.3.2 Convergent Reliability

Convergent reliability assesses whether those items in a survey measuring the same construct are highly correlated. In this study, convergent reliability was measured using the average variance extracted (AVE). This statistical measure (AVE) shows how well items represent the constructs by quantifying the average variance an item represents relative to the variance caused by measurement error. The AVE scores range between 0 and 1, the higher the better, but a commonly acceptable threshold for this test is 0.5 (ABURUMMAN et al., 2023). The results are summarized in Table 6.

The construct reliability and convergent validity tests were conducted by running the Partial Least Square SEM model. The first evaluation was done on the measurement model (Outer model) while the second evaluation was done on the structural model (inner model) and finally, the overall model fitness test was examined. The PLS-SEM algorithm was run using the path weighting scheme and reporting was done based on standardized results. The path weighting scheme was preferred as it applies to all kinds of PLS path models and gives the highest R^2 values for endogenous constructs. After running the standard PLS algorithm, the following results were obtained as presented in Table 6.

Table 6: Reliability and Validity Results before Removal of Items with Lower Loadings

1st quality criteria test results	Latent Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)	Decision Criteria
Reliability and validity results before removal of items with lower loadings	**CRM**	0.937	0.938	0.952	0.800	Passed
	FP	0.957	0.957	0.967	0.853	Passed
	GBI	0.896	0.897	0.923	0.707	Passed
	GFA	0.538	0.627	0.718	0.365	Failed

Source: Author's work

As revealed above, the variables CRM, FP, and GBI met all the four minimum construct and convergent reliability criteria. As for the GFA, it met the composite reliability (rho_c) of ≥ 0.7 but failed the other three. To solve this problem, the outer loadings results were referred to identify the items with lower loadings below the minimum threshold of 0.4. The outer loading results are summarized in Table 7.

Table 7: Outer Loadings Before Removal of Weak Items

Indicator to Construct Mapping	Outer loadings	Action
CRM_1 <- CRM	0.875	Retain
CRM_2 <- CRM	0.899	Retain
CRM_3 <- CRM	0.893	Retain
CRM_4 <- CRM	0.910	Retain
CRM_5 <- CRM	0.893	Retain
FP_1 <- FP	0.921	Retain
FP_2 <- FP	0.914	Retain
FP_3 <- FP	0.932	Retain
FP_4 <- FP	0.927	Retain
FP_5 <- FP	0.924	Retain
GAI_1 <- GFA	0.720	Retain
GAI_2 <- GFA	0.762	Retain
GAI_3 <- GFA	0.701	Retain
GAI_4 <- GFA	0.446	Remove
GAI_5 <- GFA	0.221	Remove
GBI_1 <- GBI	0.842	Retain
GBI_2 <- GBI	0.870	Retain
GBI_3 <- GBI	0.792	Retain
GBI_4 <- GBI	0.838	Retain
GBI_5 <- GBI	0.859	Retain

Source: Author's work

As shown in the outer loading results above, some item constructs of the green awareness initiatives latent variable i.e. GAI_4, and GAI_5 on green metrics reporting and green awareness ratings respectively were found to have outer loadings below the minimum threshold required correlation score of 0.4 affecting the validity and reliability of the GAI latent construct. Therefore, the two items show potential for being problematic to the model and were removed. After re-running the reliability and validity test again, the quality criteria for Cronbach alpha composite reliability and average variance extracted (AVE) were now met. The results of the second quality criteria check are summarized in Table 8.

Table 8: Reliability and Validity after the Removal of Non-Qualifying Items

2nd quality criteria test results	Latent Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)	Items Removed
Reliability and validity results after removal of items with lower loadings	**CRM**	0.937	0.937	0.952	0.800	Nil
	FP	0.957	0.957	0.967	0.853	Nil
	GBI	0.896	0.896	0.923	0.799	Nil
	GFA	0.700	0.702	0.789	0.555	2
	GFI	0.949	0.954	0.956	0.646	Nil

Source: Author's work

As shown in the results in Table 8, all the variables meet the construct reliability acceptable criteria for Cronbach's alpha and Composite reliability (rho_a) and (rho_c) as all variables have values ≥ 0.7. Similarly, all the variable constructs meet the convergent validity minimum requirement of AVE values of ≥ 0.5. The AVE values for the variables are Climate Risk Management Constructs (CRM) (0.800), Green Banking Initiatives (GBI) (0.799), Green Financing Awareness initiatives (GFA) (0.555), Green Finance Strategy (GFS) (0.646) and Banks' Financial Performance (0.853).

4.3.3 Discriminant Validity (DV)

This test examines if the latent constructs are unique to other constructs in the model. It helps to make sure that there is no redundancy among or between constructs implying that the construct measures are distinct. To check for the existence of discriminant validity, this study assessed the latent variables cross-loadings and also checked for the Fornell Larcker Criterion (FLC) criteria. Cross-loadings help to ensure that the observable indicators load more strongly in the latent construct, it is measuring than on other latent constructs. The basic

rule for the FLC is that the square root of AVE for a construct should be greater than its correlations with the other constructs. The results indicated good discriminant validity for all the latent items as they all load at least higher than 0.1 in the latent variables they are measuring. The results and interpretation for the cross-loadings are summarized in Table 9.

Table 9: Discriminant Validity Cross-loading Results and Interpretation

	CRM	FP	GBI	GFA	Interpretation
CRM_1	0.875	0.737	0.785	0.654	Pass
CRM_2	0.899	0.762	0.793	0.630	Pass
CRM_3	0.893	0.756	0.776	0.631	Pass
CRM_4	0.910	0.769	0.791	0.630	Pass
CRM_5	0.893	0.767	0.790	0.665	Pass
FP_1	0.780	0.921	0.726	0.664	Pass
FP_2	0.760	0.914	0.712	0.625	Pass
FP_3	0.799	0.932	0.748	0.661	Pass
FP_4	0.790	0.927	0.738	0.720	Pass
FP_5	0.786	0.924	0.735	0.710	Pass
GAI_1	0.563	0.550	0.515	0.736	Pass
GAI_2	0.549	0.580	0.513	0.774	Pass
GAI_3	0.489	0.506	0.444	0.724	Pass
GBI_1	0.733	0.656	0.842	0.541	Pass
GBI_2	0.755	0.685	0.870	0.599	Pass
GBI_3	0.763	0.651	0.792	0.523	Pass
GBI_4	0.719	0.666	0.838	0.560	Pass
GBI_5	0.729	0.674	0.859	0.549	Pass

Source: Author's work

4.3.4 The Fornell Larcker Criterion (FLC)

The Fornell Larcker Criterion (FLC) results were referred to further confirm the existence of discriminant validity in the SEM. As observed in the FLC Table 10, all the diagonal values representing the square roots of the AVE values for the latent constructs are greater than other values within their corresponding columns and rows, confirming discriminant validity.

Table 10: Fornell Larcker Criterion (FLC) Results

Latent Variables	CRM	FP	GBI	GFA
CRM	0.894			
FP	0.848	0.924		
GBI	0.880	0.793	0.893	
GFA	0.718	0.733	0.660	0.745

Source: Author's work

4.3.5 Collinearity Test

To check if there exists a multicollinearity problem, the VIF test was run. The aim was to check if the latent variables' VIF values fell within the acceptable limit of ≤5. After running the collinearity test, the results indicated that all the VIFs are within the acceptable ceiling limit of ≤5. Although high VIF values were noted for the latent constructs FP_1 to FP_5, there is no evidence to prove that there is a multicollinearity problem as all values fall below the acceptable threshold. The results are summarized in Table 11.

Table 11: Collinearity Results for the Reflective-Reflective Locs-FP Model

	VIF	Decision Criteria
CRM_1	2.851	VIF ≤5, Acceptable.
CRM_2	3.434	VIF ≤5, Acceptable.
CRM_3	3.252	VIF ≤5, Acceptable.
CRM_4	3.737	VIF ≤5, Acceptable.
CRM_5	3.219	VIF ≤5, Acceptable.
FP_1	4.348	VIF ≤5, Acceptable.
FP_2	4.066	VIF ≤5, Acceptable.
FP_3	4.885	VIF ≤5, Acceptable.
FP_4	4.560	VIF ≤5, Acceptable.
FP_5	4.458	VIF ≤5, Acceptable.
GAI_1	1.178	VIF ≤5, Acceptable.
GAI_2	1.226	VIF ≤5, Acceptable.
GAI_3	1.203	VIF ≤5, Acceptable.
GBI_1	2.289	VIF ≤5, Acceptable.
GBI_2	2.617	VIF ≤5, Acceptable.
GBI_3	1.872	VIF ≤5, Acceptable.
GBI_4	2.299	VIF ≤5, Acceptable.
GBI_5	2.482	VIF ≤5, Acceptable.

Source: Author's work

4.3.6 Common Method Bias Test (CMB)

According to KOCK (2017), the full collinearity test i.e. the VIF test above has been proved to be a sufficient measure for testing the common method biases (CMB) however, for avoidance of doubt I went further to investigate the potential of the CMB given that the major source of the data was self-reported surveys, using the marker variable technique with Bank Size as the marker variable. This variable was chosen since it is theoretically independent to the primary study constructs and can be tested using the same survey approach. Correlation study showed minimal correlations between Bank Size and the substantive constructs, with none

surpassing ±0.21 and most below ±0.10 (KOCK (2017). These findings suggest that common technique bias is unlikely to be a serious worry, bolstering the study's conclusions.

After confirming that all the latent constructs measuring the four latent variables met the reflective quality criteria as documented above, a High-order construct (HOC) i.e. Green Financing Initiatives (GFI) was introduced into the model. To confirm if the quality criteria was retained after the introduction of the HOC latent variable, the collinearity test was run again, and the significance of outer weights and outer loadings were also conducted to determine if the t-statistics were ≥ 1.96 and significant (p≤0.05) (Table 12).

Table 12: Significance of Path Coefficients

	Original sample (O)	Sample mean (M)	Std. deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision Criteria All Acceptable
CRM_1 <- GFI	0.862	0.862	0.012	72.718	0.000	*p≤0.05, t>1.96*
CRM_1 <- CRM	0.876	0.876	0.012	75.773	0.000	*p≤0.05, t>1.96*
CRM_2 <- GFI	0.876	0.876	0.011	82.499	0.000	*p≤0.05, t>1.96*
CRM_2 <- CRM	0.899	0.899	0.009	99.433	0.000	*p≤0.05, t>1.96*
CRM_3 <- CRM	0.893	0.893	0.009	94.405	0.000	*p≤0.05, t>1.96*
CRM_3 <- GFI	0.861	0.861	0.013	68.569	0.000	*p≤0.05, t>1.96*
CRM_4 <- CRM	0.909	0.909	0.008	113.267	0.000	*p≤0.05, t>1.96*
CRM_4 <- GFI	0.872	0.871	0.011	76.601	0.000	*p≤0.05, t>1.96*
CRM_5 <- GFI	0.873	0.873	0.011	77.572	0.000	*p≤0.05, t>1.96*
CRM_5 <- CRM	0.893	0.893	0.010	91.982	0.000	*p≤0.05, t>1.96*
FP_1 <- FP	0.921	0.921	0.008	118.847	0.000	*p≤0.05, t>1.96*
FP_2 <- FP	0.914	0.914	0.008	114.008	0.000	*p≤0.05, t>1.96*
FP_3 <- FP	0.932	0.932	0.007	140.564	0.000	*p≤0.05, t>1.96*
FP_4 <- FP	0.927	0.926	0.007	126.919	0.000	*p≤0.05, t>1.96*
FP_5 <- FP	0.924	0.924	0.007	125.915	0.000	*p≤0.05, t>1.96*
GAI_1 <- GFA	0.746	0.746	0.023	31.756	0.000	*p≤0.05, t>1.96*
GAI_2 <- GFA	0.766	0.765	0.024	31.767	0.000	*p≤0.05, t>1.96*
GAI_3 <- GFA	0.722	0.722	0.028	25.447	0.000	*p≤0.05, t>1.96*
GBI_1 <- GFI	0.828	0.828	0.017	48.011	0.000	*p≤0.05, t>1.96*
GBI_1 <- GBI	0.843	0.843	0.015	55.966	0.000	*p≤0.05, t>1.96*
GBI_2 <- GFI	0.802	0.802	0.016	48.752	0.000	*p≤0.05, t>1.96*
GBI_2 <- GBI	0.871	0.870	0.013	67.082	0.000	*p≤0.05, t>1.96*
GBI_3 <- GBI	0.793	0.792	0.017	46.032	0.000	*p≤0.05, t>1.96*
GBI_3 <- GFI	0.796	0.796	0.019	41.388	0.000	*p≤0.05, t>1.96*
GBI_4 <- GFI	0.787	0.787	0.018	43.617	0.000	*p≤0.05, t>1.96*
GBI_4 <- GBI	0.837	0.837	0.017	49.688	0.000	*p≤0.05, t>1.96*
GBI_5 <- GFI	0.791	0.790	0.020	39.461	0.000	*p≤0.05, t>1.96*
GBI_5 <- GBI	0.858	0.858	0.012	70.403	0.000	*p≤0.05, t>1.96*
GFA_1 <- GFI	0.612	0.612	0.031	19.769	0.000	*p≤0.05, t>1.96*
GFA_2 <- GFI	0.609	0.608	0.035	17.617	0.000	*p≤0.05, t>1.96*
GFA_3 <- GFI	0.544	0.544	0.035	15.339	0.000	*p≤0.05, t>1.96*

Source: Author's work

4.3.7 Heterotrait-Monotrait Ratio (HTMT)

To confirm if discriminant validity was still present after the HOC was introduced, the HTMT (Bias-Corrected) ratio was computed based on the new hierarchical model. HTMT is a popular measure for discriminant validity tests applied in PLS-SEM that helps determine whether two latent constructs are unique (DIRGIATMO, 2023). It establishes if discriminant validity has been established or violated by comparing hetero-trait correlations (between different constructs) and mono-trait correlations (within the same constructs) (ROEMER et al., 2021). The Bias Corrected Bootstrapping (Bca) was preferred over percentile bootstrapping due to its ability to minimize systemic errors making the results more reliable and less susceptible to type 1 and type II errors.

The expectation is that if the constructs are truly distinct, then hetero-trait correlations should be less than mono-trait correlations. If otherwise, it would then imply that the constructs could not be distinct enough to be said to be measuring a different thing. As a rule of thumb, an HTMT ratio of <0.85 indicates that discriminant validity is established, but an HTMT ratio of <0.90 is acceptable (EL-AMMARI et al., 2023). A ratio of >0.90 signals a potential overlap of the constructs (RHAYHA and ALAOUI ISMAILI, 2024). If the bias-corrected HTMT confidence intervals (CI) include 1.00, the constructs are not unique, and discriminant validity is therefore violated (SHARIF-NIA et al., 2024). The acceptable threshold is that the CI should not include 1.00. Table 13 below summarizes the HTMT results.

Table 13: HTMT Discriminant Validity Results

Construct Pair	Original Sample (O)	Sample Mean (M)	Bias	2.5% CI	97.5% CI
FP <-> CRM	0.722	0.838	0.004	0.734	0.761
GBI <-> CRM	0.742	0.786	-0.001	0.796	0.751
GBI <-> FP	0.748	0.763	-0.001	0.793	0.795
GFA <-> CRM	0.715	0.821	-0.001	0.817	0.820
GFA <-> FP	0.782	0.743	0.003	0.711	0.826
GFA <-> GBI	0.788	0.720	-0.003	0.748	0.811
GFI <-> CRM	0.714	0.812	-0.002	0.790	0.826
GFI <-> FP	0.716	0.724	0.000	0.817	0.799
GFI <-> GBI	0.803	0.707	0.004	0.813	0.842
GFI <-> GFA	0.82	0.706	-0.003	0.756	0.847

Source: Author's work

The HTMT tests confirmed that all the constructs fell within the acceptable discriminant validity criteria as all the values fell below 0.85 with (FP<-> CRM) having the highest value of 0.838 and all others

having lower values. There is minimal bias (-0.003 to 0.004) and there are no values close to 1 present in the upper bound (97.5%, CI) confirming that discriminant validity is upheld implying that although the latent variables are interconnected, they are measuring different aspects of green financing initiatives.

To further confirm if the minor bias signals any problem, the VIF test incorporating both the LOCs and the HOC indicators was run to check if the VIF values were within acceptable range. After running the collinearity check, it was, established that all the VIF values were below ≤5 which is below the acceptable threshold of <10 as suggested by (O'BRIEN, 2007). The results are summarized in Table 14.

Table 14: Collinearity Statistics VIF (Outer Model)

	VIF
CRM_1	2.851
CRM_1	3.364
CRM_2	3.701
CRM_2	3.434
CRM_3	3.252
CRM_3	3.442
CRM_4	3.919
CRM_4	3.737
CRM_5	3.620
CRM_5	3.219
FP_1	4.348
FP_2	4.066
FP_3	4.885
FP_4	4.560
FP_5	4.458
GAI_1	1.520
GAI_1	1.178
GAI_2	1.226
GAI_2	1.462
GAI_3	1.203
GBI_1	2.289
GBI_1	2.508
GBI_2	2.888
GBI_2	2.617
GBI_3	1.872
GBI_3	2.518
GBI_4	2.299
GBI_4	2.538
GBI_5	2.482
GBI_5	2.602

Source: Author's work

4.3.8 Q^2 Predict MV summary

The Q^2 values were computed to determine the predictive relevance of the structural equation model. This study utilized PLSpredict which is a new method in smart PLS used to compute the predictive relevance of the model

as an improvement to the traditionally used blindfolding method. PLSpredict is more robust, accurate, advanced and modern than blindfolding. Unlike blindfolding, PLSpredict utilizes a separate set of prediction errors including Mean Absolute Error (MAE) and Root Mean Square Error (RMSE) to assess how well a model generalize data (CHEAH et al., 2024). Contrastingly, blindfolding calculates predictive relevance by re-using the data points. In addition, it provides a comprehensive view allowing for comparison of the PLS model with other modelling approaches such as linear models (CHIN et al., 2020). The decision criteria for interpreting PLSpredict are that if the Q^2 values are close to 1, it implies that there is good predictive relevance in the model. According to HAIR et al. (2019), if Q^2 values range from 0.02 to 0.35, the model has small to moderate predictive relevance. Q^2 values above 0.36 to 1 indicate high predictive relevance.

Based on the study results, Green Financing Awareness constructs have relatively moderate predictive relevance as shown by the Q^2 values (GFA_1 (Q^2 = 0.373), GFA_2 (Q^2 = 0.367), GFA_3 (Q^2 = 0.291). All the Q^2 values are above the minimum threshold of 0.02.

Table 15: Q^2 Predict MV Summary Results

	Q^2 predict
FP_1	0.625
FP_2	0.590
FP_3	0.655
FP_4	0.657
FP_5	0.648
CRM_1	0.741
CRM_2	0.766
CRM_3	0.740
CRM_4	0.758
CRM_5	0.762
GBI_1	0.684
GBI_2	0.642
GBI_3	0.632
GBI_4	0.618
GBI_5	0.623
GFA_1	0.373
GFA_2	0.367
GFA_3	0.291

Source: Author's work

The Q^2 values for green banking constructs indicate relatively high predictive relevance ranging from 0.618 to 0.684 (GBI_1= 0.684, GBI_2 = 0.642, GBI_3 = 0.632, GBI_4 =0.618 and GBI_5 =f 0.623). A similar case for financial performance indicators whose Q^2 values range from 0.590 to 0.657 (FP_1= 0.625, FP_2 =

0.590, FP_3 = 0.655, FP_4 = 0.657, and FP_5 = 0.648). Climate Risk Management (CRM) Q^2 values however had the highest predictive relevance with Q^2 values ranging from 0.740 to 0.766 (CRM_1= 0.741, CRM_2 = 0.766, CRM_3 = 0.740, CRM_4 =0.758, and CRM_5 = 0.762). These results are summarized in Table 15.

4.3.9 Robustness Check – PLS-SEM vs. Indicator average (IA)

To further validate the PLS-SEM model, its loss i.e. prediction error was compared to another model i.e. Indicator Based-Average Loss as a simpler benchmark to assess the PLS-SEM model's accuracy. To enhance comparability, the two models compute the prediction errors using the latent indicators individually without considering the latent variable structure. This test provides a comparative report on how much loss each model has and tests whether the difference in the losses from each model is statistically significant (RINGLE and SARSTEDT, 2016). The table below shows that PLS loss is relatively lower for both FP and GFI latent variables i.e. FP (0.629<1.726, t=15.488, p=0.000) and their t-values are statistically significant GFI (0.470 <1.276, t=18.375, p= 0.000). Overall, the prediction accuracy of the PLS-SEM model compared to the IA model is statistically significant (t=18.649, p=0.000). These results are summarized in Table 16 below as follows.

Table 16: CVPAT LV Summary – PLS-SEM vs. Indicator Average (IA)

	PLS loss	IA loss	Average loss difference	t-value	p-value
FP	0.629	1.726	-1.097	15.448	0.000
GFI	0.470	1.276	-0.806	18.375	0.000
Overall	0.514	1.401	-0.887	18.649	0.000

Source: Author's work

4.3.10 Overall Model Fitness

The fitness of the model was assessed by the Standardized Root Mean Square Residual (SRMR) and d_ULS measures. SRMR measures the average discrepancy between the predicted and observed correlations (PAVLOV et al., 2021). The smaller the better, however, an SRMR ≤ 0.08 is acceptable (INTIMAYTA-ESCALANTE et al., 2025). The d_ULS uses the unweighted least square estimations to assess model fitness by measuring how well the model fits the data (RASOOLIMANESH et al., 2019). The results of this study show that the SRMR for the saturated and estimated models are all <0.08 and within the acceptable threshold (saturated= 0.044 and estimated= 0.044) respectively. The d_ULS and the d_G (Geodesic Discrepancy) all measure the discrepancy between implied and observed covariance matrices. While there is no established criteria for interpreting the

d_ULS and d_G results independently, the lower the values the better fit the model is. Notably, the estimated and saturated values for both d_ULS and d_G i.e. (0.330) and (0.218) respectively all match indicating consistency in the model fit tests of both models and measures. As the d_ULS and d_G results do not provide sound criteria to comment on the model fitness, the Normed Fit Index (NFI) is used to re-affirm the model fitness. The NFI compares the estimated model fit to the null or baseline model. Its rule of thumb is that, if the value ≥ 0.90, then the model is an acceptable fit (MCNEISH et al., 2018). In this case, the NFI value is 0.929 indicating the model is a good fit. The model fit results are summarized in Table 17.

Table 17: Model Fit Results

	Saturated model	Estimated model
SRMR	0.044	0.044
d_ULS	0.330	0.330
d_G	0.218	0.218
Chi-square	456.137	456.137
NFI	0.929	0.929

Source: Author's work

4.4 Coefficient of Determination (R^2)

The R^2 value is also used to test the sample consistency of the model used. The rule of the thumb according to CHENG et al. (2014), is that for the SEM to be valid, the R^2 value of the endogenous variable must be >0.1. An R^2 of less than 0.5 is considered weak, 0.5 is considered moderate and R^2 >0.5 is considered strong. In this case, the R^2 (0.746, t=37.347, p=0.000) indicates that green financing initiatives collectively (GFI) explains about 74.6% of the variances in financial performance (FP). The adjusted R^2 (0.746, t=37.217, p=0.000) is nearly identical implying that the model is robust, and additional predictors are not inflating the models' explanatory power unnecessarily further confirming the model's fitness. Table 18 summarizes the results of the Coefficient of Determination (R^2).

Table 18: Coefficient of Determination (R^2)

	R-Square				
	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
GFI<-> FP	0.746	0.747	0.020	37.347	0.000
	Adjusted R-Square				
GFI<-> FP	0.746	0.746	0.020	37.217	0.000

Source: Author's work

4.5 Bootstrapping and Hypothesis Testing

After the validity, reliability, predictive relevance and fitness of the measurement model were established without a doubt, the bootstrapping approach was used to test the study hypothesis. Bootstrapping measures the significance of the PLS coefficients by employing resampling methods (STREUKENS and LEROI-WERELDS, 2024). The bootstrapping approach was done based on a 95% confidence level, 5000 samples and utilized the bias-corrected and accelerated bootstrap confidence interval (Bca) option. The aim was to test the direct and indirect effect of green financial initiatives on financial performance through testing *seven* study hypotheses where *three* of them established the direct relationship between the three LOCs i.e. GAI, GBI and CRM on the dependent variable Financial Performance (FP).

4.5.1 Hypothesis Testing Results

The other *three* examined how the three LOCs interacted with the HOC i.e. GFI and *one* hypothesis examined how the HOC i.e. GFI interacted with the dependent variable financial performance (FP). The criteria for rejecting or failing to reject the hypothesis was based on the statistical significance of the path coefficients. All eight hypotheses were supported as all the t-values were found to be statistically significant i.e. $p \leq 0.05$. The results indicate that CRM positively impacts banks' FP (CRM -> FP, t = 65.307, p= 0.000), CRM impacts GFI positively and the relationships are significant (CRM -> GFI, t-70.055, p=0.000) therefore supporting hypothesis 1a and 1b.

GBI positively impacts FP and HOC as indicated by (GBI -> FP, t = 53.669, P=0.000, GBI -> GFI, t=69.497, p= 0.000) respectively, therefore, supporting hypotheses 2a and 2b. Similarly, GFA positively impacts FP (t=24.193, p=0.000), and has a positive significant impact on GFI (t=26.985, p = 0.000) therefore supporting hypotheses 3a and 3b. Lastly, green financial initiatives (GFI) positively influence banks' financial performance, and the relationship is statistically significant (t= 74.572, p=0.000).

4.5.2 Direct and Indirect Effects on Financial Performance

The positive coefficients (CRM → FP, total effect = 0.420) indicate that CRM has a moderate effect on banks' financial performance (FP). Similarly, GBI → FP total effects = 0.357, t=53.669, p=0.000) also reveals a moderate direct impact on FP. Comparatively, Green Financing Awareness (GFA) has a relatively weaker total

effect on FP (total effects = 0.146, t = 24.193, p = 0.000). Collectively, Green Financing Initiatives (GFI) has the highest impact on FP (total effect = 0.864, t=74.572, p=0.000), implying that active engagements with green financing initiatives result in notable financial benefits on cost savings, revenue from green products and enhanced brand reputation.

4.5.3 Direct and Indirect Effects on Green Financing Initiatives (GFI)

CRM depicts a strong positive impact on GFI (total effects = 0.486, t=70.055, p = 0.000), suggesting that banks which have integrated strong climate risk management policies are highly likely to engage in green financing activities. GBI also exhibits a similar strong positive effect on financial performance (FP) (total effects = 0.413, t = 69.487, p = 0.000), potentially implying that banks engaged with policy and operations-related, customer and employee-centric green banking practices are more likely to engage in green financing. Notably, GFA has the smallest but positive and significant impact on GFI (total effects = 0.169, t =26.985, p=0.000) implying that while promoting green awareness is essential, practical measures such as green banking and climate risk management initiatives play the most important role in informing the overall green financing initiatives undertaken by the listed Kenyan banks.

In conclusion, the Green Financing Initiatives (GFI) have the strongest impact on financial performance (total effect = 0.864). GBI and CRM strongly influence the overall green financing initiatives (GFI), supporting the notion that banks can leverage structured climate risk management and green banking policies to exploit the opportunities brought about by climate change.

The weak effect of green awareness initiatives reveals the need to combine green awareness initiatives with other actionable strategies to realize improved financial performance from green financing activities. Table 19 summarizes the path coefficient significance results.

Table 19: Path Coefficient Significance Results

No.	Ha	Variable Relationships	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
1.	**1a**	**CRM -> FP**	0.420	0.420	0.006	65.307	0.000	*Supported*
2.	**1b**	**CRM -> GFI**	0.486	0.486	0.007	70.055	0.000	*Supported*
3.	**2a**	**GBI -> FP**	0.357	0.357	0.007	53.669	0.000	*Supported*
4.	**2b**	**GBI -> GFI**	0.413	0.413	0.006	69.497	0.000	*Supported*
5.	**3a**	**GFA -> FP**	0.146	0.146	0.006	24.193	0.000	*Supported*
6.	**3b**	**GFA -> GFI**	0.169	0.169	0.006	26.985	0.000	*Supported*
7.	**4a**	**GFI -> FP**	0.864	0.864	0.012	74.572	0.000	*Supported*

Source: Author's work

To easily visualize the results, Figure 4 below presents the model results with the p values for all the hypotheses tested respectively.

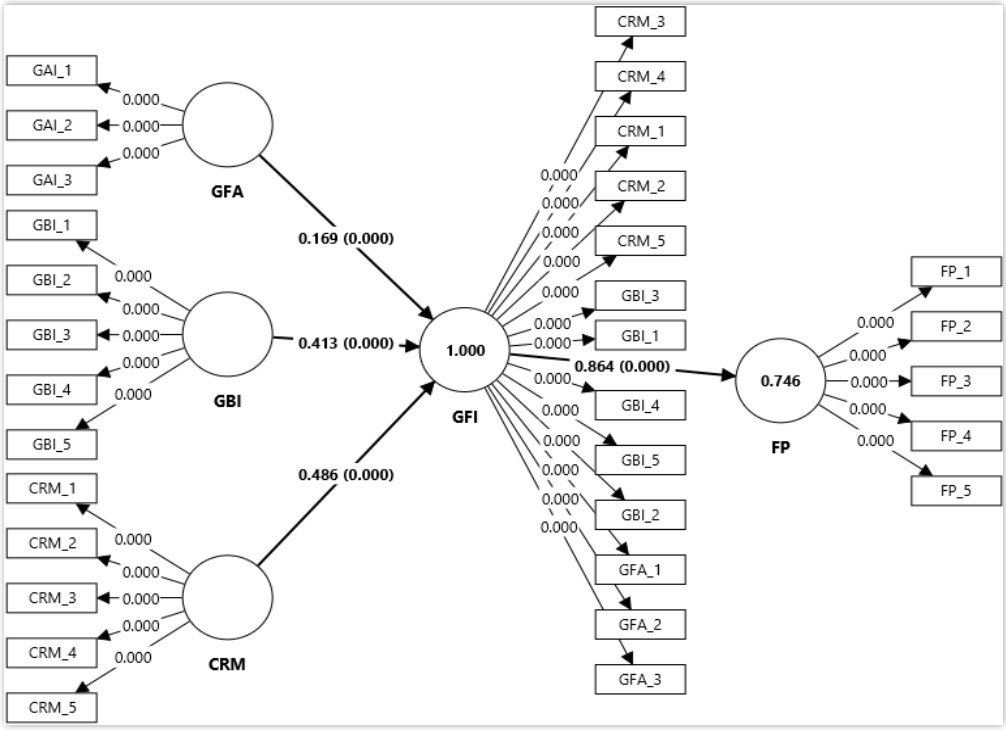

Figure 4: P-Values of tested hypothesis

Source: Author's work

4.6 Bootstrapping Multi-Group Analysis

Multi-group analysis was used to pursue the fourth and fifth objectives, which aimed at determining whether bank sizes and type of ownership affected the interaction between green financing and financial performance. According to KONIETSCHKE et al. (2015) and HUANG (2018), multi-group analysis is recommended when

using complex structures and such as those involving hierarchical structures or multiple groups as it is the case in this study. The fourth objective sought to determine whether the relationship between green financing initiatives and financial performance was significantly different for different bank sizes, while the fifth objective examined whether the interaction between green financing initiatives and financial performance was significantly different between foreign-owned and locally owned banks. Banks were categorized as either small or large based on their market share. Regarding the status of bank ownership, banks were categorized as either foreign if foreign stake was > 50% or locally owned if the local shareholding was < 50%. The following hypotheses were tested.

H 5a: The impact of Green Financing Initiatives (GFI) on Financial Performance (FP) is significantly different between small and large banks.

H 5b: The impact of Green Financing Initiatives (GFI) on Financial Performance (FP) is significantly different between foreign and locally owned banks.

4.6.1 The Significance of Bank Size Results

As mentioned earlier, the banks were categorized into either large or small banks based on their market share. To determine the threshold for defining banks as either large or small, the average market share was computed based on the market share standings as of December 2024, as that is what was publicly available. Then, banks whose market share was above the market average were coded as large banks, while those whose market share fell below the determined average were coded as small banks. These two categories were used in creating the dummy variable upon which group categories were created in smart pls. Using the multigroup PLS bootstrapping, the following results were obtained for purposes of making the relevant comparison.

Table 20 presents the results of the multi-group bootstrapping analysis that sought to compare whether there was any statistically significant difference in how the green financing initiatives undertaken by the banks impacted financial performance. The positive difference of (0.017, the one-tailed p-value of 0.094) for the pair construct CRM -> GFI suggests some weak evidence that CRM might be more influential in smaller banks, but the 2-tailed p values (0.187) completely discard the possibility of a statistically significant difference on the influence of CRM on GFI between small and large banks. This concludes that Climate Risk Management initiatives drive better financial performance regardless of whether the banks are large or small.

Green Banking Practices (GBI) seem to be more influential to the collective green financing initiatives (GFI) in large banks as indicated by the difference value (-0.021). Notably, the 2-tailed value (0.08) suggests that some evidence that GBI might strongly influence the overall green financing strategy (GFI) for the large banks; however, this observation is not conclusive as the p-value 0.08>0.05 and is therefore statistically insignificant. There are no notable variations in how green financing awareness initiatives influence the green financing strategies between large and small banks as indicated by the difference value (-0.005, p=0.712) implying that although large banks seem to promote their GFI through accelerating green awareness initiatives or investments, the difference is very meagre compared to similar initiatives by the small banks.

Lastly, green financing initiatives (GFI) seem to relate almost the same way with financial performance across different bank sizes as indicated by the minor difference (-0.011). Although the negative value suggests that large banks might experience better financial performance from green financing initiatives than small banks, the p values (0.685 and 0.630) confirm that there are no significant statistical variations.

Based on these results, it can be concluded that bank size does not significantly alter how green financing initiatives impact the bank's financial performance. Although with weak evidence (p=0.08), it is worth noting that large banks might leverage more on green banking practices to drive their green financing strategies and investments probably better than the smaller banks. Such could be attributed to large banks facing high regulatory scrutiny from governments, having high ESG commitments and having more financial resources than small banks. Nonetheless, these results conclude that the impact of green financing initiatives on the bank's financial performance is consistent across small and large banks as there is no statistically significant difference between small and large banks. These results are summarized in Table 20.

Table 20: The Significance of Bank Size Results

	Difference (Small-Large)	1-tailed (Small vs Large) p-value	2-tailed (Small vs Large) p-value	Decision All P<0.05
CRM -> GFI	0.017	0.094	0.187	Not supported
GBI -> GFI	-0.021	0.960	0.080	Not supported
GFA -> GFI	-0.005	0.644	0.712	Not supported
GFI -> FP	-0.011	0.685	0.630	Not supported

Source: Author's work

4.6.2 Testing the Significance of Bank Ownership Results

The fifth objective was to compare how the relationship between green financing awareness activities, green banking practices and climate risk management strategies informs the overall green financing initiatives and interacts with financial performance between foreign-owned banks and locally owned banks. The comparison was done by running a multi-group bootstrapping analysis to test if the differences in the variable relationships were statistically significant.

As indicated in the results in Table 21, there is a minimal difference of 0.002 which is statistically insignificant (p = 0.441 for a one-tailed test and p = 0.882 for a two-tailed test) between foreign and local banks. Similar observations are noted for the Green Banking Initiatives (GBI), on green financing initiatives (GFI) (difference = -0.000, p= 0.502 for one-tailed and 0.996 for two-tailed. However, foreign banks exhibit a stronger marginal influence of green financing awareness (GFA) on the overall green financing strategy (GFI) with a notable difference of 0.021 which is statistically significant with the one-tailed p-value (p=0.05). The two-tailed value (p=0.100), however, weakens this conclusion implying that the difference is not statistically stronger. Lastly, the overall impact of green financing initiatives (GFI) on the financial performance (FP) appears to be stronger among the local banks than among the foreign banks (difference = -0.033) but is however statistically insignificant (p=0.926 for one-tailed, p=0.147 for two-tailed). Based on the above analysis, the results suggest that bank ownership does not appear to be a differentiating factor in determining how green financing strategies impact banks' financial performance among the listed banks in Kenya. The results, therefore, conclude that the effect of sustainable green practices on financial performance remains the same regardless of whether the banks are foreign or locally owned. The results are summarized in Table 21 below.

Table 21: Testing the Significance of Bank Ownership Results

Relationships	Difference (Foreign Bank - Locally Owned)	1-tailed (Foreign Bank vs Locally Owned) p-value	2-tailed (Foreign Bank vs Locally Owned) p-value	Decision
CRM -> GFI	0.002	0.441	0.882	Not supported
GBI -> GFI	-0.000	0.502	0.996	Not supported
GFA -> GFI	0.021	0.050	0.100	Not supported
GFI -> FP	-0.033	0.926	0.147	Not supported

Source: Author's work

4.7 Importance Performance Map Analysis (IPMA)

IPMA expands the standard PLS-SEM results by identifying the crucial areas of improvement by assessing the total effects and latent performance on the predictor variable (FERDIN et al., 2024). These results provide practical insights to decision-makers, policymakers, and managers on what areas need to be focused on. IPMA analysis is key in identifying strategic priorities by pointing out the most important constructs with low performance (MOISL, 2011).

Table 22 shows high IPMA performance for the indicators GBI_1, GBI_2 and GAI_3 with MV values of 59.755, 59.302 and 56.912. Notably, most indicators for Green Banking Initiatives show relatively high performance, implying that most of the listed banks have sufficiently implemented green banking activities.

Table 22: Importance Performance Map Analysis (IPMA) Results

	MV Performance
CRM_1	54.651
CRM_1	54.845
CRM_2	54.134
CRM_2	55.168
CRM_3	54.845
CRM_3	54.651
CRM_4	55.168
CRM_4	54.134
CRM_5	55.039
CRM_5	55.039
GAI_1	56.395
GAI_2	55.491
GAI_3	56.912
GBI_1	59.755
GBI_1	59.302
GBI_2	59.302
GBI_2	58.915
GBI_3	38.302
GBI_3	59.755
GBI_4	58.010
GBI_4	38.372
GBI_5	58.915
GBI_5	58.010
GFA_1	56.395
GFA_2	55.491
GFA_3	56.912

Source: Author's work

The constructs for green financing awareness GAI_1: 56.395, GAI_2: 55.491, green financing awareness (GFA_1: 56.395, GFA_3: 56.91) and CRM ranging from (CRM_1:54.134 to CRM_5:55.168) depict moderate performance implying decent performance but still shows room for improvement. The constructs

GBI_4 (mv=38.302) show the lowest performance, indicating that most of the banks have not yet established sufficient green banking policies, especially on setting minimum thresholds for green issuance to polluting sectors.

4.8 Meta-Analysis

To situate the findings of this study to the broad global context, I found it necessary to conduct a meta-analysis based on similar studies across the globe which have examined the impact of different aspects of green financing on various aspects of banks financial performance as a basis for quantitative comparison of the Kenyan context against the global average outcome. This approach goes beyond comparison of results with literature and provides quantitative estimates based on the overall effect sizes across diverse geographical contexts offering a robust statistical basis of results comparison based on evidence-based approach.

Besides, one of the primary limitations of this study was the unavailability of publicly accessible data on green lending by the selected Kenyan banks at the institutional level. While some regions across the globe such as China, Australia, Singapore, EU etc. have already established regulatory frameworks which mandates standardized disclosure of sustainability and climate related lending, Kenya has only begun recently aligning its financial reporting practices with the International Financial Reporting Standards (IFRS S1 and S2) which provide guidance on standardized reporting of sustainability and climate related disclosure. This initiative is implemented in different phases beginning with voluntary reporting which began in early 2024 and mandatory reporting expected to begin in 2027 for listed firms including listed banks and large companies in Kenya. The initiative has been made possible through the collaboration of various partners including the KBA, CBK, ICIPAK and the Green Banking Academy. To strengthen and validate the perception-based findings, the meta-analysis approach was quite helpful in compensating for the local data limitation by synthesizing the results against other studies conducted in different geographical contexts with more mature green practices disclosure and applying a wide range of methodological approaches and analysis models. To enhance understanding on how the Kenyan banking sector compares to the rest of the world on matters regulatory environment and sustainability disclosure, Table 23 below presents a simple comparative summary of green financing framework, the ESG reporting standards as well as notable milestones relating to the green financing discourser.

These regions and countries were selected because the studies finally selected for the meta-analysis were conducted from these regions.

Table 23: Comparison of green financing regulation and ESG structures

Country or region	Green Financing Regulation Framework	ESG reporting standards	Notable milestones
Kenya	SFI Guidelines (CBK), ICAAP for climate risk, Kenya Banking Sector Charter	No uniform ESG reporting standard; few banks publish sustainability reports	First in East Africa to issue green bond; KCB is UN green finance intermediary
Indonesia	OJK issued Sustainable Finance Roadmap; mandatory green finance disclosure	GRI and OJK-aligned reporting becoming standard among large banks	Active green bond market; pilot programs in climate risk stress testing
Bangladesh	Bangladesh Bank Green Banking Guidelines since 2011; reporting is mandatory	Banks required to publish sustainability reports annually using BB templates	Early adopter of green refinance programs; mandatory green banking KPIs
China	PBoC Green Finance Guidelines; strong regulatory push for green lending	Listed banks follow CSRC ESG guidelines; strong ESG focus in Tier 1 banks	Green credit quotas; carbon finance integrated into lending assessments
Nigeria	Voluntary disclosure; new Central Bank ESG frameworks under development	Few banks report ESG metrics consistently; mostly ad hoc disclosures	Weak enforcement; most ESG progress donor- or NGO-driven
Qatar	QCB supports green finance indirectly, no mandatory green lending rules	No mandatory ESG disclosure; some banks align with international standards	Digital banking emphasis; sustainability mostly CSR-level initiative
BRICS (General)	Mixed — India & China strong regulation, Brazil moderate, Russia minimal	India follows SEBI mandate; China has CSRC. Others vary in enforcement	Large variation within bloc; India and China lead in regulatory action
Southeast Asia (General)	Generally growing; varies by country — Malaysia has robust ESG reporting rules	Malaysia and Singapore strong ESG; others moderate to low	Green finance tech adoption rising; ASEAN Green Bond Standards influential
European Union	EU Taxonomy Regulation; Sustainable Finance Disclosure Regulation (SFDR); mandatory green finance risk integration under EU Green Deal	Mandatory ESG reporting for large companies under CSRD; banks subject to EBA guidelines; GRI and TCFD-aligned disclosures common	Leader in green bond issuance; strong emphasis on climate risk stress testing; strict ESG benchmarks enforced by financial authorities

Source: Author's work

4.8.1 Meta Analysis Process

The first step was to search for the relevant studies which were derived from two databases including Scopus and the web of science. The following search queries were used in each of the two databases:

Scopus: TITLE-ABS-KEY ((“green banking" OR "green finance" OR "green financing" OR "climate finance”) AND (“bank performance" OR "profitability" OR "financial performance" OR "ROA" OR "ROE”)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (OA , "all"))

Web of Science: TS= (("green banking" OR "green finance" OR "green financing" OR "climate finance") AND ("bank performance" OR "profitability" OR "financial performance" OR "ROA" OR "ROE")) and 2021 or 2020 or 2022 or 2023 or 2024 or 2025 (Publication Years) and Article (Document Types) and All Open Access (Open Access)

Upon the initial search, a total of 343 articles were retrieved and after a through inclusion and exclusion criteria as demonstrated in Figure 5, a total of 12 studies which examined the impact of different aspects of green financing on different metrics of the bank’s profitability were examined. The focus was to identify only those published studies which provided data that was necessary in computing transformed effect sizes such as the coefficients of correlation, p-values, t-values, standard errors and the sample sizes. The selected studies were distributed in various geographical locations including China, Bangladesh, Qatar, the Bric’s, Indonesia, Nigeria, Southeast Asia and other parts of the World. In situations, where the standard errors were not reported explicitly but data on t-statistics was provided, the following formula as suggested by (WOOLDRIDGE, 2023) was applied in calculating the standard errors.

$$Standard\ error\ = \frac{Coefficients}{t-statistics} \qquad [2]$$

For the sake of the meta-analysis, the research process was summarized based on the Prisma flowchart as follows (Figure 5).

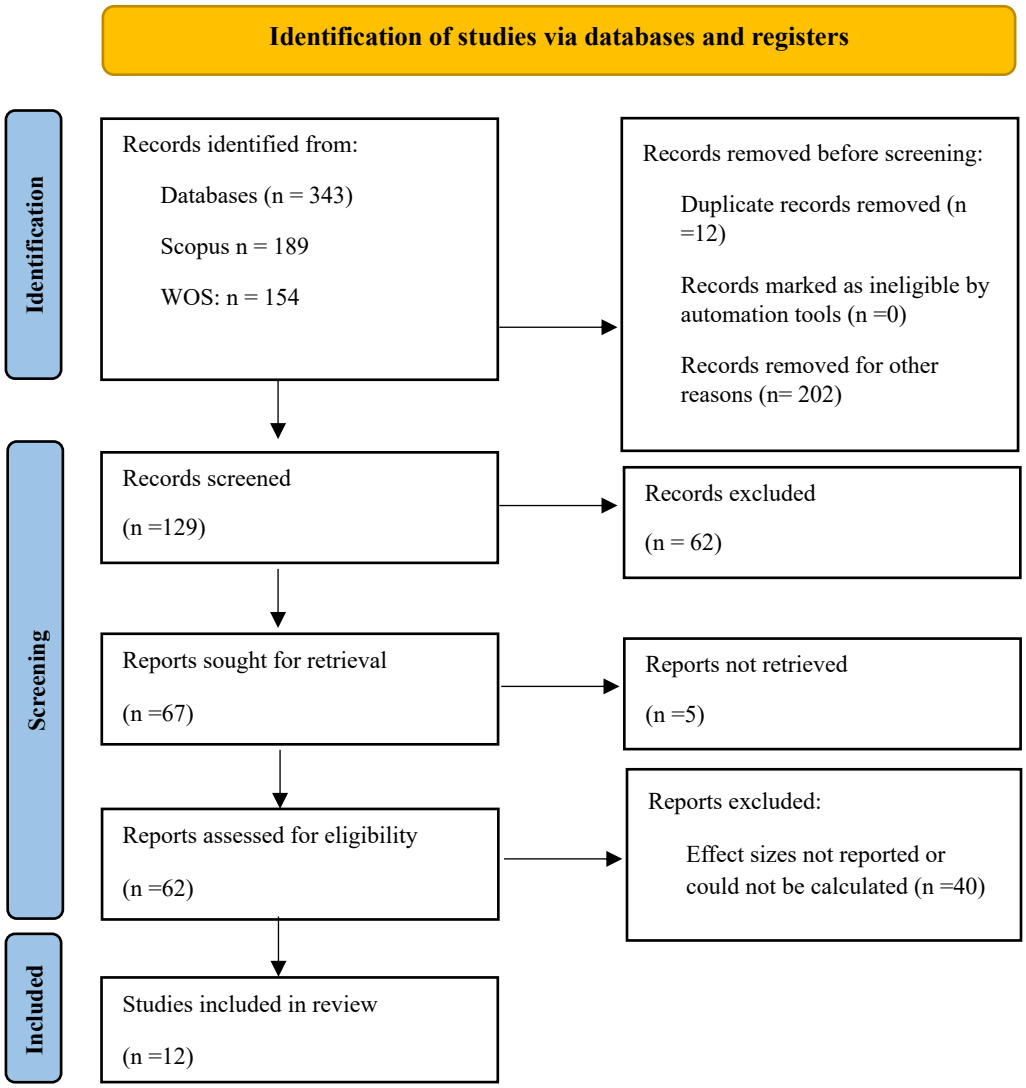

Figure 5: Researcher process based on Prisma flow-chart

Source: Author's work based on PAGE et al. (2021)

4.8.2 Calculation of Effect Sizes

Effect sizes are the quantitative basis upon which researchers synthesize findings across multiple studies (CONROY, 2011). They communicate beyond the strength and direction of variable relationships but also informs about the consistency of outcomes relating to specific variable relationships. To offer easier comparison, effect sizes standardize results from multiple studies either through odds ratio, Cohens, z-transformations, regression coefficients and Hedges (NICKEL, 2020). These common measures therefore provide a common metric upon which researchers can draw conclusions regarding certain observed relationship patterns. In this study the Cohen's d and Z -transformation were adapted. The standardized regression

coefficients were converted into Cohen's d using the following formula as suggested by (PETERSON and BROWN, 2005).

$$d = \frac{2\times\beta}{\sqrt{1-R^2}} \quad [3]$$

Where β is the standardized regression coefficient and R^2 is the coefficient of determination. In some cases where only the correlation coefficients were provided. To calculate the effect sizes, the Fisher's z-transformation was performed using the following formula as suggested by (FISHER, 1915).

$$z = \frac{1}{2} \times ln\left(\frac{1+r}{1-r}\right) \quad [4]$$

Where r, is the correlation coefficient and z are the Fisher's z value. Table 24 shows the calculated effect sizes which showed mixed results with most of the green financing proxies showing positive but significant impact on banks financial performance while other few shows negative effects.

Table 24: Effect Sizes

Variable Relationships	Effect size	CI Lower limit	CI Upper limit	Weight
1	0.67	0.55	0.80	4.62%
2	1.30	1.28	1.33	5.01%
3	0.06	-0.01	0.13	4.90%
4	0.09	0.01	0.17	4.83%
5	0.24	0.16	0.32	4.85%
6	0.01	-0.13	0.14	4.51%
7	0.02	-1.08	1.12	0.61%
8	-0.27	-0.32	-0.22	4.95%
9	-0.09	-0.12	-0.06	5.00%
10	0.04	0.03	0.04	5.02%
11	0.06	0.06	0.07	5.02%
12	0.12	0.12	0.13	5.02%
13	0.28	0.27	0.28	5.02%
14	0.33	0.21	0.45	4.62%
15	0.21	0.13	0.29	4.84%
16	0.07	-0.26	0.40	3.03%
17	0.15	-0.07	0.37	3.90%
18	0.09	0.00	0.19	4.77%
19	0.10	-0.03	0.24	4.53%
20	0.00	-7.05	7.06	0.02%
21	-0.09	-0.09	-0.08	5.02%
22	0.00	-6.29	6.30	0.02%
23	0.02	-0.01	0.04	5.01%
24	0.06	-0.01	0.13	4.89%

Source: Author's calculations

As indicated in Table 24 above, out of the 12 studies, a total of 24 proxy relationships between different aspects of green financing correlated against different aspects of banks profitability were carefully retrieved. This keen selection was important as the study could only benefit from those variables that purely examined only aspects of green financing. Table 24 also shows details of the lower and upper limit CIs which portray the range upon which the effect sizes lie at 95% confidence levels as well as the corresponding weights which show the influence each proxy has in calculating the effect sizes.

4.8.3 Forest Plot

In meta-analysis, a forest plot is used to visually display the effect sizes and the confidence of intervals for the included studies (SARKAR and BAIDYA, 2025). The main aim is to assess the consistency and direction of the study findings across multiple sources (LI et al., 2020). In this case, the forest plot shows on Figure 6 the effect sizes of 24 proxy relationship between various aspects of green financing and banks financial aspects.

The studies whose confidence intervals do not cross the zero line such as study number 1, 2, 5, 10, 11, 12, 13, 14 and 15 indicate statistically significant positive effects while those whose confidence intervals cross zero indicate non significance or statistical uncertainty. As depicted in the forest plot, proxy relationships no 20 and 22 have notably very minimal on the overall influence due to their statistical weights. Overall, the forest plot shows that green financing tends to have a small but statistically significant impact on banks' performance with this relationship influenced by region specific factors and contexts as seen with some relationships going a little bit far from the red line.

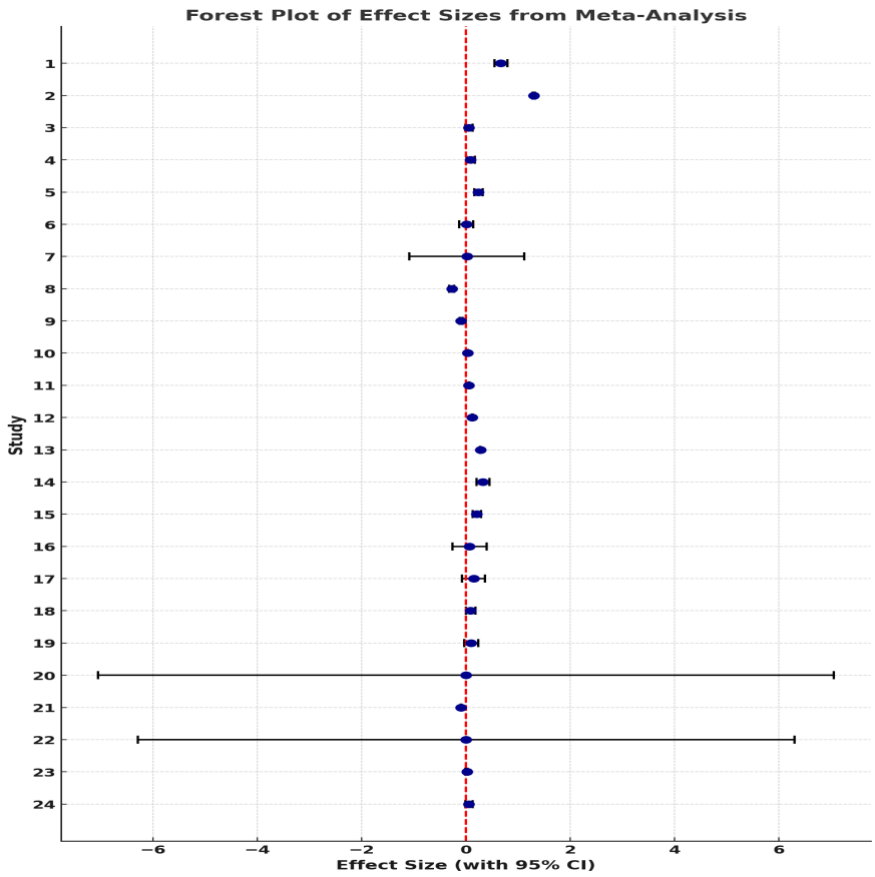

Figure 6: Forest Plot

Source: Author's work

4.8.4 Combined Effect Size and Heterogeneity Results

This meta-analysis was based on the random effect model which is considered appropriate when the heterogeneity among the studies is high due to the diverse methodological and contextual differences (MCKENZIE and VERONIKI 2024; REN et al., 2024). As revealed by the results, the combined effect size of 0.16 (p= 0.013) overall indicates a small positive but significant effect between green financing and financial performance. The Z-value of 2.49 further confirms the significance of the observed average effect. However, high heterogeneity is observed as indicated by (Q-statistics = 17,849.99, p = 0.001). The T^2 (tau-squared) = (0.04) and its square root (T = 0.21) further confirms the high variability implying that the impact between green financing and banks financial performance is highly context dependent and is influenced by regional, institutional and policy differences. Table 25 presents the combined effect size and heterogeneity results.

Table 25: Combined effect size and Heterogeneity Results

Meta-analysis model	
Model	Random effects model
Confidence level	95%
Combined Effect Size	
Effect Size	0.16
Standard error	0.07
CI Lower limit	0.03
CI Upper limit	0.30
PI Lower limit	-0.29
PI Upper limit	0.62
Z-value	2.49
One-tailed p-value	0.006
Two-tailed p-value	0.013
Number of incl. studies	24
Heterogeneity	
Q	17849.99
$\mathbf{p_q}$	0.000
$\mathbf{I^2}$	99.87%
$\mathbf{T^2}$	0.04
T	0.21

Source: Author's calculation based on meta-essentials workbook

4.8.5 Publication Bias

Publication bias occurs when there is a likelihood that published studies are influenced by the strength or direction of the variable relationship typically favoring studies with either significant or positive findings while those with negative or statistically insignificant relationships are less likely to get published (SADEGHI, 2024). It is particularly important to determine that publication bias is not present, especially when conducting meta-analysis as it can easily distort results leading to misleading conclusions.

In determining whether the studies included in the meta-analysis suffered from publication bias in this study, a histogram of standardized residuals (errors) was used to check if the residuals followed a normal distribution. As seen in Figure 7, majority of the residuals were distributed around zero with a few outliers (Z score ranging from ±63.5 and ±88.9) reasonably appearing normal with a symmetric shaped histogram. The larger blue bar is centered around Z-score=0 implying that the model predictions are fairly accurate on average. Figure 7 below visually shows the distribution of the residuals.

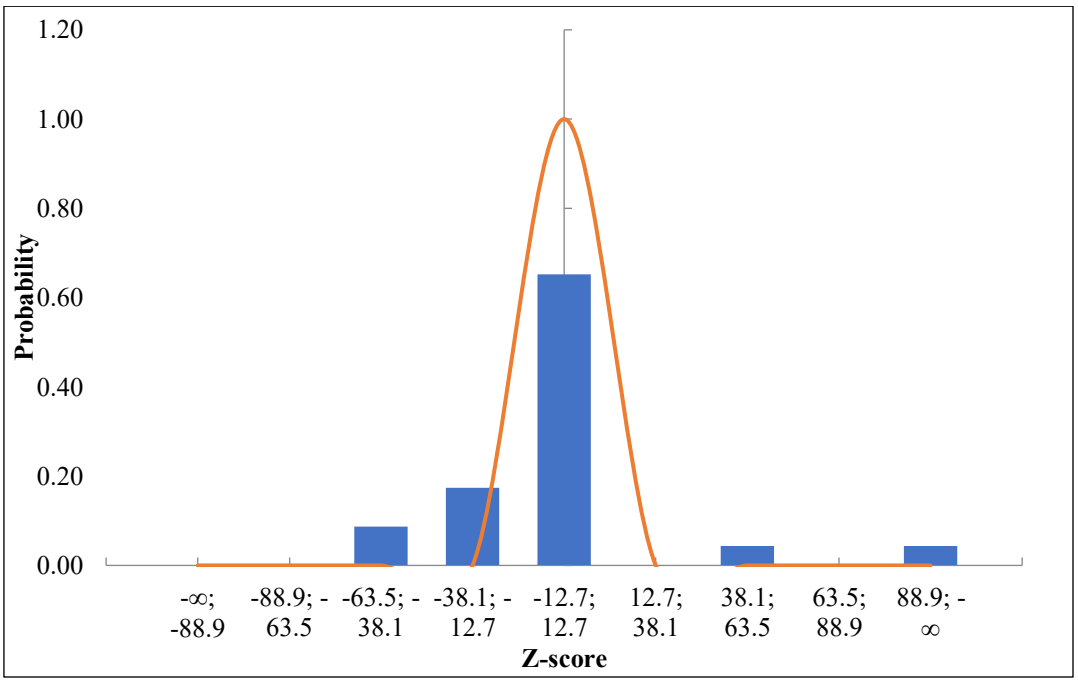

Figure 7: Standardized Residual Histogram

Source: Author's work

4.8.6 Funnel Plot

The funnel plot displays the standard error on the Y-axis against the effect sizes on the X-axis (SADEGHI, 2024). Under normal circumstances, the studies shown on Figure 8 by the blue dots are expected to be distributed symmetrically around the combined effect size which is shown by the grey dot so that it can form an inverted funnel shape. The presence of the inputted studies (hypothetical) marked in the green dot on the left side indicates the possibility of a mild publication bias (PETERS et al. 2008). Ideally, the inputted studies are generated statistically to restore the funnel plot to a symmetry funnel plot.

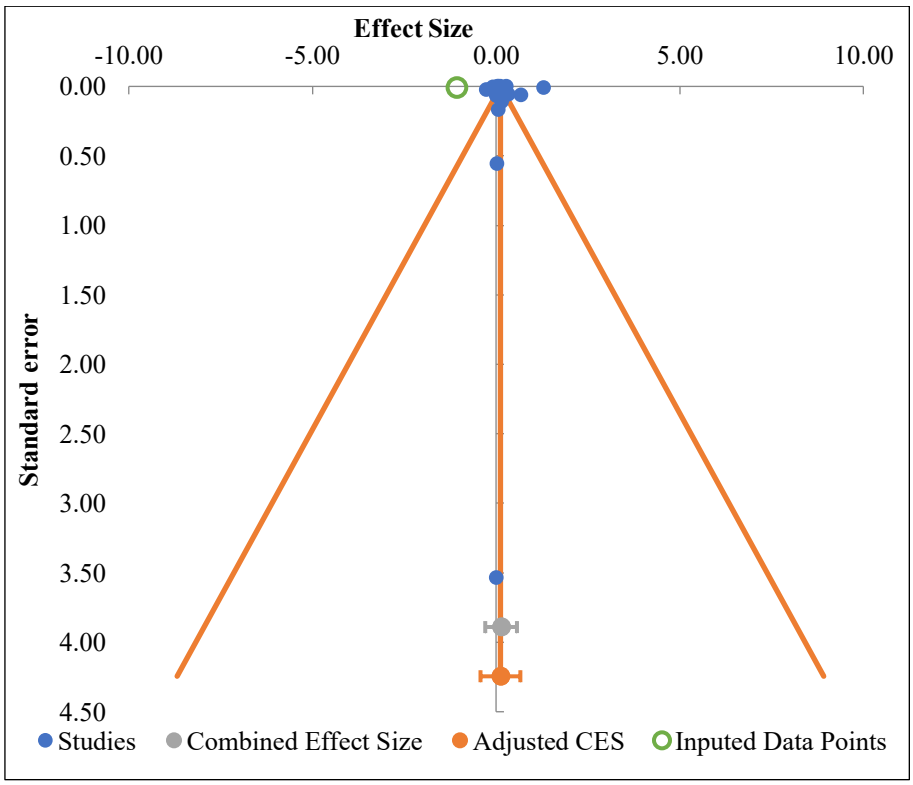

Figure 8: Funnel Plot

Source: Author's work

4.8.7 Egger's Regression Test

To further confirm is the mild publication bias suggested by the funnel plot should be a concern, the eggers regression test is carried out (SHI et al., 2020). This test helps in evaluating whether the asymmetry of the funnel plot indicates a publication bias.

The intercept of 1.22, p = 0.873 is statistically insignificant i.e. > 0.05 indicating that there is no evidence of publication bias based on the Egger's test confirming that the meta-analysis results can be relied on. Table 26 below summarizes the results.

Table 26: Egger's Regression Test Results

	Egger Regression			
	Estimate	**SE**	**CI LL**	**CI UL**
Intercept	1.22	7.55	-14.43	16.88
Slope	0.13	0.05	0.03	0.24
t test	0.16			
p-value	0.873			

Source: Author's work based on meta essentials

4.8.8 Comparing Kenyan Context to Global Effect Sizes

To better understand how the impact of green financing on banks financial performance in the Kenyan context compares to the global trends, this study statistically tested the difference between the locally observed effect size against the global effect size derived from the meta-analysis.

To make the comparison possible, both the Kenyan and global effect sizes were transformed into a common z-score. For the Kenyan context, using the path coefficients (GFI -> FP) of 0. 864, standard error = 0.012, t-statistics = 74.572 from the SEM model as summarized in table above was used to compute the Fisher's Z-transformation as follows:

$$z_{Kenyan\ Context} = \frac{1}{2} ln\left(\frac{1+r}{1-r}\right) \quad [5]$$

$$z_{Kenyan\ Context} = \frac{1}{2} ln\left(\frac{1+0.864}{1-0.864}\right) = \frac{1}{2} ln\left(\frac{1.864}{0.136}\right) = \frac{1}{2} ln(13.706) = \frac{1}{2} \times 2.617$$

$$z_{Kenyan\ Context} = 1.308$$

To test if there exist a statistical difference between how green financing interacts with banks financial performance in Kenya against the observed global context as calculated through the meta-analysis, the Z value is calculated as follows:

$$z_{Difference} = \frac{1.308-0.16}{\sqrt{0.012^2+0.07^2}} = \frac{1.148}{\sqrt{0.000144+0.0049}} = \frac{1.148}{\sqrt{0.005044}} = \frac{1.148}{0.071}$$

$$z_{Diffence} = 16.17$$

The z-score of 16.17 from the standard normal distribution table has a p-value of 0.001 indicating that there exists a statistically stronger difference in how green financing translates to enhanced bank financial performance in the Kenyan context when compared to the global average effect size ($p<0.001$).

Based on the high z-score of 16.17 is greater than ±3.29 critical value implies that $p < 0.001$, which is statistically highly significant, this study therefore supports the hypotheses that "The impact of green financing on banks' financial performance in Kenya significantly differ from the global observed outcome as measured by effect sizes".

5. FINDINGS AND DISCUSSIONS

The main aim of the study was to examine how green financing initiatives among listed banks in Kenya impact the bank's financial performance in terms of cost savings, access to the international market, brand reputation, enhancement of their balance sheet and ability to manage climate-related risks in the long run. The green financing initiatives examined focused on the banks' current and ongoing initiatives on green financing awareness, green banking practices and climate risk management strategies, which formed the independent variables. Multi-group analysis based on bank size and type of ownership was also conducted to establish whether there existed any statistically significant difference in how green financing initiatives interacted with the assessed aspects of financial performance. To pursue these specific objectives, a total of ten study null hypotheses were developed and tested, as revealed in Table 27. Among the ten hypotheses, eight hypotheses were supported, while two were rejected. This discussion section will be structured based on the study objectives and hypothesis chronologically.

Table 27: Summary of Hypothesis Testing Results

Hypothesis	Statement	Effect Type	Test/Model Used	p-value	Decision
H1a	Climate Risk Management (CRM) contributes significantly to Green Financing Initiatives (GFI)	Indirect	Structural Equation Modeling (SEM)	0.000	Supported
H1b	CRM positively impacts Financial Performance (FP)	Direct	SEM	0.000	Supported
H2a	Green Banking Initiatives (GBI) contribute significantly to GFI	Indirect	SEM	0.000	Supported
H2b	GBI positively impact FP	Direct	SEM	0.000	Supported
H3a	Green Financing Activities (GFA) contribute significantly to GFI	Indirect	SEM	0.000	Supported
H3b	GFA positively impact FP	Direct	SEM	0.000	Supported
H4a	GFI collectively positively impact FP	Indirect	SEM	0.000	Supported
H5a	The impact of GFI on FP differs significantly between small and large banks	Moderating	Multi-group SEM	0.630	Rejected
H5b	The impact of GFI on FP differs significantly between foreign and local banks	Moderating	Multi-group SEM	0.147	Rejected
H6	The impact of green financing on FP in Kenya significantly differs from global outcomes (effect sizes)	Comparative (Cross-study)	Meta-analytic Comparison	0.001	Supported

Source: Author's work

Hypothesis *1a* proposed that climate risk management (CRM) contributes significantly to the bank's collective green financing initiatives, while *1b* proposed that banks' CRM positively impacts banks' financial performance. These findings agree with other studies such as CHALABI-JABADO and ZIANE (2024) argued that banks enhance their green financing capability by integrating robust climate risk management into their risk framework. Similarly, CUCINELLI et al. (2024) notes that CRM is crucial in helping banks pursue their green goals. AIJAZ et al. (2025) also concludes that environmental and social risk management promotes sustainable financing and aligns with green financing objectives.

FAN et al. (2024) expounds on CHALABI-JABADO and ZIANE (2024) findings that climate risk management enhances banks' stability and profitability by mitigating transition and physical risks. Studies by HISHAMUDDIN et al. (2024) and FAN and GAO (2024) confirm that through addressing risks associated with climate change, CRM has been seen to enhance banks' profitability. CONLON et al. (2024) extends the argument that banks with robust CRM frameworks are better placed to deal with climate shocks, therefore requiring them to maintain low levels of loss reserves, which enhance their financial stability. WU et al. (2024) however poses a different argument that banks can only attempt to mitigate climate risks through strategies such as capital adequacy but cannot wholly avoid climate losses.

Hypothesis *2a* and *2b* sought to examine whether green banking initiatives contribute significantly to the collective green financing initiatives and financial performance. The results reveal positive and significant relationships for both hypotheses *2a* and *2b*. These findings agree with other studies including VALENCIA and CALABUIG-TORMO (2023), ZHANG et al. (2022) and BANSAL et al. (2023) who argue that green banking practices influence banks' green and environmental financial resources positively. These initiatives help banks boost their sustainability indexes by reducing their carbon footprint (VALENCIA and CALABUIG-TORMO, 2023). SINGH et al. (2022) and JAIN and SHARMA (2023) also adds that green banking practices enhance banks' cost savings, product development and operational efficiency which makes banks financially efficient and more competitive. RAHMAN et al. (2023) and MANDAGIE et al. (2025) further argues that implementing green banking initiatives promotes the bank's green financing capacity.

Multiple studies have also established a positive relationship between green banking and financial performance. MONDAL and SAHU (2023), ASLAM and JAWAID (2023) and AL-KUBAISI and KHALAF

(2023) established a positive relationship between green banking and Return on Equity (ROE) and Return on Asset (ROA). PUTRI et al. (2022) further argues that green banking enhances banks' financial performance indirectly through promoting their reputation and enhancing their operational efficiency which in return promotes its long-term profitability and cost savings. SINGH et al. (2022) however, did not find any significant direct impact of GBI on banks' financial performance but noted enhanced operational efficiency.

Hypotheses *3a* proposed that green financing awareness activities contribute significantly to the Impact of GFI on FP while *3b* proposed that GFI positively and significantly influences banks' financial performance. The results supported these two hypotheses and agree with many other previous studies. SHARMA et al. (2025) argue that green awareness initiatives are instrumental in promoting the adoption of fintech which is essentially a green financial technology that contributes to sustainable banking practices. KHAN et al. (2024) add that GFA is effective in promoting brand image which results in attracting customers who place high value on sustainability. Promoting GFA among employees can easily translate into operational efficiency by cutting down operational costs associated with traditional banking practices (BHUIYAN et al., 2024). NARAYANAN and PRADHAN (2024) further note that promoting sustainable and ethical business practices attracts socially responsible investors. CHANDRAN et al. (2024) and ANJALIDEVI et al. (2024) add that green awareness promotes banks' green products such as green credit cards, green loans or related products, therefore enhancing the bank's balance sheet in the long run.

Hypothesis *4a* proposed that green financing initiatives generally positively influence banks' financial performance. The results supported the hypothesis which aligns with the findings of multiple previous studies. YU et al. (2023) note that green financing positively promotes banks' financial performance through information transmission and capital aggregation. HUANG and LUAN (2024) adds that green financing promotes sustainable banking practices by fostering innovation and removing financial barriers which enhances social and economic performance. QIAN and YU (2024) and YE and TIAN (2025) associate green financing with enhanced ESG and financial outcomes. LI and WANG (2023) also points out that green financing drives digital innovations like fintech that influence the bank's financial performance positively. MOHAN AND MUHAMMAD (2024) notes that although the impact of green financing on the overall FP may be weak, it plays a major role in enhancing the bank's capacity to manage climate risks. LI et al. (2017) argues that the

impact of green financing on financial performance may not be experienced in the short run but most likely felt in the long run.

Hypotheses *5a* and *5b* propose that the impact of GFI on FP is significantly different between different bank sizes and between foreign and locally owned banks. The results rejected the two hypotheses, implying that bank size and type of ownership did not matter in determining the interaction between green financing initiatives and financial performance. These findings, however disagree with other studies. CHEN et al. (2022b) for instance, observed that the impact of green financing on FP tends to be more profound among small banks than in large banks. GALÁN and TAN (2024) however, notes that small banks suffer more from the negative impact of green credit. Regarding large banks, ZHOU et al. (2024) argues that the interaction of green financing and financial performance among large banks is mixed noting that while it can reduce insolvency risk it can affect the net profits negatively. Regarding bank ownership, SISWANTI et al. (2024) and YANG et al. (2024) argues that the impact of green financing on FP is more likely to be highly pronounced among foreign banks than in local banks.

The last hypothesis proposes that the impact of green financing on banks' financial performance in Kenya significantly differ from the global observed outcome as measured by effect sizes. The statistical test ($z = 16.17$, $p < 0.001$) supports this hypothesis possibly because of the higher financing of renewable energy which accounts for more than 90% of the Kenyan national energy grid, the highly growing market niche of e-mobility, expanding climate smart agriculture and growing number of international partners who support green lending through derisking mechanisms.

Overall, the meta-analysis results indicate that there tend to be a global consensus that green financing activities tend to have a small but significant impact on banks financial performance. Although the results show high heterogeneity possibly due to the diverse regional, social economic, cultural, context specific factors and diverse methodologies adopted, the pattern observed in the Kenyan banking context aligns with the overall globally observed trend that green financing positively impacts banks financial performance, but the extent to which this impact largely depends on local context factors, institutional factors, social cultural and policy contexts that influence the market dynamics.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study aimed at examining how green financing initiatives by the listed banks in Kenya affects their financial performance and whether the nature of this relationship is affected by the size of the banks or type of ownership. The green financing initiatives focused on the study included green financing awareness, climate risk management and green banking practices as the independent variables. The dependent variable was financial performance which was measured through cost savings associated with green initiatives, access to international market, enhancement of the bank's loan portfolio by including green products such as green bonds, sustainability linked loans and enhanced capacity to manage long term climate risk. A total of ten hypothesis were tested and eight of them were supported while two were rejected.

Climate Risk Management was found to significantly influence the collective green financing initiatives among the listed banks in Kenya and positively impact financial performance. Based on these are findings, this study supports the argument that integrating a robust climate risk management framework into bank lending criteria helps the banks to reduce loss reserves therefore promoting both stability and long-term profitability. It is however important to note that CRM can only help in mitigating these losses but does not make the banks entirely immune to climate related financial vulnerabilities.

Green banking practices were also found to play a significant role in enhancing banks financial performance especially through promoting banks operational efficiency, product development such as green bonds and cost savings associated with the adoption of green banking practices such as reducing paperwork, promoting mobile banking, water and energy efficiency practices etc. This finding aligns with other previous studies which identified that green banking practices positively influenced brand reputation and sustainability indices which enhanced banks profitability in the long run. Similarly, green financing awareness initiatives such as leveraging on website to inform and educate about green products, conducting seminars, workshops targeting investors and employee training also contribute significantly to banks financial performance. This finding supports the notion that promoting green awareness among employees and customers attracts socially responsible investors and promotes demand for green products. The finding supports previous studies that green awareness enhances long-term financial stability and strengthens the banks' balance sheet.

Further, the study established that overall green financing initiatives i.e., green banking practices, climate risk management practices and green awareness initiatives collectively positively impact banks financial performance. The findings support the notion that green financing initiatives drives digital innovation, fosters capital aggregation and enhances banks resilience in managing climate related risks. While short term results from green initiatives may be limited, long-term sustainability driven benefits are evident.

Contrary to the findings of most previous research, this study found no statistically significant difference on how different bank sizes and type of ownership shapes the interaction between green financing initiatives and financial performance. The findings contradict with previous studies in the literature which suggest that the impact of green financing on banks financial performance is more profound to foreign owned banks than locally owned and on small sized banks than large banks. The dissertation, therefore, implies that banks that engage in green financing initiatives are likely to derive related benefits regardless of their sizes or type of ownership. Further, the IPMA analysis reveal that majority of the banks are reluctant in implementing strict lending policies such as setting maximum thresholds they can lend to polluting sectors.

The general trend on the nexus between green financing and banks performance as investigated within the Kenyan banking contexts aligns with the overall global pattern that green financing practices and lending activities generally, tend to have a positive impact on banks profitability. However, the extent to which the green financing strategies translates to financial benefits depends on multiple factors including social cultural and economic factors, institutional related characteristics, policy, regulation and local contexts and that this relationship majorly but not universally accepted.

6.2 Limitations and Suggestion for Future Research

The data used in synthesizing the results of this study was collected using closed-ended questionnaires which were self-reported surveys administered to the bank employees and therefore of subjective nature. The study could not be based on quantitative data such as green lending or ESG scores et cetera as the data reported by the banks was insufficient, inconsistent and incomparable, making it unreliable to complete the study sufficiently. Currently, there is no central database that track sustainability initiatives for banks in Kenya and even the few banks which make such reports do not refer to any template making comparison very difficult. Future research studies in this domain might explore more objective nature of data such as amount of green

lending, portion of green loans on banks loan portfolios, ESG scores etc. especially with the implementation of IFRS S1 and S2. Additionally, other alternative methods of data collection such as open-ended interviews could be used as alternative methods of data collection to gather deeper insights from experienced bank professionals to aid in exploring whether the same observations hold.

Also, this study only focused on the 10 listed banks among the 43 registered commercial banks in Kenya. Future studies might incorporate more banks beyond the listed ones especially to also include small banks to assess whether the same results hold. Lastly, this study appreciates the ambiguity that exist while defining what is a green products given that some loan products might be considered green in one region and not in another based on the green taxonomy adopted. This study was based on the Kenyan green taxonomy published recently April 2025.

While conducting the multi-group analysis based on bank size and type of ownership, this study only dealt with two categories of bank sizes as either large or small based on the market share and classified the banks as either foreign or locally owned based on the dominant stake of ownership. Future studies might consider classifying the banks in tier 1, 2 and 3 to define bank sizes and probably consider three categories of bank ownership as either foreign, locally owned or mixed. Lastly, as green financing in emerging economies like Kenya has been growing rapidly in recent years, it is recommended that future studies might utilize data as it emerges to evaluate the performance of the eco-friendly loan products. Also, with the recent publication of the Kenyan green financing taxonomy in the year 2025, future studies might be based on more clear green financing products.

6.3 Recommendations

Based on these results, this study makes the following specific recommendations.

1. First, the integration of climate risk management through operationalization of bank policies and tools such as applying internal green scoring criteria for investment projects and borrowers to assess their sustainability alignment and climate risk exposure is recommended. Additionally, climate stress testing should be embedded within the regular planning scenario to evaluate transition and physical risks.
2. Secondly, the adoption of green banking practices whether operations, customer, employee or policy centric drives both operational efficiency and banks sustainability goals. As such, it is beneficial for banks to

deliberately invest more in greening their operations and its other stakeholders' relationships such as customers, employees and investors by adopting green banking activities such as advancing low interest rates to eco-friendly loan products to encourage high customer uptake for sustainable banking products. Specific action points could include offering preferential interest rates for loan products that are environmentally friendly such as electric vehicles, solar home systems, green mortgages to incentivize customer uptake. Establishing green literacy programs targeting SMEs and retail customers to drive awareness on sustainable products. Also, implementing green procurement policies and incentive systems that are sustainability linked indicators. Such initiatives are not only a good strategy for promoting strategic sustainability goals but also financially beneficial to the banks.

3. Thirdly, the concept of green financing is more of an emerging area of interest yet very crucial. The Kenya Bankers Association has gone a long way in floating sustainable banking modules whose uptake by bank staffs is reasonably positive so far. However, it was noted during data collection that while some banks have made this training mandatory and assess their banks employees as part of their performance KPI's, some leave it at the discretion of the employees. Employees who are trained on these green practices are more likely to be ecologically conscious and able to promote eco-friendly bank products than those who are not trained. In the case of the Kenyan banking sector, this study recommends that the banking regulatory institutions such as the Kenya bankers association should enforce policies requiring mandatory training of bank employees on the sustainable banking practices to generally promote the level of awareness and knowledge among the bank employees in the Kenyan banking sector. Such policy support is likely to accelerate the customer uptake, management and performance for eco-friendly loan products by the banks.
4. While the Kenyan banking sector has made significant strides by channeling green investments, it is worthwhile to note that just a few large banks with wide access to international organizations and sustainable oriented development partners have managed to offer significant green financing to the Kenyan economic sectors either by managing the green loans or sustainability linked loans on behalf of international partners or directly from their own loan portfolio after benefiting from de-risking strategies by international partners. Further interventions of the Kenyan government through fiscal incentives to promote green transition would go a long way in promoting more green financing and investments. Specifically, this study

recommends fiscal incentives that encourage other sectors to invest in green transition, attract new market entrants and create an enabling environment for green investments that minimizes market distortion and enhances long-term sustainability. More importantly, a stability for already deployed fiscal incentives including the 10% excise duty reduction for electric cars, the 16% VAT exemptions under the VAT Act amendments and the 0% and 10-20% reduction on import duty for electric and hybrid cars respectively is highly recommended. These fiscal incentives have attracted new market entrants such as Roam and BasiGO companies as well as new EV brands such as Nissan Leaf, BYD and Hyundai Kona in the Kenyan markets. Since the implementation of these government incentives effective July 2021, the growth for EV sales surged by 108% from 2022 to 2023 and 41% increase from 2023 to 2024 with huge contribution from the banking sector which has supported this transition in multiple ways including; partnering with E-Mobility companies and start-ups to de-risk green loans, supporting rapid deployment of EVs in the Kenyan urban transit especially by the cooperative bank of Kenya and KCB banks, tailored financing models such as "pay as you drive" e-mobility financing and financing of charging infrastructures among others. These interventions have been quite effective in promoting green transition, creating market for green financing, shaping green consumption behavior and attracting green investments into the country. To prevent market distortion and long-term sustainability, clear guidelines and timelines e.g. deciding how many years these incentives remain stable are highly recommended to encourage stakeholders' participation in the sector and protect the banks from potential exposures as they support the green transition endeavors.

5. Through the Central Bank of Kenya, the government could encourage commercial banks to channel more green financing in support of the green transition in various ways; As successfully implemented by the Magyar Nemzeti Bank (MNB), the Hungarian Central Bank, the Central Bank of Kenya could also consider implementing a gradual Green Preferential Capital Requirements Program for commercial banks that achieve certain levels of green exposures to encourage green lending especially in climate smart agriculture, renewable sector and e-mobility among other key sectors. The objective of this intervention would be to encourage banks to target green investments without having to raise additional capital especially now that Kenya has finally published its green taxonomy (2025) which largely inhibits the potential challenge of misclassification of loans by banks or greenwashing. With the reduced capital requirements, banks would

therefore, have more capital savings to reinvest, or advance more loans therefore, enhancing their profitability.

6. While there are notable strides by the Kenyan banking sector in exploring green products such as green credit, sustainability linked loan products and leveraging on fin-tech in promoting green financing among others, less has been done in exploring the emerging carbon credit market in Kenya. This study recommends that banks can exploit this opportunity by designing carbon credit backed loans that can be advanced to the vast small and medium sized businesses which can leverage on their future earnings as collateral to access carbon financing. To protect the banks from default risks associated with the proposed carbon credit backed loans, the banks can leverage on their expertise to engage third party institutions who would provide technical support for instance verifying the carbon credits, securing purchase guarantee from international buyers or even working with insurance companies to cover them against potential default on the carbon backed loan products. The loan could be structured in a manner that disbursement could be based on verified project milestones to increase chances of success to such projects.
7. Seventh, there are notable recent initiatives by the Kenyan government such as the amendment of the climate change act of 2016 also revised in 2023 to include carbon credit trading, revision of the national building code which now requires commercial buildings to dedicate at least 5% of their packing to electric cars and installation of charging facilities, tax incentives for importation, assembly and local manufacturing of green road, water and air automotives among others. This study recommends future studies to explore how these sector-specific and government interventions promote the uptake of green financing especially in light of the ongoing phased implementation of IFRS S2 and S1 on sustainability and climate finance reporting. Such insights would validate the effectiveness of the current national and sector initiatives in promoting environmental performance and inform Kenya's progress with its revised National Determined Contributions of reducing the greenhouse emissions.
8. Lastly, the meta-analysis result reveals an overall weak positive but significant relationship between green financing and banks financial performance indicating that green lending and green banking activities may not always translate to financial benefits but must be practiced prudently based on the local economic, social cultural, and local market realities to realize financial benefits.

7. NEW SCIENTIFIC RESULTS

Based on my results and discussions above, the study reveals the following new scientific insights as outlined below.

1. Through bootstrapping, this study identified that different green financing activities contribute differently to the green financing strategy for banks. This study revealed that climate risk management and green banking practices contribute more significantly to the collective green financing strategy than green awareness initiatives. The results imply that while green awareness initiatives are important in promoting the green financing strategy, they can't be sufficiently effective if implemented alone but should be combined with robust green banking and climate risk management initiatives for banks to realize financial benefits.
2. The overall PLS-SEM results reveals that green financing initiatives significantly influence the financial performance of the banks, especially in enhancing their balance sheet, gaining access to the international market, cost savings associated with climate risk management, enhancing brand reputation and enhancing banks long term ability to manage climate related risks. The study, however, notes that although these green financial initiatives collectively impact banks' financial performance positively, they do not make banks entirely immune to climate shocks.
3. To the best of my knowledge, this study is the only one seeking to examine the influence of green financing initiatives on the financial performance of listed banks in Kenya by examining how green financing awareness initiatives, green banking and climate risk management practices collectively influence banks' financial performance. Further, other similar studies done in Kenya related to this study are based on literature review and secondary materials, and none is based on primary insights, as is the case in this study. This study achieved the research purpose in examining the direct and indirect effects through creating a mediating pathway by introducing a high order construct into the baseline model to collectively measure the green financing initiatives and later determined its influence on the financial performance through PLS-SEM.
4. This study also adopts a unique way of assessing the moderating effect of bank size and ownership through conducting advanced multi-group bootstrapping rather than the conventional way of introducing interaction

terms. This was considered more appropriate when dealing with categorical variables for bank sizes and type of ownership and the complex type II hierarchical model and was made possible by the multi-group bootstrapping function available in smart PLS 4, therefore contributing a novel methodological approaches to the existing body of knowledge as future researchers can easily replicate the same approach to compare variable relationships involving different groups.

5. Lastly, when the Kenyan local contexts results are compared to the global patterns based on the meta-analysis effect sizes, the study reveals evidence that green financing tend to contribute positively to the overall banks performance. However, banks must localize their green financing strategies to align with the local social cultural, economic, political and geographical specific market realities to profit from such initiatives otherwise, green financing may not always result to financial gains as indicated by some other few studies which established negative relationships between green financing and banks financial performance reducing the overall effect to a weak positive though significant relationship.

8. SUMMARY

The study was based on five specific research objectives, which were pursued through testing ten research hypotheses. The main objective of the study was to establish whether the green financing initiatives currently undertaken by the listed banks in Kenya positively influence the banks' financial performance directly or indirectly and whether the size of the bank or its type of ownership matters in determining the financial implications of these initiatives. The first three objectives focused on examining the direct impact of green financial awareness, green banking activities and climate risk management initiatives of banks' financial performance. The fourth objective examined how the three major green financing activities collectively informed the banks' green financing strategy, while the fifth objective sought to examine the financial implications of the collective green financing strategies. The sixth objective examined whether there was any statistical difference between how green financing interacted with the banks' financial performance for large vs small banks as well as foreign vs locally owned banks.

The partial least square structured equation model (PLS-SEM) in smart pls 4 was utilized in testing the research hypothesis, and out of the ten hypotheses, eight were supported, and two on bank size and bank ownership were not supported. The analysis process involved running the quality criteria to ensure that only the valid item constructs were used in creating the final model. The quality checks employed included tests for construct reliability and convergent, discriminant validity, collinearity tests, predictive relevance and model fitness. After careful quality scrutiny, bootstrapping was used to test the hypothesis.

The study revealed that green awareness activities, green banking activities and climate risk management strategies all positively impact banks' financial performance independently. However, climate risk management was found to have the strongest impact, followed by green banking activities, while the green awareness initiatives had the least financial implications on the bank's financial performance when assessed independently. The highest influence of green financing on the bank's financial performance was realized when all three initiatives were combined.

The multigroup analysis based on bank size and bank ownership indicated no evidence of statistically significant differences in how green financing interacts with banks' financial performance, implying that all banks would benefit from engaging in green financing activities regardless of their size or type of ownership.

The meta-analysis results confirm the positive and significant relationship between green financing and banks financial performance the overall effect is weak indicating that the extent to which green financing translates to financial benefits depends on how the banks aligns their green financing strategies with the social cultural, economic, and local context realities.

In conclusion, the study singles out several new scientific insights. First, green awareness activities, green banking activities and climate risk management all influence positive financial performance either independently or collectively. Secondly, green awareness initiatives have a weak correlation with financial performance and should be combined with green banking and climate risk management strategies to translate to financial benefits. Thirdly, while some strategies might result in short-term, immediate financial benefits, the major financial implications are long-term in nature and affect the bank's financial performance either directly or indirectly. Fourthly, while green financial initiatives positively and significantly result in financial benefits, they do not guarantee the banks ultimate immunity from climate shocks. Lastly, all banks can benefit from engaging in green financing initiatives regardless of their bank sizes or type of ownership, but the banks must localize their green initiatives to the local contexts, economic and social cultural market realities.

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APPENDIX 2: Research Questionnaire

GREEN FINANCING INITIATIVES AND THEIR IMPACT ON THE FINANCIAL PERFORMANCE OF THE KENYAN BANKING SECTOR: ***A Case Study of Listed Banks in Kenya***

Dear Participant,

My name is Martin Kamau Muchiri, a Ph.D. candidate at the Hungarian University of Agriculture and Life Sciences (MATE), within the Doctoral School of Economics and Regional Sciences. As part of my doctoral research, I am investigating the impact of green financing initiatives on the financial performance of listed banks in Kenya.

Specifically, my study seeks to assess the influence of three key components:

1. Green financing awareness initiatives (particularly the Sustainable Finance Initiative - SFI),
2. Green banking practices, and
3. Climate-related risk management measures,

   as guided by the Kenya Bankers Association and the Central Bank of Kenya.

I am kindly reaching out to request your participation in this research. Your insights, based on your professional experience, are invaluable to the quality and success of this study. Please be assured that all information you provide will be treated with the utmost confidentiality and used strictly for academic purposes.

Your honest and timely responses will be deeply appreciated and will significantly contribute to advancing knowledge in this important area. Thank you very much for your time, support, and thoughtful participation.

Warm regards,

Martin Kamau Muchiri

Ph.D. Candidate, Doctoral School of Economics and Regional Sciences

Hungarian University of Agriculture and Life Sciences (MATE)

Demographic Information:

1. Gender:

- Male ☐
- Female ☐

2. Education Background:

- Diploma ☐
- Bachelor's Degree ☐
- Master's Degree ☐
- Ph.D. and above ☐

3. Work Experience:

- Less than 5 years ☐
- Between 6 to 10 years ☐
- Between 11 to 15 years ☐
- Between 16 to 20 years ☐
- 21 years and above ☐

1. Which of the following bank do you work for?

- Absa Bank Kenya (formerly Barclays Bank of Kenya) ☐
- Equity Bank ☐
- Standard Chartered Bank Kenya ☐
- Kenya Commercial Bank (KCB) ☐
- Co-operative Bank of Kenya ☐
- Diamond Trust Bank (DTB) ☐
- I&M Bank ☐
- Stanbic Bank Kenya ☐
- National Bank of Kenya ☐

- Housing Finance Company of Kenya (HF Group) ☐

In this section, kindly express your level of agreeableness or disagreement with the following statement on a scale of 1 to 5. The questions are centered on the current green financing initiatives undertaken as per the guidance of Kenya's Banking Association (KBA) and Central Bank of Kenya (CBK) and the internal green banking initiatives undertaken by the bank. Each initiative is operationalized into four measured components.

Green Financing Awareness Initiative:

1. My bank has put in place effective channels e.g., social media platforms, websites, blogs, and brochures among others for creating awareness regarding the available green financing products?
    1. Strongly Disagree ☐
    2. Disagree ☐
    3. Neutral ☐
    4. Agree ☐
    5. Strongly Agree ☐
2. My Bank has established partnerships and collaborations with other stakeholders e.g., government, environmental NGOs among others in promoting green financing.
    1. Strongly Disagree ☐
    2. Disagree ☐
    3. Neutral ☐
    4. Agree ☐
    5. Strongly Agree ☐
3. My bank conducts workshops and seminars targeting bank employees and customers to educate them about green financing principles, benefits, and available products.
    1. Strongly Disagree ☐
    2. Disagree ☐

3. Neutral ☐
4. Agree ☐
5. Strongly Agree ☐

4. My bank engages in, or sponsor events related to environmental sustainability where banks showcase their commitment to green and sustainable practices.

1. Strongly Disagree ☐
2. Disagree ☐
3. Neutral ☐
4. Agree ☐
5. Strongly Agree ☐

5. My bank has integrated green metrics in its financial reports to transparently showcase the environmental impact of the bank's operations and the positive contributions through green financing.

1. Strongly Disagree ☐
2. Disagree ☐
3. Neutral ☐
4. Agree ☐
5. Strongly Agree ☐

6. I have enrolled in the Sustainable Financial Initiative (SFI) Program which trains bank employees on sustainable financing practices.

1. Yes ☐
2. No ☐

7. If yes, how can you rate your level of awareness on green financing practices and products as well as how such affects the banks financially either in the short-run or in the long-run?

1. Not at all aware: ☐
2. Slightly aware: ☐

3. Moderately aware: ☐
4. Very aware: ☐
5. Extremely aware: ☐

Green Banking Initiatives:

1. My bank has put in place Employee Related Green Banking Initiatives such as encouraging the staff to participate in environmental volunteer activities such as community cleanups, tree planting events, flexible work arrangements, support, and recognize employees who actively contribute to environmental causes among others.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

2. My bank has established operations-related initiatives, such as reducing paper usage in banking activities, recycling, and using equipment that are eco-friendly among others.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

3. My bank has adopted customer-related initiatives, such as investing in technologies that help customers access banking services online among others.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

4. My bank has established green banking policies such as establishing thresholds for green loan issuance, supplier sustainability policy, green procurement policy, financial inclusion policy, sustainable investment policy et cetera.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

5. My bank has designed and launched financial products that support environmentally sustainable projects, such as loans for renewable energy initiatives, green building construction, or eco-friendly agriculture loan products among others.

1. Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

Climate-Related Risk Management Initiatives:

1. My bank has documented policies and procedures enabling proactive management of climate-related risks.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

2. My bank has set up climate risk-related key performance indicators (KPIs) that are cascaded down to operational business areas.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

3. My bank has put in place IT systems that comprehensively collect and aggregate the necessary data to facilitate the effective assessment of risk exposures, e.g., specialized software tools that enable banks to model and simulate the potential impact of climate change on their portfolios.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

4. My Institution ensures that sufficient resources, financial or non-financial, are allocated to climate strategy implementation. Potential enhancements include, for example, capacity building of staff, seeking expert advice, recruiting talents, and strengthening relevant data systems and frameworks.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

5. Each relevant business and functional unit taking part in climate strategy implementation have their roles and responsibilities clearly defined. Certain roles and functions in the climate strategy, such as those relating to managing climate-related risks, contain built-in mechanisms for checks and balances.

1: Strongly Disagree ☐

2: Disagree ☐

3: Neutral ☐

4: Agree ☐

5: Strongly Agree ☐

Green Financing and Bank's Financial Performance:

1. Implementing green financing activities and principles has promoted the adoption of sustainable operational practices within the bank that have led to cost savings through energy efficiency measures, reduced waste, and streamlined processes, contributing to improved financial performance.

- 1: Strongly Disagree ☐
- 2: Disagree ☐
- 3: Neutral ☐
- 4: Agree ☐
- 5: Strongly Agree ☐

2. The current green financing initiatives and practices have enhanced my bank's statement of financial position due to the inclusion of green financing products such as green loans.

- 1: Strongly Disagree ☐
- 2: Disagree ☐
- 3: Neutral ☐
- 4: Agree ☐
- 5: Strongly Agree ☐

3. Engagement in green financing activities has helped my bank gain access to international markets as many global investors are increasingly interested in environmentally sustainable projects opening up new opportunities for cross-border collaboration and business expansion.

- 1: Strongly Disagree ☐
- 2: Disagree ☐
- 3: Neutral ☐
- 4: Agree ☐
- 5: Strongly Agree ☐

4. Adopting green financing practices has improved my bank's brand image and reputation as consumers and investors increasingly value environmentally responsible businesses, and a positive reputation has attracted customers, enhancing their loyalty with the bank and attracting socially responsible investors.

- 1: Strongly Disagree ☐
- 2: Disagree ☐
- 3: Neutral ☐
- 4: Agree ☐
- 5: Strongly Agree☐

5. By integrating environmental considerations into lending and investment decisions, my bank has developed capacity to manage long-term risks associated with climate change and environmental degradation.

- 1: Strongly Disagree ☐
- 2: Disagree ☐
- 3: Neutral ☐
- 4: Agree ☐
- 5: Strongly Agree ☐

APPENDIX 3: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **506439**

Date of Issue: **19/February/2024**

RESEARCH LICENSE

This is to Certify that Mr.. Martin Kamau Muchiri of Hungarian University of Agriculture and Life Sciences, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Embu, Kajiado, Kiambu, Kirinyaga, Muranga, Nairobi, Nyeri on the topic: THE IMPACT OF GREEN FINANCING INITIATIVES ON THE FINANCIAL PERFORMANCE OF THE KENYAN BANKING SECTOR: A Case of the Listed Banks in Kenya. for the period ending : 19/February/2025.

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THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)

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