



GREEN FINANCE AS A STRATEGIC TOOL FOR ENVIRONMENTAL COMPLIANCE AND SUSTAINABLE COMPETITIVENESS

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Abstract

In this paper, the relation between green finance and environmental compliance and sustainable competitiveness of firms is explored. The study was triggered by a high level of interest among firms to meet environmental requirements, while maintaining competitiveness in a market increasingly driven by the climate risk agenda and responsible investment and stakeholder pressure. The paper was based on the NRBV which centres around the notion that pollution prevention, product stewardship and sustainable development capabilities can turn into a source of firm advantage. The study was designed as a documentary and systematic literature review, focusing on empirical and/or policy studies published primarily from 2019 to 2026. The focus was on green finance instruments like green bonds, sustainability linked loans, green credit lines, ESG equity funds, carbon credits and green guarantees. A narrative synthesis and a simple percentage analysis were used for analysing evidence from the literature reviewed. It was found that green finance promotes environmental compliance by providing funding for environmental compliance technologies, pollution monitoring, environmental certification, disclosure systems and regulatory reporting. The results also indicated that green finance contributes to sustainable competitiveness through the reduction of financing constraint, increased green innovation, boosted reputation, increased efficiency and improved access to sustainability sensitive markets. The high transaction cost, poor disclosure capacity, however, is the major constraint, as is also the risk of greenwashing and restricted access to smaller companies. The paper has found that green finance is not only a funding tool, but also a strategic governance instrument connecting environmental compliance and longer-term competitiveness. It called for more regulatory convergence, building green finance capacities at the firm level and credible assessment of the outcomes of green finance.

Keywords: Green finance, environmental compliance, sustainable competitiveness, green bonds, ESG, firms.

1.0 INTRODUCTION

1.1 Background to the Study

Green financing has thus become a strategic imperative for companies dealing with the environmental and competition challenges they face today. Climate change, resource scarcity, pollution and stricter disclosure obligations become increasingly relevant to business and economic activity, so companies are subject to greater protests by proving that the way they operate meets environmental law requirements and expectations for disclosure. Against this backdrop, green finance can provide targeted financing for projects and practices that reduce environmental impacts, enable cleaner production systems, increase resource efficiency, and improve environmental disclosure. While corporate green bonds are designed to finance climate-positive design projects, third-party certification of the bond itself is more convincing for investors (Flammer, 2021). This indicates that green finance belongs to a financial and a signalling and accountability tool.

For developing economies, where enterprises face financial limitations, deficient environmental infrastructure and low technical capability, the role of green finance is more pronounced. This finds its context in the fact, like all countries, organisations still operate within a framework of regulatory expectations (The Nigerian Exchange Group and sector regulators – Securities and Exchange Commission et al) which ultimately shapes environmental compliance in Nigeria. In 2018, the Securities and Exchange Commission of Nigeria published Green Bond Rules to promote issuance of green bonds for activities such as renewable energy, energy efficiency, sustainable water management, sustainable waste management and climate change adaptation. The Nigerian Exchange Sustainability Disclosure Guidelines are also urging companies, whose ordinary shares are listed on the Nigerian Stock Exchange (NSE) to disclose environmental, social and governance issues that might be material in nature as it affects those businesses. The frameworks show increasing interactions between finance and regulation as well as sustainability reporting in the decision-making processes of these firms.

Environmental compliance is the extent to which a company observes and uses environmental laws, standards, permits as well as disclosure and voluntary environmental certifications. For some industries, compliance might mean investing in pollution control equipment, waste management systems, emissions monitoring and environmental auditing as well as putting an ISO 14001 certification or sustainability reporting effort into action. For most companies these requirements are hard to meet as compliance often requires significant capital, technical expertise and monitoring. Conditional financing for environmental improvements is one way to mitigate these constraints, and green finance tools can provide such solutions. It has been found by Gao & Liu (2023) that green credit policy can effectively promote the ESG performance of corporations through facilitating their green technological innovation, and Li et al. (2024).

Yet, sustainable competitiveness is the totality of a company being profitable, innovating and competing in a compliance with environmental protection. Green finance offers access to capital at a lower price, which could in turn enable firms to compete by becoming more efficient with energy use, face less regulatory risk, gain better reputations and capture markets sensitive to design. The study of Li & Lin (2024) confirmed that green finance significantly promotes the financial performance of green enterprises through reducing capital constraints and expanding investment in projects. However, none of this is conclusive evidence. However, Auzepy et al. (2023) and Kim et al. Also (2025) warn that SLF sometimes cannot deliver significant sustainability benefits if KPIs are not well defined, not sufficiently transparent or poorly monitored.

The present document therefore summarizes the extant literature on the connections between green finance, environmental compliance and sustainable firm competitiveness. It does not collect new primary data, but rather synthesises empirical and policy research to fulfil two objectives. The first objective is about the contribution of green finance instruments to compliance, in terms of environmental targets that companies aspire to achieve; and the second about the contribution of those same instruments to sustainable competitiveness. But this study is relevant because companies are now more frequently faced with the perspective that compliance with environmental regulations can be considered as one of the possibilities for either innovation, legitimacy, access to markets and long-term strategic performance.

1.2 Statement of the Problem

Compliance with environmental laws and the disclosure requirements for sustainability is becoming more and more challenging for firms, while there are many firms that are constrained in terms of financing and technicality. Investing in cleaner technology, environmental management systems, monitoring equipment, certification, waste treatment, sustainability reporting are part of environmental compliance. These requirements are costly, particularly for companies in emerging economies where green capital markets are still underdeveloped and environmental data systems are underdeveloped. If they can't afford to do it, there are regulatory risks, reputational risks, losing market access, operating costs and loss of investor confidence.

To this end, green finance is broadly presented as a solution, but the existing literature does not yield a clear-cut conclusion about the effectiveness of green finance. Based on the results of some studies, green bonds, green credit and sustainability-linked loans lead to better environmental performance, disclosure of environmental, social and governance (ESG) data and firm value. Other research indicates mixed findings, particularly if green finance is linked to greenwashing, high transaction costs and low level of monitoring, and benefits are targeted to large firms only. This generates a research challenge as managers, regulators and academics require a better understanding of the role of green finance in

enabling environmental compliance and sustainable competitiveness. This paper tackles the problem by summarising existing research and examining the prevailing trend in the evidence for the two objectives.

1.3 Objectives of the Study

The main objective of the study is to review literature on green finance as a strategic tool for environmental compliance and sustainable competitiveness of firms. Specifically, the study seeks to:

- i. examine how green finance instruments facilitate environmental compliance in firms.
- ii. assess how green finance instruments facilitate sustainable competitiveness of firms.

1.4 Research Questions

The following research questions guided the study:

- i. How do green finance instruments facilitate environmental compliance in firms?
- ii. How do green finance instruments facilitate sustainable competitiveness of firms?

1.5 Significance of the Study

The study matters to managers of firms, as it offers insights into how green finance can have an important strategic role beyond financing the project itself. The second one is the core demonstration of green finance use cases for adherence systems, environmental certification, pollution control technologies and sustainability reporting. The study also provides important implications for regulators, illustrating how rules connected to disclosure, monitoring and credible verification of financial instruments may be the game changer between red and green. The study will be relevant for investors and financial institutions as it emphasises how the use of green financial instruments can facilitate firm competitiveness by mitigating environmental risks. For scholars, the study is useful through two aspects of its scope where evidences from literature are presented; environment compliance and sustainable competitiveness.

1.6 Scope of the Study

The study is a paper based on literature that examines green finance and environmental compliance and sustainable competitiveness of firms. It is primarily based on literature from the empirical and policy worlds from 2019 to 2026, and includes green bonds, sustainability linked loans, green credit lines, ESG equity funds, carbon credits and green guarantees. The focus is on how companies can leverage green finance to meet environmental needs and to remain competitive, even though it references Nigeria and other jurisdictions.

2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

2.1.1 Green Finance

Financial resources that are mobilised and allocated for activities that bring environmental benefits or mitigate environmental impacts are referred to as green finance. It encompasses financial instruments, policies and investment opportunities for renewable energy, cleaner production, energy efficiency, climate adaptation, sustainable waste management, low-carbon transport, sustainable agriculture and environmental innovation. Flammer (2021) states that corporate green bonds are a specialized type of debt financing where the bond proceeds are dedicated to a project that is beneficial for climate change. In Nigeria, the SEC Green Bond Rules defines green projects as projects in the following sectors: renewable energy, clean transportation, sustainable water management, climate change adaptation, energy efficiency, sustainable waste management and sustainable land use.

Green finance is not the same as traditional finance as it adds environmental purpose, disclosure and accountability in the financing process. A normal loan may be granted based on the creditworthiness of the borrower but a green loan/ sustainability linked loan will require proof that the borrower is taking steps to decrease emissions, improve waste management or meet agreed sustainability targets. Auzepy et al. (2023) provide a definition of sustainability-linked loans, which align loan conditions with sustainability KPIs, and Gao & Liu (2023) demonstrate that green credit has the potential to affect firm behaviour through credit allocation and environmental risk screening. In this study, green finance is considered as a strategic financial measure to facilitate the realization of environmental compliance and sustainable competitiveness.

2.1.2 Green Finance Instruments

Green finance instruments: These are the funding instruments that are relevant to channel funds to environmentally responsible activities. The main instruments are green bonds, sustainability linked loans, green credit lines, ESG equity funds, carbon credits and green guarantees. Green bonds are debt funds that finance projects that have a clear environmental benefit, and sustainability linked loans are loans that are issued with proceeds for all manner of projects but with sustainability performance influencing the price of the loan. Green credit lines are financing mechanisms that banks will offer for environmentally sustainable projects, and ESG equity funds invest in companies that exhibit high ESG scores. Carbon credits are market-based solutions used by companies to purchase and trade verified reduction in emissions, while green guarantees alleviate the risk associated with lending for green projects.

The significance of these instruments is in how they relate finance to environmental behaviour. Green bonds mandate that proceeds be allocated to projects that have

environmental benefits, and typically include environmental reporting. The pricing incentives of sustainability-linked loans are based on the key performance indicators, such as greenhouse gas reduction, use of renewable energy or ESG scores. Green credit lines and green guarantees alleviate financing problems for companies when investing in cleaner technology. ESG funds bring pressure on companies to disclose and advance their environmental governance. There is an emerging framework in Nigeria for connecting finance and compliance via green bonds and sustainable finance guidelines and global evidence indicates that green finance instruments can promote green innovation, disclosure and environmental performance when they are well-designed.

2.1.3 Environmental Compliance

Environmental compliance is compliance with environmental laws, regulations, standards, permits, reporting requirements and voluntary environmental management systems by firms. This encompasses national environmental law, waste disposal standards, emissions limits, climate disclosure rules, ESG reporting guidelines and ISO 14001 environmental management systems and sectoral environmental permits. Compliance is about more than just avoiding penalties; it is about implementing internal processes to measure environmental impacts, report sustainability information, prevent pollution and show responsible corporate behaviour. Compliance is no longer limited to physical pollution control, as the Nigerian Exchange Sustainability Disclosure Guidelines and the SEC Sustainable Finance Principles indicate.

For companies, environmental compliance typically involves costs for equipment, such as monitoring systems, cleaner production technologies, waste-treatment plants, emissions measurement, staff training, auditing and certification. The requirements impose financial stress as compliance benefits might be long term, and costs are likely to be immediate. One way to overcome this challenge is green finance, which offers specific tools to support investments for compliance. Li et al. (2024) demonstrate that green credit guidelines can promote environmental performance by implementing environmental and social risk assessment under credit management. Additionally, Sun & Hao (2025) reveal that third party certifications enhance the environmental legitimacy of green bonds when they are monitored and verified by third parties, which suggests that finance can aid compliance of green bonds.

2.1.4 Sustainable Competitiveness

Sustainable competitiveness is the capacity of a company to retain its market competitiveness, profitability, innovation and trust from the various stakeholders while minimizing environmental damage and ensuring long-term sustainability. It is not the same as being short-term competitive, it's about the environmental and social context in which the business can be successful. A competitive firm can be one who is competitive in price

or output but not sustainable because of their operations causing them to be subject to regulatory sanctions, wasteful resource use, reputational damage or climate related risk. Sustainable competitiveness is thus financial performance and resource efficiency, green innovation, market legitimacy, environmental reputation and resilience.

Green finance can help to achieve sustainable competitiveness by tackling financing barriers, facilitating investments in clean technology, lowering energy costs and waste costs, enhancing disclosure quality and building stakeholder trust. Based on their study of capital consolidation and information exchange, Li & Lin (2024) concluded that green finance facilitates the financial performance of green companies. This is consistent with the findings of Flammer (2021) that investors are positively inclined towards the issuance of corporate bonds in the green bond market, particularly in the case of bonds that are certified, which indicates that credible green finance can enhance market perceptions. But sustainable competitiveness does not just happen automatically because of poorly designed green finance, as it can result in symbolic compliance, high transaction cost or greenwashing. This provides a reason for credible monitoring, and firm-level capability.

2.1.5 Green Finance and Environmental Compliance

The connection between green finance and environmental compliance lies in the ability of green finance to supply capital and incentives for companies to fulfil environmental obligations. There are numerous environmental responsibilities that need technology, systems and knowledge to be invested. For instance, they could require funding to equip production facilities with pollution control equipment, upgrade production facilities, become certified with ISO 14001, complete ESG reports, or meet environmental audit requirements. Green bonds and green credit lines are especially pertinent since the funds raised from them can be directly allocated to projects that qualify as green projects. In this way, green finance lowers the barrier to firms in complying with environmental regulations.

Also, green finance promotes compliance by means of conditionality, disclosure and monitoring. Borrowers might be requested to implement environmental goals, prepare impact reports, obtain third party verification or implement environmental management systems as part of their obligations to lenders and investors. Auzepy et al. (2023) reveal that the quality of the sustainability key performance indicators determines the success of sustainability-linked loans, and Kim et al. (2025) prove that transparency positively influences the ESG performance after the loans have been issued. Green finance can be used to enhance compliance where there are measurable targets and credible reporting and outside verification. If not, green finance might not induce change in firm behaviour and may even turn into a greenwashing danger.

2.1.6 Green Finance and Sustainable Competitiveness

The connection between green finance and sustainable competitiveness is illustrated by the potential of green finance to make environmental responsibility a strategic business advantage. Companies can use green financing for green technology, energy-saving, green innovation and environmental reporting systems. They are investments that can lower operating costs, enhance product quality, boost brand reputation and attract investors who want investing in sustainable companies. Gao & Liu (2023) demonstrated that green credit can enhance the ESG performance via green technological innovation, while Lei et al. (2025) demonstrated that green finance can decrease financing restraints and encourage research and development investment.

Green finance also contributes to firms to compete by minimizing their environmental risk exposure. Companies with positive environmental records will find that these good practices will help them to avoid the risk of penalties from regulators, costly litigation, disruption of operations, and reputational damage. Environmental responsibility is a competitive asset where customers, investors and regulators appreciate it. However, the competitiveness impact may be different depending on the size, sector, ownership and regulatory pressure of the firm. Liao et al. (2024) discovered that green credit policy may squeeze out green innovation from some polluting enterprises, particularly non-state-owned enterprises. It means that green finance is most effective when it is able to foster competitiveness by allowing firms to turn finance into real environmental and market outcomes.

2.2 THEORETICAL FRAMEWORK

2.2.1 Natural Resource-Based View

This study is based on the Natural Resource Based View of the firm which was propounded by Hart in 1995 as an extension of the Resource Based View of the firm. It is the theory that suggests that competitive advantage may come from capabilities that allow firms to decrease the environmental impact, handle ecological constraints, and react strategically to ecological pressures. Pollution Prevention and Product Stewardship and Sustainable Development are strategic capabilities that Firms can use to create a long-term competitive advantage, as identified by Hart (1995). The theory provides insights into the importance of not considering green finance as just a source of funds but as a mechanism to enable the development of environmental capabilities by firms in the case of this study.

According to the proponents of the Natural Resource-Based View, environmental strategies can increase efficiency, innovation, reputation and market positioning. Russo and Fouts (1997) related environmental performance to profitability; more recent scholars of sustainability have theorized that valuable environmental resources are those that are rare, hard to imitate, and part of organizational routines. The theory's Achilles heels lie in the belief that the investments in the environment will readily convert to a competitive advantage. Critics say the green investment could raise upfront costs, it could be hard for

small businesses to do, and it could yield mediocre competition results when regulations are weak or consumers are not willing to pay a premium for green products. Also, Auzepy et al. (2023) and Kim et al. (2025) demonstrate that sustainable finance might not work if sustainability goals are either poorly defined or the disclosure is unclear.

The study is based on the Natural Resource Based View, since the subject is related to the link between environment compliance and sustainable competitiveness. Green finance instruments supply the funds needed for companies to establish pollution reduction facilities, meet environmental requirements, create green innovations and enhance disclosure of sustainability. The results are in line with the theory's premise that ecology can be a source of competitive advantage, as companies turn ecological pressures into capabilities. This means that the theory offers a helpful basis for understanding the role of green finance in supporting environmental compliance and sustainable competitiveness of companies.

2.3 EMPIRICAL REVIEW

2.3.1 Green Finance Instruments and Environmental Compliance

In a Nigerian bank, Adeyemi, et al. (2024) tested the mediating role of financial innovation between the influence of green finance and environmental performance. A cross sectional survey design was adopted in this study. The population comprised the branch managers of Access Bank in Southwestern Nigeria and 250 managers were targeted, with 200 copies of the questionnaire being collected. Targeted sampling was employed and the data were analysed using the structural equation modelling approach in the software package, STATA 15. It resulted that green finance had a positive effect on environmental performance and financial innovation enhanced the relationship. The authors found that green financing can be an effective tool to drive positive environmental impacts if companies have innovative financial systems in place and suggested enhanced investments in green finance products and environmental reporting. The study is relevant because it gives Nigerian evidence that in order to achieve compliance-related environmental performance, Green finance can be a facilitator.

Gao & Liu (2023) studied the impact of the green credit policy on corporate ESG performance in China. The study is based on a quasi-experimental design and the population comprises the Chinese A-share non-financial listed companies between 2010 and 2020. The study was conducted using a quasi-experimental research design and the sample consists of companies listed on the Chinese stock exchange that were affected by the Green Credit Guidelines. The study employed purposive panel selection using available firm-year data and employed difference-in-differences, parallel trend tests and PSM-DID for analysis. The results indicated that green credit was found to have a significant positive effect on green technological innovation, and in turn, this positive effect enhanced the ESG performance. The authors' findings show that credit policy can act as a "disciplinary tool"

for firms to undertake environmental governance and they suggest that it is time to increase the level of green credit enforcement. The study is supportive of the present paper as it demonstrates that green credit can help fulfill the requirements even under the pressure of the lenders and the innovation process.

The effect of GCGs on the environmental performance of high-polluting, high-energy and surplus-capacity firms has been studied by Li, Zhang, et al. (2024). This research employed a quasi-natural experiment with panel design. The population was Chinese A-share listed companies, the sample size was 461 companies from 2008 to 2020. The sampling technique used was purposive because only firms that matched the study classification and data availability criteria were sampled. Analysis was done using difference-in-differences method. The results showed that the implementation of the Green Credit Guidelines had a positive impact on the environmental performance of the targeted companies by conducting an environmental and social risk assessment. They found that green credit has the potential to be a powerful instrument to stimulate environmental behavior and suggested that the bank's screening level must be enhanced. The review is relevant because it demonstrates compliance facilitation via credit conditions.

Sun & Hao (2025) investigated if and how green bond issuance is correlated to an improvement in corporate environmental performance and the influence of third-party certification. In the study, the population of interest are the firms that issued green bonds, and an empirical panel design was used. The sample comprised corporate green bond issuers and firms comparable to the green bond issuers obtained from the market and environment databases. The sampling was purposive because only firms which had green bond and environmental performance data were selected. Analysis based on regression was employed. The study revealed that green bonds had positive effects on the environmental aspects and that third-party certification had a positive effect and helped limit greenwashing. The authors found certified green bonds to be more trustworthy environmental compliance measures and recommended improved verification standards. The study is relevant as it connects green bonds with environmental performance measures.

Auzepy, et al. (2023) studied the design of sustainability-linked loans to assess whether they are meant to set up sustainable incentives. The study employed a documentary empirical approach with a large sample of sustainability-linked loans that are provided from 2017 to 2022. The population was global sustainability linked loan facilities and the sample was loans for which key performance indicator and pricing information were available. The sampling was purposive and data analysis was achieved by applying a KPI quality scoring and descriptive statistical assessment method. The results revealed that the use of indicators that create credible incentives was limited in many loans. The authors found that targets need to be material, ambitious and measurable to enable sustainability linked loans to help with compliance. A new study suggests that the loan design and

disclosure have to be improved. It is relevant because it brings two points to light: conditionality as a compliance mechanism; greenwashing as a barrier.

Kim, et al. (2025) discussed sustainability-linked loans in the context of ESG lending. The large-scale archival design with firms that borrowed using sustainability-linked facilities was employed in the study. The population consisted of borrowing firms in the sustainability-linked loan market and the sample consisted of facilities that had ESG performance and transparency data. A purposive sampling was conducted because full information on sustainability-linked loans was needed. Comparative and regression technique were applied by the authors to analyze the data. The results indicated that high-transparency borrowers had higher ESG scores following issuance, while low-transparency borrowers' scores declined. The research has found that sustainability linked finance needs to come with credible disclosure to facilitate the enhancement of environmental outcomes, and that there is a need to further increase transparency of loan contracts. The study is relevant because it has revealed that monitoring is the determining compliance value of green finance.

Dai, et al. (2025) studied the environmental impact of the Green Credit Guidelines in China by looking at its effects on high-polluting companies. The data for this study were A-share listed companies from 2006 to 2022. High-polluting listed companies were included in the population and firms with available Bloomberg ESG environmental scores and financial data were included in the sample. Purposive sampling was used and difference-in-differences estimation was employed for analysis. The results indicated that green credit had a positive impact on the environmental indicators concerning resource efficiency and pollution reduction and ecological conservation. The authors found that credit regulation can help to enhance environmental compliance of polluting companies, with varying impacts across different regions and firm attributes. The study suggested to have differentiated green credit supervision. It is relevant because it gives evidence based on compliance.

The impact of green finance pilot zones on the environmental performance of companies in China was studied by Yu, et al. (2025). A difference-in-differences research design was used in the study. The population was Chinese A-share listed companies, and the sample was 2,324 sample companies. The sampling was focused on firms in and out of green finance pilot areas and where data on their environmental performance was available. Data analysis method used was DID regression and heterogeneity test. The research indicated that green finance policy had a statistically significant positive effect on the environmental performance of the company in general, especially for companies that are state-owned and not key monitored pollution. The authors found that policy-supported green finance can boost compliance behavior and suggested specific policy support for this purpose. The study is relevant because of its ability to explain the role of green finance infrastructure.

Geng, et al. (2023) have investigated the impact of green credit on the disclosure of environmental information by new-energy listed companies. This study was designed quantitatively as a panel study. The population comprised listed new-energy companies, and the sample included companies with green credit and environmental disclosure data. Purposive sampling was chosen due to the requirements for disclosure and sector. Employing regression analysis, the study identified the relationship between green credit and disclosure of environmental information. It was found that the green credit had positive effects on the environmental disclosure behaviour and encouraged the environmental disclosure of the firms in a more transparent manner. The study noted that green credit helps to ensure compliance by incentivizing companies to improve environmental measurement and reporting. The authors called for increased disclosure, which makes the study applicable to environmental compliance.

Liao et al. (2024) wondered whether green credit policy yields genuine green results or fake green results to polluting enterprises. The study employed a quasi natural experimental design with polluting firms with share listing on the Chinese A-share market from 2009 to 2019. The polluted population comprised listed firms and the sample comprised firms that were impacted by the Green Credit Guidelines and a similar control group. Purposive sampling and difference-in-differences analysis were employed for the study. Contrary to numerous positive results, the study revealed that in some polluting companies, there was a negative effect of the green credit policy on ESG performance due to the fact that financing constraints took precedence over green innovation. The authors concluded that the enforcement ability is diminished as a result of poorly designed green credit, and recommended policy support for limited companies. The study is relevant because it has the capacity to identify the barriers to compliance.

2.3.2 Green Finance Instruments and Sustainable Competitiveness

Flammer (2021) investigates the role of corporate green bonds, with implications for companies and investors alike. Design/methodology/approach This study used archival empirical design with data on the global corporate green bond market issuances for the years 2013–2018. The sample consisted of firms for which bond issuance, stock market and environmental data were observable; the population consisted of corporate green bond issuers. The sampling was purposive and data analysis was through event-study estimation and comparative analysis. The results suggested that green bond announcements were well received by investors, especially for first-time issuers and certified bonds, and that issuers improved their environmental performance after issuance. One of the main findings is that green bonds can be, and often are used to signal commitment in favor of climate-friendly investment with room for improving credibility through certification (Jafino et al 2023). The article makes an important contribution by linking green finance with the reputation and market competitiveness.

Li & Lin (2024) analyzed the reciprocal relationship between green finance and financial performance of Chinese green businesses. This study employed a quantitative panel design. It was green listed enterprises in China which were randomly selected as the sample, and consisted of the financial data of Chinese green enterprises from 2012 to 2022 as well as the data of Chinese green finance. Sampling method chosen was purposive sampling, Analysis of data was Generalised Method of Moments. Main findings of research Research and development confirmation that green finance has a positive and significant impact on financial performance due to the strong positive correlation between green finance and financial performance in this field. The authors have concluded that first, green finance has improved the financial capability of environmentally friendly enterprises and second, to support these eco-enterprises. This study also contributes towards the competitiveness objective by investigating the relationship between green finance and firm financial performance.

Lei, et al. A study on green finance and green innovation of listed companies in China by Zhang et al. (2025). The study used a panel data of Chinese A-share listed companies in the period 2012 to 2021. Population: listed firms; Sample: full green finance, financing constraint and research and development data The Methodology that was used is Purposive sampling and regression based mediation analysis. The results suggested that the green finance relaxed the financing constraints and raised the investment in research and development, promoting green innovation. The role of innovation capability to the positive impact between green finance and firm environmental performance was established by the authors, who also recommended that relevant policies be enacted to increase accessibility of green finance. The significance of the study is because green innovation is one of main factor driving sustainable competitiveness of companies.

Wang et al (2024) Green Bonds and Corporate Environmental Investment This study used the quantitative panel design (QPD) with companies that had a history of issuing green bonds. With regard to population, it was stated as listed firms eligible for green bond finance; with regard to sampling, the sample was firms which have environmental investment and financial information. Sampling method and tools: The purposive sampling was applied, and the data analysis carried out through panel regression. The studies found that issuance of green bonds had a significantly positive effect on corporate environmental investment, and this impact was more pronounced for state firms and an associated measure of the firm's environmental preferences. The authors concluded by stating green bonds promote strategic environmental investments and urged increasing the access to bond market. It is relevant because investments made in the environment return on greater efficiency, reputation and competitive positioning.

Furthermore, Gao & Liu (2023), also provided the demonstration of the role of green credit in improving ESG performance ability with green technological innovation, which could also be seen as a contribution to competitive advantage area. The sample of this study is Chinese continental A-share non-financial listed companies in 2010-2020. This study used purposive sampling to select firms exposed to the Green Credit Guidelines, and with complete data. Analysis was conducted using difference-in-differences and propensity score matching with difference-in-differences (PSM-DID) techniques. The findings demonstrate that green fields not only positively contributed to firms' green innovation by improving their reputation and market legitimacy. The authors discuss the important implications: Green credit can promote incentives to innovate and improve sustainable development in several areas of business competitiveness. The study is relevant due to the fact that the ESG performance directly affects investor trust and market access.

Evidence from Adeyemi et al., (2024) on the relationship between green finance, financial innovation and environmentally performance of a bank in Nigeria. Method: The study utilized targeted sampling to collect two hundred valid responses from the managers of Access Bank branches in Southwestern Nigeria. Analysis was performed using structural equation modelling. The findings revealed that green finance improved environmental performance and the mediating role of financial innovation. The authors were able to conclude that green finance is less effective when the financial and managerial systems are diverse and recommended a stronger design of environmentally friendly products. This study proposes the following hypotheses H1 Financial innovation positively influences environmental performance in financial institutions and which is relevant for sustainable competitiveness through enhanced reputation, trust and strategic differentiation of a financial institution.

Abidin et al. (2024): The impact of green finance on the financial sustainability performance of SMEs in Malaysia and Indonesia. This study was of the empirical, comparative design. The population contained SMEs in the two economies, and the sample comprised of SMEs with at least some green finance and sustainability performance data. Data collection Purposive sampling and quantitative analysis. The findings suggest that green finance promotes the firms' financial sustainable performance differently depending on the institutional setting of host countries and firm capabilities. The authors propose that green finance can improve the sustainability of SMEs in Indonesia and provide several types of a green finance product for small-scale SMEs. Relevance: Environmental practices need financing; based on SMEs in countries where environmental investments can be translated into competitiveness, such practices will require fundraising efforts.

Hoang (2025) examined about determinants of green finance and green performance of SMEs in the agricultural sector: the case of Vietnam. It was an empirical study focusing on financial institutions, legal frameworks and corporate ventures. The population consisted of specialized agricultural SMEs and their financing institutions as well, while the sample comprised those who had already achieved some level of green finance experience. It has followed quantitative and sectoral analysis in the methodology of purposive sampling, used methodarily The findings showed that green finance, SME stand-alone financial instruments and regulatory support substantially improved green finance ease of access and enterprise readiness. Found in the context of institutions and managerial capacity as supportive environment, when green finance does have a rallying effect on competitiveness. The study is important as it identifies access barriers and firm size.

Liu et al. (2024) studied the effect of green innovation on corporate ESG performance in Chinese A-share listed companies from 2009 to 2021. The population was made up of listed firms and the sample consisted of firms with available data for green innovation and ESG. Data collection technique used as purposive sampling and analysis was panel regression. The results revealed that radical and progressive green innovation both positively stimulated ESG performance. They identified positive effects of green innovation on sustainability performance and proposed supporting policies to transform enterprises towards green innovation strategies. Second, the study is also relevant because green finance mostly consists of an innovation in a way that stems sustainable competitiveness through reputation, efficiency and trust values of stakeholders.

Cheng et al. (2025) studied how green innovation can affect future financial and environmental growth of the firms. It was an empirical, longitudinal, research design. The sample is a subset of companies with existing green patent, financial, and environmental performance data. Data was analyzed using purposive sampling and regression analysis. The findings showed that pollution-prevention innovation improved the economic and environmental outcomes jointly, whereas some pollution-control investments showed only an improvement in the environmental outcomes alone. Types of green investment were different: The authors found in their study the need for priority pollution-prevention innovation. The significance of the study is that innovation, which green finance supports, can bring about sustainable competitiveness.

Khan, et al. Anekwe et al. (2025) examined the topic of green bonds with corporate environmental and financial outcomes. Using firms that issued green bonds and matched non-issuers, the study employed a panel empirical design. The population was made up of publicly traded firms that had some activity in green bond markets, with the sample consisting of firms that both issued green bonds and were able to access performance data. A purposive sampling technique was used to conduct a regression analysis. The findings showed that green bonds may improve environmental performance, while the effect on financial performance was mixed over different studies. Given the likely potential of green bonds as environmental value, their finding that this opportunity is more often realised ahead of financial benefit justified a greater alignment between green investment and business strategy. This makes the study very suitable because it gives a balanced perspective on competitiveness.

Wu (2025) examined the interrelationship of green bond issuance, ESG performance and firm valuation. The study type was exploratory empirical design. Population were firms that issued green bonds, the sample includes firms for which ESG rating, bond characteristics and valuation data were available. Purposive sampling and regression analysis have been adopted. Results showed green bond issues were related to ESG performance and valuation, and bonds indicated a commitment to the environment, particularly for credible bond features. In particular, the author recommended that green bonds could help promote the market value growth of sustainability signalling and encouraged reporting transparency with respect to a green bond. The relevance of the study is illustrated through demonstrating the reputational and valuation pathway of green finance, its interrelation, and link to competitiveness.

2.4 Summary of Empirical Review and Research Gap

The empirical review shows that green finance facilitates environmental compliance mainly through funding, credit conditionality, disclosure requirements and monitoring. Research, including Gao & Liu (2023), Li et al. (2024), Sun & Hao (2025) and Adeyemi et al. (2024), evidences that green credit, green bonds and green finance are beneficial to

environmental performance, the disclosure of ESG and environment related behaviour. Liao et al. (2024), Auzepy et al. (2023) and Kim et al. (2025) demonstrate, however, that weak targets, inadequate transparency, and financing issues can diminish the impact of green finance. The problem is many studies refer to environmental performance in general and they don't differentiate between the compliance mechanisms like certification, disclosure, monitoring, and regulatory risk reduction.

The empirical review further reveals that green finance can help achieve sustainable competitiveness by easing financing constraints, encouraging green innovations, boosting financial performance, increasing valuation and increasing the reputation among stakeholders. Flammer (2021), Li & Lin (2024), Lei et al. (2025) and Wu (2025) provide evidence of this positive pathway. The financial and market advantages, however, are suggested as possible conditions and/or lagged effects by Khan et al. (2025) and Liao et al. (2024). This paper thus helps by structuring the literature into two objective-based folders, namely: Environmentally compliant and More competitive through sustainability.

3.0 METHODOLOGY

3.1 Research Design

The study used two research designs, namely Documentary and Systematic Literature Review. This design was suitable given that the paper did not generate new primary data, but rather conducted a review and synthesis of existing empirical and policy-based research on green finance, environmental compliance and sustainable competitiveness of firms. This design allowed the literature to be organised into the two research goals and to see the predominant set of results.

3.2 Sources of Data

The study was conducted using second-hand information from peer-reviewed journal articles, policy documents, Government regulations and authoritative institutional reports. The literature search was based on green finance instruments, including green bonds, sustainability linked loans, green credit, ESG funds, carbon credits and green guarantees. The words used in the search were key themes such as green finance and environmental compliance, green bonds and environmental performance, sustainability linked loans and ESG targets, green credit and corporate ESG performance, green finance and firm performance and sustainable finance and competitive advantage.

3.3 Inclusion and exclusion criteria

Studies were included where they were published, the primary publication period of 2019-26, in English, at a firm level or related to the firm's outcome, and related to either environmental compliance, environmental performance, disclosure of ESG, firm

performance, market value, innovation, or competitiveness. Those studies were excluded that dealt with only sovereign green finance, or lacked publication information, or only covered compliance/regulation/environmental performance or performance/competitiveness/market outcomes. This resulted in the analysis of only relevant studies.

3.4 Method of Data Analysis.

These were conducted by narrative synthesis and simple percentage analysis. All the reviewed studies were initially categorized based on the two objectives. All the studies were analyzed for Instrument, Context, Population or Data source, Sample, Method of analysis, Findings, Conclusion and Relevance. The findings were then categorized as evidence for or against the hypothesis. Simple percentages were calculated with the formula shown below:

$$\text{Simple Percentage} = (\text{Frequency} / \text{Total Number of Studies Reviewed in the Category}) \times 100$$

4.0 ANALYSIS AND DISCUSSION OF REVIEWED FINDINGS

Table 4.1 Analysis of Findings on Environmental Compliance

Direction of reviewed findings	Frequency	Percentage
Positive facilitation of compliance/environmental performance	7	70.00%
Mixed or conditional facilitation	2	20.00%
Negative or compliance-limiting effect	1	10.00%
Total	10	100.00%

Source: Researcher's computations (2026)

As shown in Table 4.1, 70 per cent of the studies examined under Objective 1 found green finance instruments to help environmental compliance or environmental performance. Adeyemi et al. (2024) also showed that green finance boosted the environmental performance of a Nigerian bank, while Gao and Liu (2023) demonstrated that green credit led to green innovation and boosted ESG performance. Furthermore, Li et al. (2024) indicated that the Green Credit Guidelines positively affected the environmental performance of high-polluting companies, and Sun and Hao (2025) demonstrated that green bonds certified by the Guidelines promote environmental performance and lessen the danger of greenwashing.

Mixed evidence is the other 20 percent of the studies; this is predominantly associated with loan design quality, transparency and implementation. In fact, Auzepy et al. (2023) observed that sustainability-linked loans did not create full credible incentives, as some of

the key performance indicators were not strong. Kim et al. (2025) also discovered that borrowers with high transparency had positive ESG results following the sustainability loans whereas those with low transparency had negative results. The negative or limiting evidence is 10 per cent and is borne out by Liao et al. (2024), which showed that for constrained polluting firms, green credit policy may crowd out green innovation. Based on the discussion, the authors propose that, if the design, monitoring and support of green finance is strong, then it can help environmental compliance.

Table 4.2 Analysis of Findings on Sustainable Competitiveness

Direction of reviewed findings	Frequency	Percentage
Positive effect on competitiveness/performance/innovation	8	66.67%
Mixed, delayed or conditional effect	3	25.00%
Weak or not consistently significant financial effect	1	8.33%
Total	12	100.00%

Source: Researcher's computations (2026)

As shown in Table 4.2, 66.67 percent of the analysed studies on the second objective showed positive impacts of green finance on sustainable competitiveness. Flammer (2021) discovered that positive investor reactions were observed on green bond announcements by corporations, especially when certified. According to Li and Lin (2024), green finance has boosted the financial performance of green businesses; Lei et al. (2025) showed that green finance has alleviated financing constraints and facilitated green innovation. The results indicate that green finance is able to enhance the competitiveness in terms of reputation, financing barriers, innovation and financial performance.

The conditional evidence accounts for 25 percent of the studies and shows that competitiveness benefits depend on firm size, ownership, sector, regulatory pressure and managerial capacity. Abidin et al. (2024) and Hoang (2025) suggest that green finance is advantageous for SMEs when financial products are available and there is regulatory support. Cheng et al. (2025) further demonstrate that innovation for pollution prevention is more financially and environmentally beneficial than end-of-pipe pollution-control investments. Khan et al. (2025) indicates the weak or not consistently significant category, as they concluded green bonds had a positive impact on environmental outcomes but did not always yield immediate financial returns. In short, the competitiveness impact of Green Finance is not automatic, but it is attainable if companies are able to understand how to use the capital from Green Finance to create innovation and efficiency, and to send credible market signals.

4.3 Discussion of Findings

The result of the study is that green finance helps to achieve environmental compliance by supporting environmental projects and rendering environmental performance measurable. Li et al.(2024) found that environmental performance of high-polluting firms was strengthened by the green credit guidance, in terms of credit management and environmental risk assessment, which provides strong support to this finding. It is also corroborated by the study by Adeyemi et al. (2024) which found that a green finance was beneficial to environmental performance in a Nigerian bank, and by the study by Sun and Hao (2025) which found that the third-party certification enhanced the environmental impact of green bonds. These studies show that environmental compliance goes better when there are project eligibility requirements associated with financing, along with monitoring, reporting and verification.

The second is that green finance encourages sustainable competitiveness by innovation, market reputation, financial performance and risk reduction. Flammer (2021) showed that the investors are more interested and enthusiastic about buying the certified corporate green bond, and Li & Lin (2024) showed that green finance can enhance the financial performance of green enterprises. Moreover, Lei et al., (2025), demonstrated that green finance drives green innovation by alleviating financing pressures and fostering R&D investment. These studies are in line with the Natural Resource Based View as they indicate that environmental capabilities can be transformed into key resources when firms leverage environmental finance to develop cleaner technologies and enhance reputation and mitigate environmental risks.

The third conclusion is that 'green finance' is not a panacea for compliance or competitiveness. The impact is related to the credibility of the instrument, the robustness of sustainability goals, disclosure transparency and the capacity of the firms. Auzepy et al. (2023) identified that sustainability-linked loans tend to have poor KPIs, and Kim et al. (2025) demonstrated that the ESG performance of borrowers of such loans could potentially erode following issuance. Moreover, Liao et al. (2024) discovered that the green credit policy can suppress innovation in limited firms. The results indicate that green finance needs to be backed by a robust reporting system with credible assurance and assistance for smaller or financially weaker entities.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The study examined the literature available on green finance as a strategic instrument for environmental compliance and sustainable competitiveness of companies. The first one focused on the role of green finance instruments in ensuring environmental compliance. The review revealed that Green bond, Green credit, sustainability linked loans as well as

ESG-related instruments are used to support compliance through financing of pollution control technology, environmental monitoring systems, certification, disclosure and environmental reporting. The second goal looked at the role played by green finance instruments for sustainable competitiveness. The evidence presented highlighted the role of green finance in enabling competitiveness through decreased financing constraints, green innovation, investor confidence and reputation, efficiency and access to sustainability-sensitive markets.

5.2 Conclusion

In conclusion, the study shows that green finance is a strategic instrument and it has the power to connect environmental compliance with sustainable competitiveness. It helps companies meet environmental requirements through capital and incentives to clean up production processes, disclosure and monitoring. It also enables competitiveness through enhancing innovation, reputation, investor reaction and long-term resilience. But achieving green finance success requires credible targets, transparent reporting, third-party verification, and regulatory support and managerial capacity. Thus, companies must view green finance as a governance and performance instrument, rather than a PR tag.

5.3 Contribution to Knowledge

The present paper adds to the existing knowledge in the field of green finance by presenting a literature synthesis in two objective-based areas that are of importance in the field: “environmental compliance” and “sustainable competitiveness”. It demonstrates that, green finance can help with funding, conditionality, monitoring, and disclosure to help ensure compliance and can help with innovation, reputation, cost efficiency, and market access to help achieve competitiveness. The paper also adds to the discussion on the interconnection between the two outcomes: When firms provide themselves with real environmental capabilities through the use of green finance, compliance can become a basis for sustainable competitiveness.

5.4 Recommendations

- i. Only green finance tools can be used for the purpose of compliance enhancing investments, like pollution control technology, environmental monitoring systems, ISO 14001 certification, waste management systems and sustainability reporting infrastructure.
- ii. Regulators, banks and capital-market institutions need to further strengthen disclosure, third-party verification and sustainability target requirements to incentivize green bonds and sustainability-linked loans to create tangible environmental impact and not greenwashing.
- iii. Since the literature indicates that the capacity and financing requirements of the firms drive their green finance choices and their actual compliance with green finance measures

and their green competitiveness, financial institutions should create inclusive green finance products for SMEs.

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