



A PRISMA ALIGNED SYSTEMATIC LITERATURE REVIEW ON GREEN FINANCE: BRIDGING THE GAP TOWARDS A SUSTAINABLE FUTURE

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ABSTRACT

Purpose: The growing need to embed environmentally responsible practices has placed green initiatives at the forefront of global development agendas. As a dynamic and evolving dimension of the monetary and economic framework, green finance makes a significant contribution to enabling this transition. This study systematically reviews global advancements in green finance between 2010 and 2025, with particular emphasis on regulatory frameworks, financial instruments, and their contributions to environmental sustainability.

Design/methodology/approach: A PRISMA-driven systematic literature review (SLR) approach has been utilized, retrieving 340 peer-reviewed studies from four academic databases, including Scopus, Web of Science, ScienceDirect, and Google Scholar. Following screening and assessment, 100 studies met the inclusion criteria. The review highlights emerging trends, thematic developments, and critical debates in the field, emphasizing the role of green financial instruments, policy frameworks, and institutional mechanisms in mitigating climate risks, reducing carbon emissions, and safeguarding ecological systems.

Findings: The study underscores emerging trends in green finance mechanisms, notably green bonds, sustainability-linked loans, carbon markets, and blended finance instruments. It identifies key drivers of adoption, including regulatory frameworks, policy support, market pressures, investor demand, technological innovations such as fintech and blockchain, and growing environmental awareness. Furthermore, it reviews methodological approaches employed in green finance research while acknowledging persistent barriers, such as limited data access, methodological shortcomings, regulatory fragmentation, and inadequate transparency.



Overall, the findings underscore the transformative potential of incorporating green financial assistance into widely accepted economic and monetary frameworks, thereby reinforcing its crucial role in enhancing financial robustness and maintaining ecological balance. The study concludes by calling for further empirical investigations to strengthen the evidence base on how green finance can accelerate sustainable development and long-term ecological integrity.

Originality/Value: This PRISMA-aligned systematic review is the first to develop a unified conceptual framework by integrating regulatory taxonomies (antecedents), financial instruments, and environmental outcomes of green finance. It further examines the role of institutional quality, regulatory frameworks, and policy interventions, alongside the participation of MSMEs, in advancing green financial mechanisms and facilitating ecological preservation. As these dimensions remain underexplored, the study emphasizes the need for future empirical investigations to address existing gaps.

Keywords- Green Finance, Sustainable Finance, Sustainable development, Climate change, Sustainable Economic Growth, PRISMA, green bonds

INTRODUCTION

The escalating threats of environmental degradation, climate change, and global warming have placed sustainability at the center of contemporary policy and economic debates. Both developed and developing economies are compelled to adopt innovative strategies to mitigate climate-related risks and foster adaptive resilience. Platforms such as the annual Conference of the Parties (COP) under the UNFCCC framework provide a global forum for deliberation, negotiation, and the formulation of actionable timelines to address these pressing challenges [79]. Within this context, green financing has evolved as a pivotal mechanism that incorporates ecological priorities into monetary decision-making, thereby enabling the transition toward sustainable growth [102], [122]. Green finance is broadly defined as investment practices that incorporate environmental considerations into financial flows, encompassing strategies such as the use of non-conventional energy, low-carbon infrastructure, and ecological preservation [95]. Lindenberg identifies three foundational dimensions of green finance: (1) investments in sustainable projects and green products, (2) public sector mechanisms to incentivize environmental initiatives, and (3) a financial system structured to facilitate climate-aligned investments [124]. More broadly, green finance forms part of the larger sustainable finance paradigm, which encompasses environmental, social,



and governance (ESG) considerations and serves as a crucial instrument for achieving long-term sustainable development [122].

Over the past decade, worldwide regulatory frameworks such as the Paris Agreement (2015), the EU Taxonomy for Sustainable Activities (2020), and Sustainable Development Goals (2015) have significantly advanced the impact of green financing in mitigating climate risks and fostering inclusive growth. A wide range of financial instruments support this agenda, with green bonds evolving as the most influential green instrument. Green financial mechanisms or instruments not only provide measurable environmental benefits but also enhance investor confidence by offering dual economic and ecological returns. The United States and China currently dominate global green bond issuance, contributing to substantial reductions in carbon emissions, 17% and 18.8% respectively, between 2005 and recent years. In India, pioneering issuances such as Yes Bank's Green Infrastructure Bonds in 2015 and the Export-Import Bank's \$500 million green bond have positioned the country as an emerging leader in facilitating green finance.

The conceptual roots of green finance date back to the 1970s, although the term gained widespread recognition after the 2015 Paris Agreement and the adoption of the SDGs. Landmark initiatives such as the United Nations Environment Programme Finance Initiative (UNEP FI), launched in 1992, have been instrumental in mainstreaming environmental considerations into financial systems by engaging banks, insurers, and asset managers worldwide [85]. Today, UNEP FI includes nearly 190 institutions across 40 countries, fostering global knowledge diffusion and supporting best practices in sustainable finance. Collectively, these efforts highlight green finance as not only a catalyst for environmental protection but also a driver of sustainable entrepreneurship, green banking, and economic growth [61], [102].

Need and Significance of Green Financing

1. In areas impacted by climate change, green financing lowers the risk of natural catastrophes and climate change by providing green loans and investments.
2. Green finance provides essential financial support to enterprises pursuing green innovations. Through access to green loans and investments, businesses can acquire advanced sustainable technologies, reduce their carbon footprint, adopt resource-efficient processes, and build human resource capacities aligned with eco-conscious operational standards [94].
3. Green investments that support training for employees in green industries may lead to the creation of green jobs [7], [52].



4. Eco-friendly practices often involve higher initial costs than conventional alternatives; green finance helps alleviate financial constraints, making it more feasible for organizations to transition toward sustainability [111].
5. By giving green financial help to environmental protection regions and programs, both developed and developing economies can achieve sustainable development goals [9].
6. Companies that engage in green finance initiatives might raise the value of their product brand, investors' confidence, and the company's portfolio [35]. Green finance initiatives raise awareness of environmental sustainability among industry players and motivate them to produce eco-friendly goods and services.
7. By granting farmers green loans to adopt cutting-edge technologies, the agriculture sector can also be developed while enhancing resilience and environmental sustainability.
8. Green financing can be utilized for carrying out environmental protection-related research and development (R&D) in a compelling manner. By channeling funds into green projects, it enables key stakeholders, including governments, corporations, and regulatory bodies, to proactively address ecological concerns and minimize exposure to regulatory risks.

Research Questions

1. What are the principal drivers that influence the acceptance and implementation of green financial mechanisms?
2. How does green finance contribute to environmental sustainability outcomes?
3. What methodologies or approaches are typically employed in green finance-related research?
4. Which regulatory taxonomies, financial instruments, and environmental outcomes are most effective in promoting green finance?

METHODOLOGY

This study follows the PRISMA 2020 statement and adopts a descriptive research design, with a focus on identifying emerging challenges and recent trends pertaining to the context of green finance. Data have been systematically extracted from scholarly research articles and papers published across multiple academic databases. A Systematic Literature Review (SLR) method has been implemented, incorporating well-defined inclusion criteria, transparent selection protocols, and analytical procedures to ensure objectivity in the article screening process. To ensure transparency and replicability, a systematic review has been done in alignment with the PRISMA framework [85], [91].

1. Research Design, Data Sources, and Search Strategy:

Relying solely on a single database may result in overlooking recent or region-specific developments in green finance. To address this limitation, the present study integrates data from multiple prominent academic databases to enhance comprehensiveness and validity. Specifically,



the analysis draws from four major databases- Scopus, Google Scholar, Web of Science, and ScienceDirect. The articles and research papers originated from these data sources, which published relevant literature between 2010 and 2025. A keyword-driven search was conducted across these platforms, with emphasis on topics directly related to green finance. Only English-language publications were considered. The diversified selection of databases helped ensure a balanced and inclusive review of global research contributions. The Search strings combined keywords related to “green finance”, “green financing”, “sustainable finance”, “climate finance”, and “green bonds” using Boolean operators (“AND,” “OR”) in each database.

1. Inclusion Criteria: Articles and research papers were selected based on the following points:

- The content must primarily address the terms, including green finance, climate finance, green finance instruments and policies, and Sustainable finance.
- Only accessible, peer-reviewed, and full-text documents were included.
- Only Empirical, conceptual, and review studies were included in this study.
- There were no geographical restrictions, allowing the inclusion of studies from different regions of the globe to capture a broader scope of perspectives.

2. Exclusion Criteria:

The following publication kinds were excluded: non-English papers and articles, blogs, papers published in multiple venues or duplicate publications, conference abstracts, book chapters, studies which are not peer reviewed, papers without the availability of full text or only abstracts of papers accessible, papers focused on outdated concepts or financial instruments, or policies no longer relevant to current green finance discourse, studies that do not directly align with the scope of green finance, and therefore lack thematic relevance, were excluded from the review, duplicate studies present across databases, research notes, editorials, brief surveys, and unpublished data. Then, the eligibility of each article and research paper was manually assessed by the authors. The analysis reveals frequently occurring emerging trends and recent developments within the scope of green financing [44]. The findings of the review highlight eight prominent thematic areas:

1. Correlation between green financing and inclusive and sustainable economic growth
2. Green Investment in the renewable energy sector
3. Impact of green financial mechanisms in driving green technological innovation
4. Role of sustainable investment in the reduction of greenhouse gas emissions
5. Prospects of green financing within micro, small, and medium enterprises (MSMEs)



6. The link between responsible business practices and green financing
7. The relation between green growth and green financing mechanisms
8. Current trends in green finance, including its challenges, awareness levels, and potential opportunities

A deeper understanding of these thematic dimensions enhances recognition of emerging trends and recent developments in the field of green financial assistance. A comprehensive database search initially yielded 340 studies. Following the removal, a total of 236 records underwent title and abstract screening. Subsequently, 133 complete studies were assessed for eligibility based on predefined inclusion and exclusion criteria. Of these, 33 studies were excluded due to irrelevance to the research scope or methodological shortcomings. Ultimately, the systematic review incorporated a final sample of 100 studies.

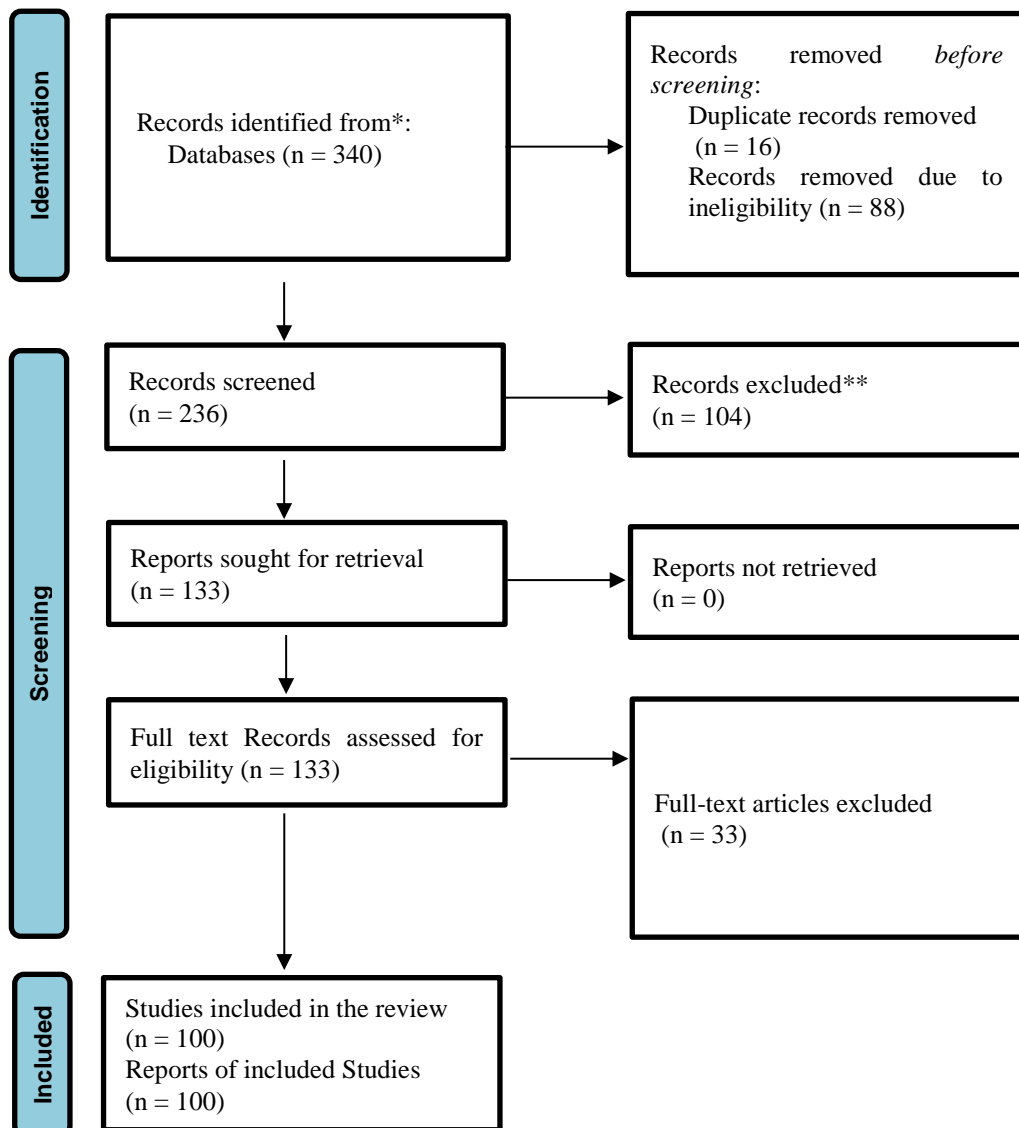




Fig. 1. PRISMA Flow Diagram of Study Selection Process

3. Analysis and Synthesis:

The final set of 100 peer-reviewed studies that met the inclusion criteria was systematically analyzed in terms of their methodological rigor, thematic relevance, geographic coverage, and contribution to the field of green finance. To provide clarity, the literature was synthesized into two major thematic clusters:

1. Emerging Trends in Green Financial Instruments:

The key emerging trends in green financial instruments are:

- 1. Green Bonds and Sustainability-Linked Bonds (SLBs):** While SLBs offer income based on environmental performance indicators, the green bond market is growing and encourages investments in clean transportation, renewable energy efficiency projects, and green infrastructure [41], [42], [46], [74].
- 2. Green Credit and Sustainability Linked Loans (SLLs):** Green Loans are getting popular, while SLLs cover supply chain sustainability and sustainable agricultural projects.
- 3. Carbon Markets:** Blockchain technology is being used to promote carbon credits, which enhances transparency and credibility in carbon trading systems [59].
- 4. Biodiversity Bonds:** Biodiversity bonds are getting popular nowadays, which channel investments into projects involved in ecosystem restoration and conservation.
- 5. Sustainable Investment Platforms:** AI-driven technologies and Digital banks are getting popular in facilitating sustainability-focused investments to promote eco-friendly projects [12], [16], [55].
- 6. Decentralized Green Finance (DeFi):** Decentralized platforms are getting popular, which helps in promoting peer-to-peer green lending and investments, reducing transaction costs, and promoting investment in sustainable projects.

2. Regulatory frameworks and Policies:

According to numerous reviewed publications, a well-crafted regulatory framework is crucial for boosting investor confidence and preserving the legitimacy of green financial products. Implementing green practices can also benefit greatly from several significant green policies, such as regulatory incentives, green taxonomies, etc. The role and significance of prominent organizations like the UN and the EU in establishing policies and advancing green standards are also explored in studies.



Table 1. Showing Antecedents (Drivers), Mechanisms (financial Instruments), and Environmental Outcomes of green finance

Antecedents/Drivers	Mechanisms/Financial Instruments/Channels/Processes	Outcomes (Environmental, Financial, and Social Impacts)
Regulatory Frameworks and taxonomies (Paris Agreement, EU Taxonomy, RBI, and SEBI guidelines)	Mandatory ESG disclosure, carbon pricing, and green banking.	Reduced risk of Green Washing, helps in improving transparency and attainment of SDGs.
Emerging Green financial instruments (Green bonds, Sustainability-linked bonds, carbon markets)	Availability of Financial channels according to market provision, sharing of risk, and availability of blended finance.	Adoption of green technologies enhances the competitiveness of a firm and helps in reducing the cost of capital.
Institutional Quality	Building investors' confidence, full disclosure of data, and adequate availability of financial supervision	Lower risk perception and enhanced transparency due to the availability of data and the building of greater capital mobilization.
Corporate Social Responsibility (CSR)	ESG integration in projects and the accessibility of Socially Responsible business financing for green projects.	Reduction in carbon emissions encourages trust of stakeholders and enhances the reputation of businesses.
Participation of MSMEs and Private Sectors	Access to sustainable credit, green fintech, and green microfinance.	Helps SMEs in the adoption of green technologies and innovation, and hence promotes green growth.
International institutions and collaboration (UNEP, SIDBI, NABARD, World Bank)	Availability of climate funds, blended finance, and Green Investment Guarantee Schemes.	Adaptation of green infrastructure facilities, disaster risk management, and use of global best green practices, growth of sustainable entrepreneurship, and attainment of global SDGs.

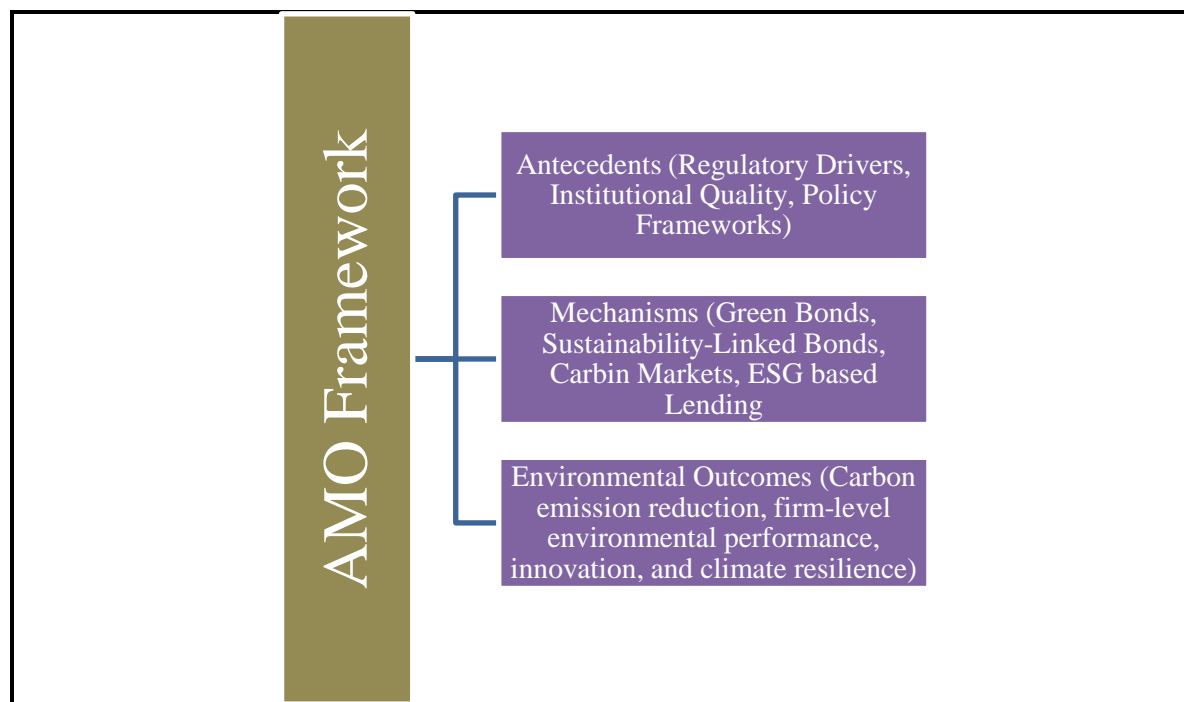


Fig. 2. AMO (Antecedents-Mechanisms-Outcomes) Framework

The Antecedents-Mechanisms-Outcomes (AMO) framework provides a structured lens to examine the advancement of green financial mechanisms and its environmental impact. Within this framework, antecedents refer to the foundational drivers that shape the adoption and effectiveness of green finance. These include regulatory frameworks, institutional quality, policy interventions, and initiatives aimed at infrastructure decarbonization. Such factors create the enabling conditions necessary for the smooth functioning of green finance mechanisms by reducing implementation barriers, mitigating risks, and fostering investments in sustainable projects. Mechanisms represent the financial processes, tools, and institutional arrangements that facilitate the flow of resources into sustainable initiatives. These include green financial instruments such as green bonds, sustainability-linked loans, carbon markets, and biodiversity bonds, as well as the integration of digital technologies and decentralized finance. By mobilizing capital toward sustainable projects, these mechanisms enhance transparency, improve accountability, and lessen vulnerabilities traditionally associated with green investments. Outcomes of green financing mechanisms manifest in both environmental and socio-economic dimensions. Prominent results include accelerated decarbonization, enhanced resource efficiency, pollution reduction, and the advancement of sustainable infrastructure. In addition, green finance contributes to climate risk mitigation, technological and digital transformation, and achieving the



target of attaining Sustainable Development Goals (SDGs). The AMO framework not only clarifies how antecedents and mechanisms collectively shape these outcomes but also highlights conceptual and empirical gaps. One such underexplored area is the impact of green finance in sustaining MSMEs in developing economies, where access to sustainable finance remains limited despite their potential to drive inclusive and environmentally responsible growth.

3. Challenges Involved in Green Finance Adoption:

1. India's carbon emissions place it third in the world, which intensifies the need for the adoption of sustainable financing solutions [34], [50], [54], [64].
2. It is necessary to solve problems related to pollution, waste management, and water scarcity through effective utilization of renewable energy resources and eco-friendly technologies [24], [38], [45], [53].
3. MSME's access to green funding is restricted because of risk perceptions and stringent paperwork requirements [74], [127].
4. The unavailability of a proper regulatory green framework for the uninterrupted functioning of green financial activities [123], [125].
5. Inadequate involvement of the private sector in offering green financial support [109].
6. Customers and investors' ignorance of the available green loans and investment prospects [106].
7. Underdeveloped markets for green bonds and carbon trading platforms.
8. The lack of a consensus definition for green financing sometimes leads to greenwashing. For example, investors are often misled by the lack of ESG reporting rules, which are still in their infancy [77], [82], [90], [108].

4. Research Gaps and Future Directions:

Green financing mechanisms are witnessing increasing prominence across the economic sectors of both developed and developing economies. However, despite this growing interest, significant research gaps persist within the scope of green finance. These include a scarcity of empirical research focused on developing economies, the absence of a universally accepted definition of green finance, hindering comparative analyses and meta-studies, and a limited number of longitudinal investigations, which restrict the assessment of long-term impacts of green financial initiatives. Moreover, future research should delve into recent rising areas such as the application



of green financial technologies (green fintech) and the role of environmentally oriented technological innovations [83].

2. METHODOLOGICAL APPROACHES EMPLOYED IN GREEN FINANCE STUDIES

While there are studies from industrialized nations, there aren't many from developing regions of Europe and Asia in the field of green finance. Approximately over 30% of studies employ a qualitative technique mainly focused on policy analysis and case studies, 15% - 20% utilize a hybrid approach, and over 50% use quantitative approaches, often using econometrics models and techniques with statistical tools for quantitative analysis in studies.

The majority of research on green finance comes from North America (less than 20%), Asia (about 30%), Europe (over 35%), and Africa and Latin America (less than 15%). There is an urgent need to close this research gap in green finance because of the unequal distribution of studies in low-income and emerging economies.

Principal factors involved in Green Finance Adoption

Green financing is frequently referred to as responsible investing because it prioritizes governmental, social, and environmental issues [13], [17], [58]. [120]. Green finance also includes sustainable development standards that maintain openness and consider long-term planning when distributing funding for environmental goals, as per the UN Sustainable Development Goals (SDGs) [117].

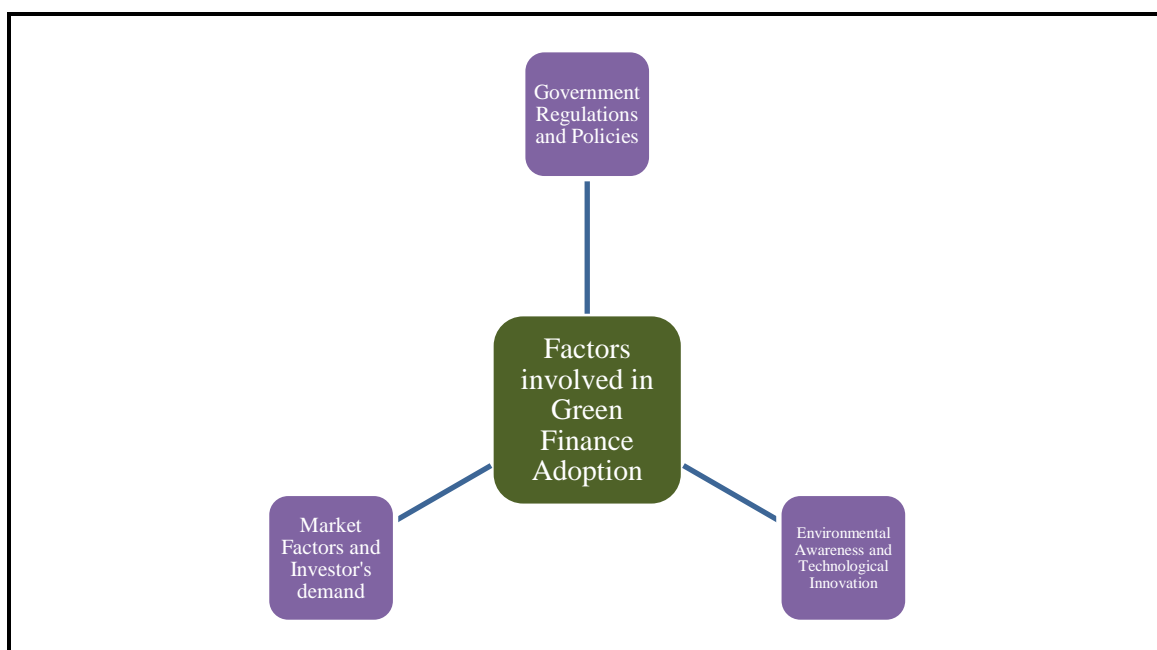




Fig. 3. Major Factors involved in Green Finance Adoption

The principal factors involved in green finance adoption are:

1. Government Regulations and policies:

- Governments are now aggressively enacting several schemes, policies, and regulations to encourage green investments in green businesses and green technology. Green techniques are now being included in the financial operations of financial organizations [15], [26].

2. Market factors and investors' demand:

- The demand related to green investments is rising due to the result of investors' increasing incorporation of ESG considerations into their investment choices [23].

- Due to supply and demand, the green finance market is expanding significantly, opening doors for investors and financial institutions [22].

- Green Instruments like sustainability-linked loans, green bonds, and many cutting-edge financial technologies and products are making it easier for money to go toward green projects [10].

3. Environmental awareness and technological innovations:

- Raising public awareness about the adverse effects of climate variability, natural disasters, and sudden increases in global temperatures is of paramount importance for fostering a sense of knowledge of the necessity and effectiveness of green finance within the economic sector. Furthermore, advancements in technology, particularly in blockchain and AI technology, are enhancing the transparency, traceability, and operational efficiency of green financial systems, thereby accelerating their adoption and credibility [19], [101].

Green Finance and Sustainability

Green financing plays an important role in fostering sustainable growth and attaining the target of meeting the Sustainable Development Goals (SDGs) by promoting initiatives that decrease carbon emissions, promote green technologies, and enhance energy efficiency [9], [10], [6], [8], [30]. By redirecting capital toward environmentally responsible enterprises, it also facilitates the adoption of sustainable agricultural practices and mitigates risks linked to climate variability [2]. Moreover, the integration of green financing strategies can enhance a nation's global competitiveness and strengthen its position in the current shift toward a climate-resilient economy [29], [116].



Limitations of the Study

1. Only peer-reviewed papers are included in the study.
2. Only the articles and research papers written in the English Language are included in this study.
3. This research is limited to the years 2010–2025.
4. Non-indexed journals were not included in the study.

RESULT AND DISCUSSION

Between 2011 and 2021, scholarly engagement with the subject of green finance produced more than 200 academic publications. A marked escalation in research output occurred between 2022 and 2025, reflecting the increasing acknowledgement within both academia and industry of the urgent need to transition toward environmentally sustainable practices. This surge in interest highlights the importance of raising public awareness about the adverse consequences of climate change and the mounting risks posed by global warming, thereby reinforcing the potential value of green finance. By directing investments into innovative green technologies and low-emission, energy-efficient projects, green financing plays a transformative role in steering economies toward low-carbon and sustainable development pathways [33], [57]. Through diverse financial instruments, it mobilizes resources for initiatives that foster the production and diffusion of environmentally responsible goods, services, and technologies. Although green investments entail significant risks and typically yield long-term returns, they remain indispensable for advancing environmental sustainability, stimulating green economic growth, and accomplishing the Sustainable Development Goals (SDGs). Growing public and investor awareness of sustainability is further stimulating the requirement for sustainable products, contributing to the attainment of both national and international sustainability targets. This rising interest has intensified academic inquiry into green finance regulations and practices [72], with researchers increasingly examining emerging trends in this field [36]. Notably, a substantial portion of the literature concentrates on China, underscoring its pivotal role in advancing sustainable finance globally [39], [60]. Scholars and policymakers alike are particularly focused on analyzing China's strategies and their broader international implications [1], [3], [14], [28], [69].

This study affirms the transformative capacity of green finance to accelerate sustainable development while supporting long-term economic growth. Green financial mechanisms such as green bonds, carbon trading schemes, credit guarantees, and sustainability-linked loans are



instrumental in mitigating climate risks, lowering carbon emissions, and driving the sustainable restructuring of economies. In addition to safeguarding natural resources, green finance strengthens inclusive and resilient economic systems by directing investment flows into environmentally sustainable ventures. However, several barriers to adoption persist, including the absence of standardized taxonomies and definitions, inconsistencies in data, inadequate regulatory frameworks, and limited financial literacy. For micro, small, and medium enterprises (MSMEs), the backbone of many economies, these challenges are compounded by high costs, risk perceptions, and insufficient policy support, limiting their ability to access green finance effectively. Despite these impediments, integrating green finance into mainstream financial systems is urgently needed, as it is vital not only for achieving environmental and economic outcomes but also for fulfilling the United Nations SDGs.

The analysis further identifies the key drivers of green finance adoption, demonstrating that these initiatives simultaneously support economic development and ecological preservation [49]. Core elements of green financing assist in resolving climate-related risks, advancing financial expansion, and enabling the conversion to a resilient, green economy [51], [56]. Yet, substantial challenges remain, particularly in developing economies such as India, where green finance frameworks are still emerging. Evidence shows that green financial support facilitates the adoption of green technologies by SMEs, promotes the incorporation of sustainable practices, and contributes to carbon emission reduction [37], [48], [63]. Moreover, green initiatives foster entrepreneurship and create environmentally sustainable employment opportunities [73]. Nonetheless, investor hesitancy persists, attributed to prolonged and delayed returns associated with many green projects. The absence of a globally accepted definition of “green finance” further complicates its practical application [4], [68]. Although critical for achieving the SDGs and broader sustainability goals, green finance continues to encounter multiple operational and regulatory obstacles [27], [32], [43]. Therefore, establishing a comprehensive regulatory architecture and adopting robust green policies are essential for safeguarding the prolonged effectiveness, scalability, and credibility of green finance mechanisms [25].

CONCLUSION

The present study emphasizes the substantial progression of green finance in promoting sustainable development and stimulating green economic growth, particularly within developed



economies. In contrast, although developing economies have experienced a growing implementation of green financing across multiple sectors, the adoption of green financial initiatives remains at an early stage. Addressing these challenges necessitates the establishment of comprehensive regulatory frameworks and policy instruments designed to facilitate the promotion and uptake of green financial services [21], [71]. Furthermore, rigorous empirical research is essential for examining the prolonged implications of green finance and assessing the effectiveness of green technology adoption within the broader economic context [110].

The analysis reveals that sustainable investments substantially contribute to ecological preservation and facilitate the transformation to a green economic model. To fully leverage the benefits of green financial practices, coordinated engagement is required from governments, financial institutions, investors, regulators, stakeholders, and academic institutions [5], [47]. The research offers valuable insights for researchers by demonstrating the advantages of green finance while also recognizing the prevailing constraints and future prospects for advancing green financial mechanisms.

In conclusion, green finance holds considerable potential to transform economies toward sustainable development while generating positive environmental outcomes, positioning it as an essential instrument or tool for future sustainable economic expansion and growth. Achieving this potential involves collaborative efforts among governments, financial institutions, businesses, and academia to address gaps related to awareness, the promotion of regulatory and policy frameworks, and the provision of green financial access to enterprises, particularly MSMEs engaged in green projects. There is an urgent need for further theoretical, conceptual, and empirical research to unleash the full capability of green financing and facilitate the development of more sustainable economic systems.

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