

Original Research Article

Effect of Green Finance on Environmental Performance of Banking Institutions: A Critical review*Harshmani Kothiyal^{1*}, Dr. Smita Tripathi²*

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Abstract: Purpose-The purpose of this article is to study the effect of green financing on the environmental performance of banking institutions in India. This study also focuses on the initiatives undertaken by the banks towards achieving environmental goals.

Design/methodology/approach-This research paper is conceptual in nature, based on an extensive review of literature, data from websites of different banking institutions and government websites, and evaluation of other resources. The study focuses on four banks, two banks from the public sector and two from the private sector were selected for the study, that are listed on the NSE Bank Nifty index as of October 2023. These banks were selected based on the following criteria: (a) they actively engage in ESG (Environmental, social, and Governance) activities and disclose them in their sustainability reports. Based on this criterion, we have found that only two public sector banks (State Bank of India and Bank of Baroda) out of three that are indexed in NSE Bank nifty, meet these requirements. Therefore, to match the number of banks with the public sector and to provide diversity, we have decided to select two private sector banks that also meet the above criterion and since we have more private sector banks following these criteria, we have further decided to choose the banks on other criteria: (b) the banks with highest net profitability for the year 2022-23. So, based on this, two private sector banks (HDFC Bank and ICICI Bank) out of Eight large private sector that were indexed were selected.

Findings-This study has explored the relationship between green financing and the environmental performance of a few selected Indian banks, both public (State Bank of India and Bank of Baroda) and private sector (HDFC Bank and ICICI Bank). It was found in all selected banks that green financing and environmental performance are positively related and green initiatives have a significant impact on the environment. These banks are successfully reducing their negative impact on the environment through green financing in eco-friendly projects. It also indicates the green energy (renewable sources) is crucial for a good future and helps fight climate change and this will also require a lot of money in the form of green financing. Countries (e.g., the United States, China, Germany, Netherlands, etc) that have adopted these eco-friendly strategies have seen benefits for their economy and the environment. The study also noticed that Public and private banks might have different approaches to doing things, but they might also be working towards the same green goals of the country. The study also found that we need better rules (ESG frameworks), like the one used by the State Bank of India. In this regard we can also take an example from Triodos Bank (Netherlands), Nordea (Sweden), and Rabobank (Netherlands) as these are the top banks in the world that are adopting the best sustainable banking practices (as per the article of Fintech Magazine February 20, 2023), so from there we can also adopt policies and measure as per our Indian context. The study also revealed that there is a need for government support, clear policies, and increased transparency in financial reporting where we are investing money in environmentally friendly and non-

environmental projects. Also, for the green revolution in India, there is a need for a strong partnership among Indian governments and financial institutions. These things together with cultural changes help promote sustainability and better environmental performance that guarantees a resilient future.

Research limitations/implications-Theoretical implications: The study helps in understanding the relationship between green financing and environmental performance. The study highlighted that there is a positive impact of green financing in promoting sustainability. The findings stress incorporating environmental factors in financial decisions. The research identifies a gap in India's green financing understanding and urges further exploration. Currently, India's banks are at an early stage in adopting green financing practices, while some countries have made significant progress. So, this is one of the earliest studies conducted in the country that seeks to establish a relationship between green finance practices and environmental performance, especially focusing on the banking industry. It has been focusing primarily on some main public as well as private sector banks in India.

Limitations: While this study has provided essential information, there are some limitations that need to be focused on in future research. One of the major limitations is that the study only looked at the green finance practices and environmental performance of a few commercial and public sector banks in India using secondary data, which limits the scope and generalizability of the findings.

Managerial implications: We have identified key points from our study that can be applied to the banking sector. They are: Firstly, there is a need to enhance the transparency of financial reports. When providing details on the financial breakdown, banks must indicate the funds allocated to both green energy and non-green energy projects. Secondly, each bank must adopt Environmental, Social, and Governance (ESG) norms compulsorily. These norms should be integrated into their day-to-day business operations, ensuring responsible lending practices. Thirdly, all banks should establish a green financing framework, taking inspiration from the success of the State Bank of India. Additionally, collaborating with renewable energy initiatives and promoting environmentally friendly financing practices are crucial steps towards a greener and more sustainable approach. Lastly, each bank should engage in the development of green products and services, fostering innovation with a sustainability focus. By following these practical implications, Indian banks can become significant contributors to sustainable development and the reduction of the effects of climate change.

Social implications: are considerable. It places a focus on addressing the societal and environmental effects of climate change. It fosters ethical lending and a sustainable future by showing successful cases. The importance of policy frameworks for green finance is emphasised, along with collaboration between governments and banks. Adopting environmentally responsible financing can improve sustainability, environmental performance, and resilience for future generations.

Originality/value-The authors provide one of the first reviews of the effect of green finance on environmental performance in India concentrating on initiatives undertaken by different public and private sector banks.

Keywords: Green finance, Environmental performance, Climate change, Sustainability.

1. Introduction

Most countries, especially those in the developing world, have prioritized economic expansion over environmental sustainability. Consequently, they grapple with a host of environmental challenges, including global warming, loss of biodiversity, environmental degradation, soil erosion, air pollution, deforestation, and land loss (Guang-wen et al., 2022; Zheng et al., 2021). Climate change, a multifaceted global issue, spans ecological, sociopolitical, and socioeconomic dimensions (Abbass et al., 2022; Adger et al., 2005; Leal Filho et al., 2021; Feliciano et al., 2022).

Recent data underscores a concerning increase in global greenhouse gas levels, contributing to a rise in

Earth's temperature. In 2021, global temperatures surpassed pre-industrial levels by approximately 1.1 °C, emphasizing the urgency of addressing climate change. This imperative aligns with the goals set by the 2030 Agenda for Sustainable Development (United Nations Development Organizations).

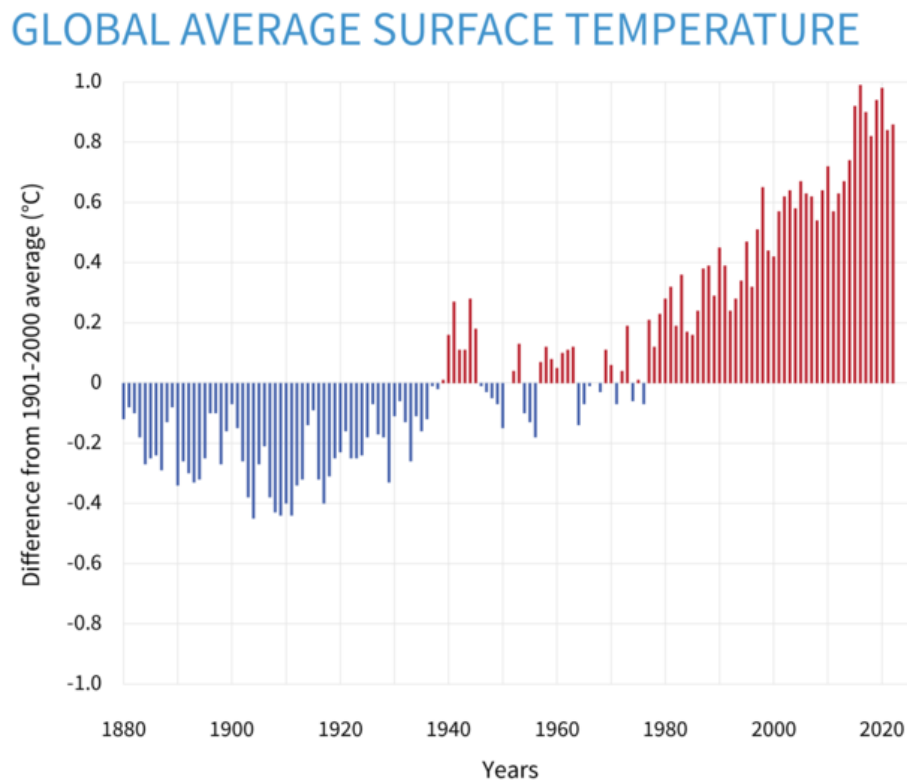


Figure 1 Global Average Surface Temperature (Source: NOAA climate.gov)

Now, the environmental performance of each country becomes pivotal in progressing toward economic sustainability. Banks play a crucial role in this context, serving as essential conduits for transferring funds from savings to investments. Although the products offered by banks directly influence the environment, the behavior of customers with financial assets can have an indirect impact (Elsayah et al., 2022). The concept of "green banks" emerges in discussions of green financing. As defined by Volz et al. (2015), these financial organizations use public financing to support sustainable energy initiatives, providing low-cost, long-term loans for low-carbon emission projects. Green banks, whether public or semi-public financing institutions, leverage public funding and various financial tools to attract private investment, ensuring each cent of public funding supports multiple dollars of private investment. Green banks can take diverse forms and develop various financial products based on differences across countries (Dorry and Schulz, 2018). Banks can employ an array of financial instruments, including long-term, low-interest financing, revolving loan funds, insurance offerings (such as loan guarantees or loan loss reserves), cost-effective government investments, and even original financial inventions (Marwan, 2020).

As economic growth often harms the environment by depleting natural resources and causing pollution, there is an increasing need to discuss how to make economic growth sustainable. Globally, nations are placing greater emphasis on adopting eco-friendly technology to enhance and safeguard the environment. However, this transition requires a suitable incentive system to encourage increased funding for ecologically sustainable enterprises. Shifting funds from traditional businesses to environmentally friendly and green ones can optimize resource distribution, fostering long-term sustainable growth. Major economies have implemented targeted green finance policies, involving corporations, governments, and central banks (RBI report). In this landscape, banking and financial institutions play a significant role in optimizing or eliminating carbon footprints by directing funds

to industries sensitive to climate change. Additionally, the banking industry aids organizations in adapting to green strategies, reducing climate risks, and promoting economic recovery (Sharma et al., 2022; Park and Kim, 2020).

In this study, our aim is to develop an understanding that banks, while not direct polluters, can play a vital role in reducing their impact on the environment, including carbon footprints and greenhouse gases. This research seeks to unravel the intricate interactions between green finance and environmental performance, shedding light on their critical role in crafting a sustainable and resilient future.

2. Review of Literature

2.1 Green Finance and Environmental Performance

The term “Green finance” refers to investing money in environmentally friendly projects and initiatives, ecological products, as well as policies that promote the growth of a more sustainable economy. Green finances include, but is not limited to, climate finance. It also refers to a broader range of other environmental goals, such as controlling industrial pollution, clean water, or wildlife conservation etc (Lindenberg et al., 2014; Hohne et al., 2012). While, The Environmental performance is the relationship between the organisation and the environment. It is all about creating a balance between the many activities, practises, and procedures followed by the organisation and their impact on the environment. It focuses on the environmental consequences of the organisational process like, the environmental consequences of its goods and services, product recovery and processing, and the environmental consequences of resources utilised (Rajput et al., 2013). Here, Banks and financial institutions can play a significant role in assisting organisations in acquiring the financial resources they require (Afzal et al., 2022; Ji et al., 2021). It also provides opportunities for the investor to earn profit. Now, it is requisite to increase green financing because traditional financing choices are likely to have a detrimental impact on the environment (Afzal et al., 2022; Kim et al., 2020). Furthermore, as investors are becoming more aware of the significance of green energy for environmental welfare, green financing is on the rise (Afzal et al., 2022; Gagnon et al., 2020; Miralles-Quirós et al., 2019).

Chowdhury et al., (2013) focuses on the point that Green finance is one of the most important tools for the green growth of a country and it can help in reducing the impacts of green-house gases also. Global warming leads to negative climate change and is responsible for green house gas emissions. The study confirms there is a need for investing in different eco-friendly projects, including renewable energy and others that are aimed at mitigating climate change while enhancing economic development. This aspect also explains various advantages associated with green buildings since such developments not only promote a healthy environment but also reduce diseases among the people who live in them.

Soundarrajan et al., (2016) Concluded that green finance is a fundamental basis for green economic growth. Green growth means working in such a way, where technological companies, banks, government, and people work together. It also has been stated that the future of Indian banks depends upon the situation that how they will utilise sustainable finance. It provides opportunities for Indian banks to remain globally competitive by minimising the harmful effect on the environment, and earning profit while supporting sustainable finance. Banks should not just invest in sustainable initiatives but also use their financial power to encourage other firms to work towards larger social and environmental objectives.

Munjal and Sharma (2019) analyse the relationship between environmental performance and financial variables (return on equity and return on assets). They studied both Public and private sector banks in India. They found that there is no positive relationship between a bank's environmental performance and its ROI (Return on equity). However, there is a positive and significant relationship between a bank's environmental performance and its ROA (Return on assets). They suggested that the banks can improve their profit by adopting environmental practices in their operations. They also observed that environmental performance reporting in Indian banks is still in the developing phase and provides mixed results.

He et al., (2019) explore the relationship between green financial development and renewable energy enterprises in China. Based on the analysis of data they have concluded that Banks are providing less funding to renewable energy entrepreneurs. This decline in financing has a negative impact on the efficiency with which investments in the renewable energy sector are undertaken. The study also found that short-term loans have a key role in this, uniquely influencing green financing. Short-term loans have minimal influence in the interim, whereas long-term loans have no such impact. However, for renewable energy companies that invest too much, there is an in-between effect with bank loans. They have also, suggested that green financial development can help control excessive investment by reducing bank credit.

Taghizadeh-Hesarya et al., (2019) found that investors and financial institutions are not readily interested in investing in green energy projects because they think there is a high risk and low return involved with these projects as compared to alternative energy investments. To overcome this problem and to fill the green finance gap, they suggested that there is a need to combine credit guarantee schemes and spillover-effect tax returns to reduce risks and improve returns for big green projects like hydro and large solar farms. Similarly, for small green projects like solar and wind, there is a need to integrate distributed ledger technologies (DLTs) into the current HIT fund framework and it will help build trust, lower risks, and encourage more involvement from the private sector in supporting green finance and investments. Based on this study they have established a theoretical model and framework for soliciting investments in green energy projects.

Oyedele et al., (2022) found that green loans have a positively strong and favourable relationship with environmental performance. It also, indicates that supporting green loans will increase the sustainability of the environment. Also, it was empirically found that green loans, green technologies, green training, and environmental performance are positively correlated. It has also been noticed lack of commitment from Nigerian banks in financing investments related to financing investment in renewable energy and waste management. So, there is a need to increase the investment in this regard. It was also suggested that investment in online banking amenities like ATMs, point-of-sale systems, mobile apps, online customer care platforms, etc. has significantly enhanced the bank's environmental performance.

Dai et al., (2022) empirically examined and found that CSR has a considerably positive influence on green innovation and environmental performance in emerging markets like Bangladesh. while green innovation significantly improves environmental performance. Furthermore, the results showed that green finance can play a significant role in green innovation and better environmental performance of banks. Also, the research findings show a green innovation can play a strong mediating role in the relationship of CSR and environmental performance, as well as between green finance and environmental performance. The study suggests that there is a need to adopt sustainability into banking policies in order to achieve the country's long-term economic success.

Zhang et al., (2022) found that green banking has a positive relationship with a bank's environmental performance and green financing. Green financing(sources) also significantly effects on bank's environmental performance. Furthermore, it was shown in the study that green financing can mediate the relationship between green banking practices and a bank's environmental performance. Furthermore, they have also, analysed that there are several major problems associated with the development of green banking in Bangladesh like limited awareness of customers about green banking, high investment expenses, technical barriers, and lack of capable and competent staff for evaluating green credits/loans.

Chen et al., (2022) revealed that there is a correlation between green financing and green activities within banks including their employees' involvement, daily operations, and policy-related green banking practices. However, customer-related green banking practices did not show any significant effect. Furthermore, green project financing by banks had a strong and positive impact on their environmental performance. The study proposed that a collaboration between the government, the banking institutions, and international institutions should be employed in setting up a system of green financing with the intention of finding out if it has an effect on banks' environmental performances.

Bakry et al., (2023) investigated the effect of green finance on the environmental performance of 76 developing countries between 2010 to 2019. The study found that CO₂ emissions are correlated with green financing, real GDP, urbanisation, and energy from renewable sources under various specifications, and therefore, we can estimate that there is a long-run relationship between these variables. Green financing and renewable energy, in particular, are proven to have considerable and limiting impacts on CO₂ emissions, and thus there is a need to promote green finance and renewable energy.

Zakari et al., (2023) explore the link between green finance, green energy (GF), and environmental performance (EP). It was found that green finance and green energy have a significant positive relationship impact on environmental pollution. It will play an important role in reducing the carbon dioxide in China and Japan. It is also suggested that there is a need to promote green energy through subsidies and grants. Also proved that Green Energy is environmentally friendly.

Ma et al., (2023) explore the relationship between green finance, renewable energy investment, green economic recovery, and environmental performance in G-20 countries. It was empirically found that the countries who are having latest technology and sustainability plans have better environmental performance. It was also found that Digital finance can have a significant effect on how smoothly things work compared to simply making them bigger. In developing countries and areas with relatively low levels of green finance, green finance contributes all the more towards improving energy and environmental performance. However, it has a negative impact on environmental product innovations in developed countries that are largely focused on green innovation or environmental policies.

Guang-Wen et al., (2023) explore the relationship between fintech adoption (FA), green finance (GF), or green innovation (GI) on environmental performance (EP). They have collected primary data from 302 banking employees from Bangladesh and found that fintech adoption and green finance have a significant influence on the environmental performance of banking institutions with the mediating effect of green innovation.

Mirza et al., (2023) found that there is a positive relationship between financial technology investment and green lending, indicating that adopting these technologies can boost green finance and enhance bank profitability. Moreover, the research indicates that business size, human capital efficiency, and market concentration influence bank profits as well as eco-friendly lending choices.

So, there are limited studies that have been conducted on the relationship between green finance and environmental performance, and most of these studies have been conducted outside of India. Furthermore, very few studies have specifically looked at the environmental performance of banks. So, this study aims to address this research gap by focusing on India and providing new and valuable insights in this area.

3. Methodology

Design/methodology/approach-This research paper is conceptual in nature, based on an extensive review of literature, data from websites of different banking institutions and government websites, and evaluation of other resources. The study focuses on four banks, two banks from the public sector and two from the private sector were selected for the study, that are listed on the NSE Bank Nifty index as of October 2023. These banks were selected based on the following criteria: (a) they actively engage in ESG (Environmental, social, and Governance) activities and disclose them in their sustainability reports. Based on this criterion, we have found that only two public sector banks (State Bank of India and Bank of Baroda) out of three that are indexed in NSE Bank nifty, meet these requirements. Therefore, to match the number of banks with the public sector and to provide diversity, we have decided to select two private sector banks that also meet the above criterion and since we have more private sector banks following these criteria, we have further decided to choose the banks on other criteria: (b) the banks with highest net profitability for the year 2022-23. So, based on this, two private sector banks (HDFC Bank and ICICI Bank) out of Eight that were indexed were selected.

3.1 India Green Initiatives

Green energy is the key to a better and sustainable future and this requires a huge amount of capital investment in the form of green financing. One of the main focuses of the Union Budget 2023–24 is green growth, which aims to assist in the country's green industrial and economic transition as well as ecologically friendly agricultural and sustainable energy sources. Some of the main initiatives and projects under the Union Budget 2023-24 are Green Hydrogen Mission, Energy Transition, Energy Storage Projects, Renewable Energy Evacuation, Green Credit Programme, PM-PRANAM, GOBARDHAN Scheme, Bhartiya Prakritik Kheti Bio-Input Resource Centres, MISHTI, Amrit Dharohar, Coastal Shipping, and Vehicle Replacement (The Hindu 2023, February 23). India’s relentless focus on expanding renewable energy sources (Figure 2) reflects its commitment to reducing carbon footprints and greenhouse gas emissions. As we move forward, green energy remains the compass guiding us toward our sustainable goals.

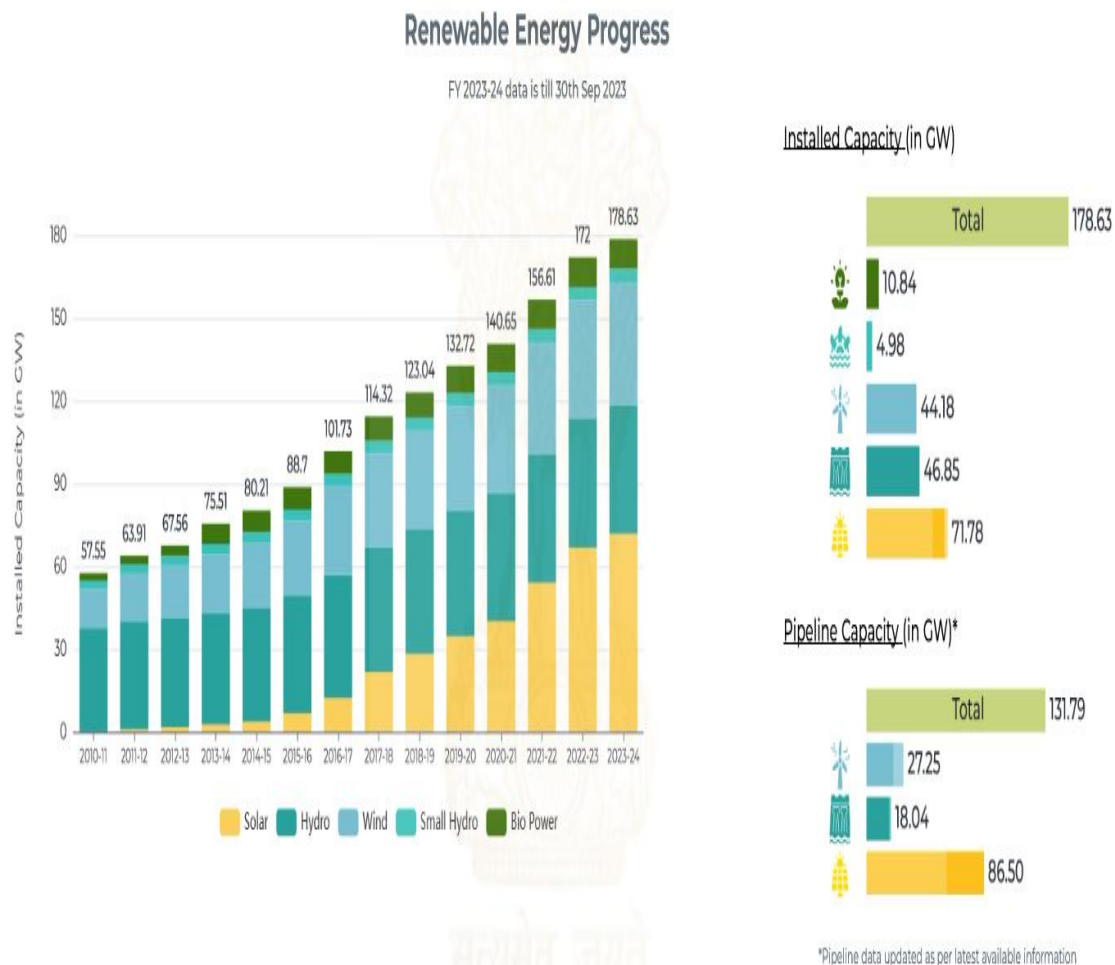


Figure 2 India Renewable Energy Progress (Source: India Climate and Energy Dashboard)

As, per the RBI report on Currency and Finance 2022-23, India has launched an ambitious and focused climate change strategy while balancing its economic and environmental goals. In order to attain the goal of Net Zero emission by 2070, India has also amended its Nationally Determined Contributions (NDCs) which seek to increase the percentage of renewable energy and reduce the carbon emissions intensity per unit. At COP27, India announced its Long-Term Low-Emission Development Strategy, which included goals to expand green hydrogen generation, electrolyser manufacturing capacity, and biofuel use. India has also developed and fostered the International Solar Alliance, the Coalition for Disaster Resilient Infrastructure, and the Mission LIFE (Lifestyle for Environment) to enhance solutions-based international collaboration. As per World Bank article (2023, June 12), India released the first tranche of its first governmental green bond on January 25, 2023, for a total of INR

80 billion. Government and financial institutions have been using the green bond tool since 2015. By February 2023, India has released roughly USD 21 million in eco-friendly bonds. The Private Sector Produced 84% Of Total (see Figure 3).

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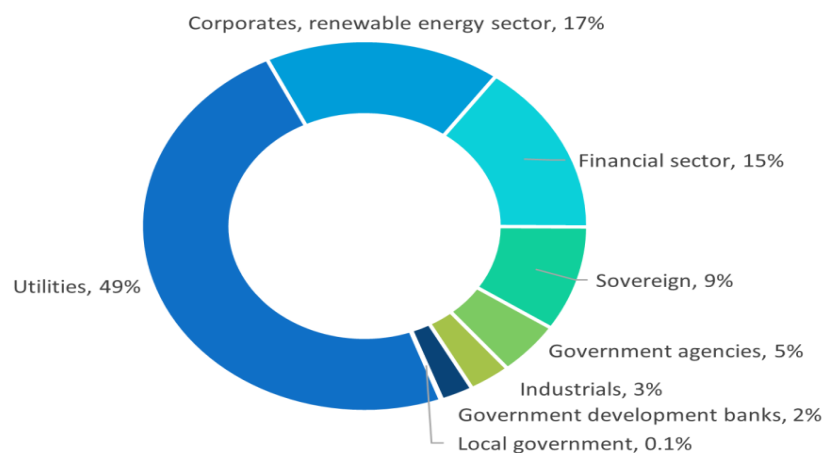


Figure 3 Green bond amounts issued in India by type of issuer.

Source: World Bank with data from Bloomberg.

3.2 State Bank of India Green Initiatives

State Bank of India Chairman Dinesh Kumar Khura announced at a conference on 'Climate Finance and Risk' held by SBI under the supervision of the Department of Financial Services (DFS) in New Delhi, that India is required to generate its own funds from individual or Institutional Domestic or Foreign Investment to meet the demands of Green Financing. It also, stressed on the point that there is a significant need for strong climate-focused frameworks backed by government laws. According to SBI, India ranks seventh among the world's most impacted countries by climate change, although receiving a relatively modest share (about 7%) of climate capital (The Hindu Business Line 2023, June 17). State Bank of India has come up with its own Environmental, Social, and Governance (ESG) Financing framework – the “Framework”. With this framework SBI intends to issue green, social, and sustainability bonds and Loans for financing/refinancing present or future initiatives that might yield positive impacts on the environment and/or society in India, either wholly or partially (Sustainalytics 2022 Second-Party Opinion State Bank of India ESG Financing Framework).

SBI has shown more interest in Renewable Energy (RE), by Supporting the expansion of RE projects with a total capacity of 23,679.55 MW. As of March 31, 2023, the Bank had sanctioned INR 36,243.42 crore for different renewable energy projects such as solar power, wind power, hydropower, and biomass projects. The total amount sanctioned in the following manner INR 23,916.66 crore for solar power (including rooftop and ground-mounted), INR 8,225.04 crore for small hydro/hydro, and INR 3,979.49 crore for wind power. INR 2,367.13 crore for sustainable transportation, INR 572.85 crore for fuel gas distribution, and INR 562.87 crore for energy efficiency processes and products. SBI finalized its USD 1 billion syndicated social credit in FY23. The offering was met with the enormous involvement of banks from Taiwan, Japan, China, and the Middle East, resulting in a full subscription. The funds will be used in accordance with the ESG framework's established scope. Along with this, since from fiscal year 2019, bonds of USD 800 million have been issued. Green bonds totalling USD 650 million have been listed on the INX and the Luxembourg Stock Exchange. The proceeds will be used for environmentally friendly projects. In FY21, the bank also raised a EUR 50 million green loan. SBI's international offices have also begun issuing ESG-related loans and pricing based on sustainability grids. The 'Strategy Paper on Sustainability Loans' was created to expand the IBG's presence in sustainable financing.

Foreign Offices (FOs) have 59 loans with a total outstanding amount of USD 2,244 million under sustainable lending. The effect of this is helpful in increasing emission reduction potential by 5.72 Mn tCO₂/year Increase in annual renewable energy output by 80,57,299.08 MWh and increase in renewable energy projects with a combined capacity of over 3,472.70 MW (SBI Sustainability Report 2023).

3.3 Bank of Baroda Green Initiatives

The bank has understood, that how climate risk affects its overall business operations. Climate change has been regarded as a major danger to the bank's entire business operations. Therefore, the bank has declared that it will make every effort to reduce the environmental effect of its operations as well as its loan and investment portfolio. The Global Credit Exposure Management Policy of the Bank has created an Internal Rating Model including environmental elements. Credit proposals from the Bank are evaluated using Credit Assessment Memorandums (CAMs), which include comments on environmental/pollution considerations. To further reinforce the Internal Rating Model, the Bank is including climate risk factors and ESG criteria in the loan evaluation method, which will be refined and strengthened. The Bank has committed that it will examine all potential financial risks associated with environmental and climate change when processing loans, including screening, appraisal, pre-sanction processes, and post-disbursement monitoring. The bank will also integrate these ESG practices throughout its organization, indicating a commitment to considering environmental, social, and governance factors in its business operations.

In addition to these, the Bank of Baroda has undertaken several other important initiatives as well (BOB Sustainability Report 2022-23 & 2017-18). Here some of them are as follows:

(1) The bank has committed that it will not lend to such companies that are polluting the environment or creating ozone-depleting compounds.

(2) The bank has Installed solar panels in more than 175 branches, resulting in a reduction of 2400 tons of carbon dioxide emissions.

(3) The bank has taken a step towards energy efficiency by installing LED lights in all its domestic branches.

(4) The Bank has installed a biogas plant with a capacity of 500 Kg of wet waste at the bank's headquarters in Mumbai's Bandra Kurla Complex (BKC). This facility will help in generating cooking gas, which is used in the bank's canteen. Furthermore, the bio-gas plant's organic manure is used in the garden/lawns.

(5) The bank is also focusing on the concept of green building so, upcoming office/residential buildings in various locations should be designed with the Green Building Concept in mind, which means adopting eco-friendly and resource-efficient processes at every stage of construction, from choosing the location and development to construction and operation, followed by maintenance, renovation, or even destruction.

3.4 ICICI Bank Green Initiatives

ICICI Bank has given top priority to responsible funding, which means providing funds in such projects that will not harm the environment. For this purpose, the bank will carefully assess the risks and returns of such projects. The bank mainly supports environmentally friendly sectors such as renewable energy, electric cars, and waste processing, as well as small-scale businesses like Khadi and handicrafts that positively impact society. When the Bank receives funding requests for new projects, it will use its ESG framework to identify how these projects can affect people and the environment. This helps them to make responsible lending decisions. The Bank also launched its environment conservation programs that are intended to lower their environmental impact using a 3R (Reduce, Reuse, Recycle) strategy. For a more sustainable future, they have implemented an integrated ecological and environmental plan. The efforts of the bank, are focused on creating and sustaining green workplaces by saving energy, conserving water, and managing waste better. As a responsible corporate citizen, ICICI Bank helps transition India's low-carbon economy with long-term benefits. ICICI Bank has prioritised financial inclusion and has developed digital products that help in promoting access to loans in MSMEs sectors (Micro, Small, and Medium Enterprises) and underserved rural areas. This will also apply to Lending to

sustainable industries, like as renewable energy, for this, there is also a need to balance risks with profits.

The Bank's current portfolio in areas such as renewable energy, electric cars, green-certified real estate, waste management, and positive impact sectors such as small-scale khadi and handicrafts was around 73.80 billion as of March 31, 2022. Along with all this, the Bank is looking forward to its efforts to rationalise the use of natural resources and create plans to increase energy efficiency and implement green practices (ICIC Bank Annual report 2021-22 and ICICI Bank Sustainability Report 2022-23). There are several other significant actions undertaken by the bank throughout the year some of them are as:

(1) The Bank facilitates an extra 0.81 million square feet that were recognised as green buildings by the Indian Green Building Council (IGBC). From 2.28 million square feet in fiscal 2021 to 3.09 million square feet in fiscal 2022, the total area having IGBC certification grew.

(2) During fiscal 2022, an additional 260 kWp of solar power capacity was added, bringing the total renewable energy installed capacity to 3,174 kWp.

(3) The Bank also analysed and improved renewable energy supplies under power purchase agreements. Renewable energy accounted for around 7% of total energy consumption in fiscal 2022.

(4) From the fiscal year 2022 to 2023 carbon emission has been reduced from 1.35 tCO₂e to 1.16 tCO₂e per Full Time Equivalent (FTE) employee.

(5) The Banks has saved 50 million liters of water through rainwater harvesting in 2022 across 2,000 rural schools and 5 billion litres of Water saved by sustainable farming methods.

3.5 Hdfc Bank Ltd. Green Initiatives

Environmental, social, and governance (ESG) factors are becoming increasingly important in the decision-making process of businesses and investors while making an investment. All this happening due to frequent changes like change in the rules and regulations and change in the tastes and preferences of buyers etc. All these can have a big influence on the financial performance of companies. The banking industry plays a significant role in making our world more environmentally and socially responsible. Therefore, Banks are developing New ESG instruments, which help in bringing necessary changes towards achieving the target of net zero emissions by 2050. In fact, the banks are considering ESG criteria in their decisions while providing loans. Banks are also being more careful about the risks related to ESG issues, like climate change, and they are testing how these things could affect the environment and society at all levels. Banks are even creating new financial products with ESG components that are being developed to meet the rising demand for sustainable investment solutions, such as green bonds, social bonds, etc.

The HDFC bank has revealed its annual report for the financial year 2022 which tells that, while providing loans to customers the Bank will evaluate the project's environmental and social risks assessments. Also, when banks evaluate big projects like factories or infrastructure that need a lot of money (over \$100 million and lasting more than 5 years), they are subject to the bank's Social and Environment Monitoring System (SEMS). Under this, the Bank will check whether these projects could harm the environment, people's health, or safety. If it is harmful then the bank does not finance such projects. The bank wants to invest money in such projects that do not harm the environment and help in reducing the effect of climate change. To reduce its impact on the environment, Banks are investing their money in renewable energy and energy-efficient projects. As of next year, the bank will enhance its criteria for assessment under the "ESG & Climate Change Assessment" approach and will take more care about whom they are lending money. This framework has taken the place of the former "SEMS Framework" which applies to all borrowers when the bank directs funded and non-funded credit exposure to the borrower in excess of RS 100 crore. The new framework covers more than 1400 corporate borrowers under "ESG & Climate Change Assessment". As of March 31, 2023, These Debtors Have Funds Outstanding \$3,68,327.66 (Integrated Annual Report 2022-23).

Along with this some of the major actions undertaken by the banks are as follows:

- (1) The Bank has reduced 1,799 t CO₂ (carbon emissions) through green tariff electricity.
- (2) The Bank has installed onsite solar rooftops in its office buildings to increase the usage of on-site renewable energy, which helps in avoiding 239.02 t CO₂ emissions.
- (3) Along with this bank has developed around 11,820 Water Conservation structures and they have also financed a total amount of 15,115 Crores for renewable energy.
- (4) To develop the City Gas Distribution (CGD) network by Torrent Gas Jaipur Private Limited, the bank has successfully financed a project term loan of Rs 2143 crore. Financing for CGD contributes to the energy transition to a greener fuel, reducing the dependence of the country on oil, and supports the initiatives of governments to transform the country into a gas economy.

4. Discussion

Climate change is causing big problems all around the world, as it is creating problems in many ways that we can see and feel, some places are getting way too hot, while others are facing droughts and some are dealing with too much rain and more natural disasters, etc. All these have wide-ranging effects on people, animals, and the economy of the country. Thankfully, governments and many groups know how serious this is, and they're doing things to try and fix it. We did a literature analysis on green financing and environmental performance for this conceptual paper, and the results show that many nations have a very positive stance toward green funding. The countries that have followed this strategy have benefitted in economy as well as environmental sustainability terms. However, when we talk about India, we can see that India is in its early phase and currently lagging behind greatly in this area. There is a need for more focused studies in green financing especially in India to fill the gap.

Currently, we do not have any significant way that show how much money is going into environmentally friendly projects compared to other projects. Businesses and Banks are only preparing the Business Responsibility and Sustainability Reporting (BRSR) as mandated by the Securities and Exchange Board of India (SEBI). There is still a need to increase transparency in this regard. Where banks can present their financial report by showing how much money they are putting into green projects. This will provide more transparency and enable decision-makers to have enough information about it. The State Bank of India (SBI) is working well in this area, leading the way with its ESG Financing Framework and helping renewable energy projects. All this signifies there is a need for government support and requires more clear policies that can help us make sustainable investments. But, in order to achieve widespread effectiveness, others have to do the same. There is also, a need that each and every bank must consider environmental, social, and governance (ESG) norms during their business operations. ICICI Bank and HDFC Bank are good examples of this change. They are focusing on being responsible when lending money and being open about their efforts to be sustainable.

Moreover, today green finance and renewable energy facing many challenges in India. These include a lack of awareness, conflicting definitions, high borrowing costs, and mismatches in investment timeframes. The capital-intensive nature of the sector and private sector-led development hinder attracting needed investments. False claims of environmental compliance and the absence of a universal definition add complexity. Borrowing costs for green projects are high due to asymmetric information. Market infrastructure needs development, with coordinated policies and engagement with industry bodies (Solomon 2020; Sarangi et al., 2020; RBI Bulletin)

Findings: This study has explored the relationship between green financing and the environmental performance of a few selected Indian banks, both public (State Bank of India and Bank of Baroda) and private sector (HDFC Bank and ICICI Bank). It was found in all selected banks that green financing and environmental performance are positively related and green initiatives have a significant impact on the environment. These banks are successfully reducing their negative impact on the environment through green financing in eco-friendly projects. It also indicates the green energy (renewable sources) is crucial for a good future and helps fight climate change and this will also require a lot of money in the form of green financing. Countries (e.g., the United States,

China, Germany, Netherlands, etc) that have adopted these eco-friendly strategies have seen benefits for their economy and the environment. The study also noticed that Public and private banks might have different approaches to doing things, but they might also be working towards the same green goals of the country. The study also found that we need better rules (ESG frameworks), like the one used by the State Bank of India. In this regard we can also take an example from Triodos Bank (Netherlands), Nordea (Sweden), and Rabobank (Netherlands) as these are the top banks in the world that are adopting the best sustainable banking practices (as per the article of Fintech Magazine February 20, 2023), so from there we can also adopt policies and measure as per our Indian context. The study also revealed that there is a need for government support, clear policies, and increased transparency in financial reporting where we are investing money in environmentally friendly and non-environmental projects. Also, for the green revolution in India, there is a need for a strong partnership among Indian governments and financial institutions. These things together with cultural changes help promote sustainability and better environmental performance that guarantees a resilient future.

Theoretical implications: The study helps in understanding the relationship between green financing and environmental performance. The study highlighted that there is a positive impact of green financing in promoting sustainability. The findings stress incorporating environmental factors in financial decisions. The research identifies a gap in India's green financing understanding and urges further exploration. Currently, India's banks are at an early stage in adopting green financing practices, while some countries have made significant progress. So, this is one of the earliest studies conducted in the country that seeks to establish a relationship between green finance practices and environmental performance, especially focusing on the banking industry. It has been focusing primarily on some main public as well as private sector banks in India.

Managerial implications: We have identified key points from our study that can be applied to the banking sector. They are: Firstly, there is a need to enhance the transparency of financial reports. When providing details on the financial breakdown, banks must indicate the funds allocated to both green energy and non-green energy projects. Secondly, each bank must adopt Environmental, Social, and Governance (ESG) norms compulsorily. These norms should be integrated into their day-to-day business operations, ensuring responsible lending practices. Thirdly, all banks should establish a green financing framework, taking inspiration from the success of the State Bank of India. Additionally, collaborating with renewable energy initiatives and promoting environmentally friendly financing practices are crucial steps towards a greener and more sustainable approach. Lastly, each bank should engage in the development of green products and services, fostering innovation with a sustainability focus. By following these practical implications, Indian banks can become significant contributors to sustainable development and the reduction of the effects of climate change.

Social implications: The study's societal implications, which concentrate on the overall effect of green financing, are considerable. It places a focus on addressing the societal and environmental effects of climate change. It fosters ethical lending and a sustainable future by showing successful cases. The importance of policy frameworks for green finance is emphasised, along with collaboration between governments and banks. Adopting environmentally responsible financing can improve sustainability, environmental performance, and resilience for future generations.

Limitations: While this study has provided essential information, there are some limitations that need to be focused on in future research. One of the major limitations is that the study only looked at the green finance practices and environmental performance of a few commercial and public sector banks in India using secondary data, which limits the scope and generalizability of the findings.

Future direction: To enhance future studies, researchers might look at a broader range of banks while keeping primary research in mind, or they could do a comparison study among the top green financing banks in India or between the world's top country's banks. Another relevant study topic would be to look into how banks in different countries are implementing green finance practices to enhance sustainability. So, we may acquire a more thorough understanding of green financing and its influence and efficacy on environmental performance by addressing these concerns.

Appendix A

Table A1 Summary of some recent studies.

Reference	Title of the Study	Data Collection/ Methodology	Variables	Findings
Rajput et al., (2013)	An Empirical Study of Impact of Environmental Performance on Financial Performance in Indian Banking Sector	Secondary Data was collected for the period of March 1997 to March 2013. Analyses using Panel regression method.	Environmental Performance and financial performance (net income, expenses with profitability, and variables of green banking exhibiting environmental performance)	The finding indicates that there is no significant relationship exists between the environmental performance and Financial performance of Indian banking Sector.
Chowdhury et al., (2013)	Green finance is essential for economic Development and sustainability	Used Secondary Data and Qualitative analysis	Green financing, Environmental sustainability	This study reveals, that Green finance is one of the most important tools for the green growth of a country. It is helpful in reducing climate change and promotes sustainable development. The study confirms there is a need for investing in different eco-friendly projects, including renewable energy and others that are aimed at mitigating climate change while enhancing economic development.
Soundarajan et al., (2016)	Green finance for sustainable green economic growth In India	Used Secondary Data and Qualitative Analyses.	Green finance, recent trends, and the future opportunities and challenges	Green finance is a fundamental basis for green economic growth. Green growth means working in such a way, where technological companies, banks, government, and people work together. It also has been stated that the future of Indian banks depends upon the situation that how they will utilise sustainable finance.
Munjal and Sharma (2019)	Environmental Performance Reporting in Commercial Banks of India: Exploring Association With Financial Performance	Secondary data is used in the research, which is gathered from 21 public sector banks and 20 private sector banks in India during a five-year period (2013-14 to 2017-18).	Environmental Performance Reporting and Financial Variables (Return on Equity, Return on Assets)	The study found that there is no positive relationship between a bank's environmental performance and its ROI (Return on equity). However, there is a positive and significant relationship between a bank's environmental performance and its ROA (Return on assets).
He et al., (2019)	Can green financial development promote renewable energy investment efficiency? A consideration of bank credit	Secondary data collected from 141 listed renewable energy enterprises in China as a sample.	Green Financial Development and Renewable Energy Investment Efficiency	Green financial development negatively impacts overall bank loan issuance for renewable energy enterprises in China. Short-term loans have minimal effects, while long-term loans show no intermediary impact. For over-investing companies, green finance mitigates over-investment by reducing bank credit issuance.
Taghi-zadeh-Hesarya et al., (2019)	The way to induce private participation in green finance and investment	Secondary data from various sources	Green investment	It was found that investors and financial institutions are not readily interested in investing in green energy projects because they think there is a high risk and low return involved with these projects as compared to alternative energy investments
Afzal et al., (2022)	Green finance and sustainable development in	Secondary Data was collected from 40 European countries for	Financial Development (includes domestic credit to the private sector, bank credit	The study finds that there is no positive relationship between financial development and four different

	Europe.	the period from 1990 to 2019.	to the private sector and foreign Direct investment) and environmental degradation (energy use, CO2 emissions, greenhouse emissions and Natural resource depletion) Control variables include Income level (GDP per capita), institutional quality (government effectiveness index), technology (mobile phone subscribers), population size, urbanization (urban population), and education (secondary school enrollment)	measures of environmental deterioration, whereas FDI (foreign Direct Investment) and institutional quality typically worsen the environmental measurements.
Zhang et al., (2022)	Do Green Banking Activities Improve the Banks' Environmental Performance? The Mediating Effect of Green Financing	The Primary data using the convenience sampling technique was gathered from bankers of private commercial banks (PCBs) in Bangladesh, with a final sample size of 352. SEM technique was used to analyse the data.	Green Banking Activities, green financing, and banks' environmental performance	This study found that green banking has a positive relationship with a bank's environmental performance and green financing. Green financing(sources) also significantly effects on bank's environmental performance. Furthermore, it was shown in the study that green financing can mediate the relationship between green banking practices and a bank's environmental performance.
Oyedele et al., (2022)	Does green finance affect environmental Performance? Evidence from Nigerian banks	Primary data was collected from 250 respondents from Nigerian banks with the help of non-probability convenience. Also, structural equation modelling (SEM) was used to analyse the data.	Green finance (green loans, green investment, green technology, green training) and banks' environmental performance	It was found that green loans have a positively strong and favourable relationship with environmental performance. It also, indicates that supporting green loans will increase the sustainability of the environment. Also, it was empirically found that green loans, green technologies, green training, and environmental performance are positively correlated.
Dai et al., (2022)	Corporate Social Responsibility, Green Finance, and Environmental Performance: Does Green Innovation Matter?	Primary Data was collected with the help of structured questionnaires. The data was gathered from 357 commercial bankers in Bangladesh. The data was analysed with the help of the structural equation modelling (SEM) technique.	Corporate Social Responsibility (CSR) Green Finance (GF), green innovation (GI) and Environmental Performance (EP)	CSR has a considerably positive influence on green innovation and environmental performance. Furthermore, the results showed that green finance can play a significant role in green innovation and better environmental performance of banks. Also, the research findings show a green innovation can play a strong mediating role in the relationship of CSR and environmental performance, as well as between green finance and environmental performance.
Chen et al., (2022)	The effect of green banking practices on banks' environmental performance and green financing: An empirical study	Primary Data used-Total of 354 structured questionnaires were delivered for the collection of data, between March and April 2019, of which	Green Banking Practices, Green Financing, and Environmental Performance.	The study revealed that there is a correlation between green financing and green activities within banks including their employees' involvement, daily operations, and policy-related green banking practices. However, customer-related green banking practices did not show

		322 were recovered, indicating a retrieval rate of 90.96%.		any significant effect. Furthermore, green project financing by banks had a strong and positive impact on their environmental performance.
Bakry et al., (2023)	Is green finance really “green”? Examining the long-run relationship between green finance, renewable energy and environmental performance in developing countries	A sample of 76 developing countries over the period from 2010 to 2019 was used. The data collection process used two main statistical techniques: panel cointegration analysis and panel vector error correction model (VECM)	Carbon emissions (CO2), green finance, real gross domestic product, urbanization, and renewable energy.	The study reveals that CO2 emissions are correlated with green financing, real GDP, urbanisation, and energy from renewable sources under various specifications, and therefore, we can estimate that there is a long-run relationship between these variables. Green financing and renewable energy, in particular, are proven to have considerable and limiting impacts on CO2 emissions, and thus there is a need to promote green finance and renewable energy.
Zakari et al., (2023)	Assessing the impact of green energy and finance On environmental performance in China and Japan	Secondary data used from 2010 to 2020, annual data from China and Japan were collected to evaluate the influence of green energy and financing. It has used Pooled ordinary least-squares/weighted least-squares and fixed-effect With Driscoll-Kraay standard errors model.	Environmental performance, green energy, green finance, foreign direct investment, personal income, and trade openness.	It explores the link between green finance, (GF), green energy, and environmental performance (EP). It was found that green finance and green energy have a significant positive relationship impact on environmental pollution. It will play an important role in reducing the carbon dioxide in China and Japan. It is also suggested that there is a need to promote green energy through subsidies and grants. Also proved that Green Energy is environmentally friendly.
Ma et al., (2023)	Combining the role of green finance and environmental sustainability on green economic growth: Evidence from G-20 economies	Secondary data using Quantitative research methodology, particularly utilizing a Quantile Regression Model. The time frame for analysis is from 2010 to 2020.	Green finance, renewable energy investment, economic recovery, Digital Banking and environmental performance	Findings indicate a connection between green economic recovery, digital banking, renewable energy investment, and green financing in G-20 nations. Compared to economies of scale, digital finance has a bigger impact on operating performance. In areas with less established credit and capital markets, green financing has a favourable influence on energy-environmental performance; in emerging nations, it encourages green innovation.
Guang-Wen et al., (2023)	The effect of Fintech adoption on green finance and environmental performance of banking institutions during the COVID-19 pandemic: the role of green innovation	Primary data from 302 banking employee	Fintech adoption, fintech adoption (FA), Green finance(GF), Green innovation (GI), and Environmental performance (EP)	This study revealed that fintech adoption and green finance have a significant influence on the environmental performance of banking institutions with the mediating effect of green innovation.
Mirza et al., (2023)	The role of fintech in promoting green finance, and profitability: Evidence from the banking sector in the euro zone	Primary: collected data from 319 banks located in the Eurozone area and applied a panel fixed effects model to the sample.	Fintech, Green Finance and profitability	The study found that there is a positive relationship between financial technology investment and green lending, indicating that adopting these technologies can boost green finance and enhance bank profitability.

Source: Authors' compilation from literature

Conflict of interest

The authors declare no conflict of interest.

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