

# *Impact of CSR, Green Finance and Green Innovation on Environmental Performance of Banks in India*

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In an era of growing environmental challenges, the role of banks in promoting sustainability is critical. This study examines how Corporate Social Responsibility (CSR), green finance, and green innovation influence the environmental performance of Indian banks. Guided by legitimacy theory and the natural resource-based view, survey data from 379 bank employees were analysed using structural equation modelling. The results reveal that robust CSR initiatives, effective green finance practices, and innovative green strategies significantly enhance banks' environmental performance. These findings contribute to theoretical understanding and offer practical insights for improving sustainability in the banking sector. The study recommends that banks in emerging economies strengthen internal resources by investing in CSR, adopting green finance, and fostering green innovation to boost environmental performance. Such efforts align with global sustainability goals, positioning banks as key players in environmental protection and responsible finance.

*Keywords:* corporate social responsibility, green finance, green innovation, environmental performance of banks, structural equation modelling

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## **Introduction**

Banks, as major players in the financial world, play a crucial role in promoting environmentally sustainable practices. Their green finance efforts – which span economic, social and environmental aspects – combined

with innovative green strategies, are essential in boosting their overall environmental performance (Guang-Wen and Siddik 2022; Chen et al. 2022; Zheng et al. 2021a). These efforts are designed to strike a balance between economic growth and environmental protection, highlighting a rising awareness that sustainability should be at the core of every business strategy. By merging green finance with innovative environmental strategies, banks have a unique opportunity to address ecological challenges head-on. Incorporating ethical values into their everyday operations enables financial institutions to effectively navigate the ever-changing landscapes of economics and finance while pushing forward initiatives that prioritize environmental responsibility (George et al. 2023). Additionally, actively participating in Corporate Social Responsibility (CSR) programmes and channelling funds into eco-friendly projects are essential steps toward enhancing environmental performance and promoting sustainable growth (Salim et al. 2023). Integrating CSR into environmental performance management systems can drive the transition toward sustainability, helping businesses create long-term value and ultimately improve their environmental outcomes (Atangana et al. 2023).

Despite the clear significance of green finance and green innovation, there is still a lack of extensive research on these topics, particularly in the banking sector of emerging economies such as India (Ramesh and Mendes 2015; Kraus et al. 2020; Ajibike et al. 2023). This gap in research is concerning as it limits our understanding of how CSR practices, green finance, and green innovation affect banks' environmental performance. Without thorough empirical studies on these connections, stakeholders lack essential insights needed to promote sustainable practices in the banking sector, thereby hindering progress toward environmental preservation and economic development.

To address this gap, the study aims to explore how CSR practices, green finance, and green innovation interact and influence the environmental performance of banks in India (Bihari and Pradhan 2011) (see figure 1). By offering valuable insights, the research aims to guide strategic decision-making, promoting both environmental sustainability and economic growth within the banking sector. To bridge the identified research gap, the study is centred on the following research question:

*Do CSR practices, green finance elements (social, economic, and environmental dimensions), and green innovation have any impact on environmental performance of selected banks in India?*

Using a carefully crafted questionnaire and structural equation modeling, this study aims to clarify how these factors influence environmental sustainability. It also examines the direct impact of CSR practices, green finance and green innovation initiatives on environmental performance, offering deeper insight into the key mechanisms that drive sustainability in the banking sector (Prasad et al. 2019).

The study's findings are expected to provide both theoretical and practical insights. Empirical evidence from Indian banks will add to the existing research on CSR, green finance, green innovation, and environmental performance, particularly in the context of emerging economies. By showcasing the positive effects of green finance and innovation on environmental outcomes, the study aims to guide banking managers in making strategic decisions that maximize the use of internal resources to strengthen sustainability efforts. Ultimately, this research seeks to enhance understanding of the pathways toward environmental sustainability in the banking sector, supporting informed policy development and industry initiatives.

Unlike other industries that directly impact the environment through emissions and resource consumption, banks drive sustainability through financial decisions. As intermediaries, they fund green projects, incentivize eco-friendly practices, and integrate environmental risks into investments, shaping entire industries. This financial influence positions banks as key enablers of sustainability rather than just participants. Given their critical role in financing sustainable development, studying how banks integrate green finance, CSR, and innovation is essential for understanding environmental performance drivers and shaping effective sustainability policies.

This study is distinct from previous research in several ways. Unlike existing studies that primarily focus on the effects of CSR, green finance, and green innovation on firm performance and sustainability performance (Abbas et al. 2019; Zheng et al. 2021a), this research investigates their impact specifically on the environmental performance of both private and public sector banks in India – an area largely overlooked in the context of emerging economies. Additionally, prior studies on this subject have yielded inconsistent and inconclusive findings, necessitating further exploration of the relationship between CSR, green finance, green innovation, and environmental performance within banking institutions. To address this gap, the present study proposes and tests a comprehensive research model grounded in legitimacy theory and re-

source-based view theory, integrating the concept of green finance to provide a more holistic understanding of how these factors interact to shape environmental outcomes in the banking industry.

The structure of this study is as follows. Section 2 provides the theoretical background and literature review. Section 3 outlines the development of the research hypotheses. Section 4 describes the research methodology employed. Section 5 presents and analyses the empirical results. Section 6 offers a comprehensive discussion of the findings. Finally, Section 7 concludes the study by summarizing key insights, highlighting theoretical and practical implications, and identifying limitations and directions for future research.

## **Theoretical Background and Literature Review**

### **THEORETICAL BACKGROUND OF THE STUDY**

Legitimacy theory emphasizes the need for organizations to align their values and actions with societal norms to sustain their legitimacy. To achieve this, businesses adopt CSR initiatives, ensuring they comply with both legal and ethical standards while fulfilling stakeholder expectations for social and environmental accountability (Dowling and Pfeffer 1975). Green finance helps organizations manage their environmental impact by reducing energy use and lowering their carbon footprint, thereby reinforcing their legitimacy. Likewise, green innovation promotes sustainability by developing and implementing eco-friendly technologies, meeting societal expectations and supporting environmental protection efforts (Kölbel and Busch 2021). Leveraging CSR, green finance, and green innovation, organizations can secure and maintain their legitimacy, crucial for achieving environmental sustainability, as emphasized by the legitimacy theory (Chen et al. 2022; Ferreira et al. 2014). Banks wield substantial influence on sustainability, and their endeavours to contribute to societal betterment are communicated to uphold and reinforce their reputation and customer relationships (Matute-Vallejo et al. 2011; McDonald and Rundle-Thiele 2008).

Furthermore, the resource-based view theory posits that an organization's resources and capabilities drive competitive advantage (Hart 1995; Barney 1991). The natural resource-based view expands on this idea within the framework of environmental sustainability, proposing that tackling environmental challenges can lead to long-term competitive advantages. By utilizing environmental resources effectively and im-

plementing pollution prevention strategies, organizations can enhance their sustainable performance (Singh et al. 2020). The resource-based view highlights the importance of incorporating CSR practices across environmental, social, and economic dimensions to effectively evaluate organizational performance. This approach aligns with societal expectations while also strengthening the organization's competitive position (Sánchez-Infante Hernández et al. 2020). Furthermore, in line with the resource-based view, banking institutions can use CSR initiatives to set themselves apart from competitors and enhance their public image (Gangi et al. 2019). Strategic CSR practices create a mutually beneficial scenario where banks adopt socially responsible approaches to enhance their market positioning, bolster long-term profitability (Bénabou and Tirole 2010), and ensure long-term sustainability (Kolk 2016).

Existing research has applied various theories, such as stakeholder theory and the ability-motivation-opportunity theory, to explore the connections between CSR, green finance, green innovation, and environmental performance. This study adopts a framework based on legitimacy theory and the natural resource-based view to examine how CSR, along with green finance (covering economic, social and environmental dimensions) and green innovation, affects environmental performance. By combining these theoretical perspectives, the research aims to offer valuable insights into how organizations can harness CSR, green finance, and green innovation to promote environmental sustainability, advancing both academic understanding and practical applications in the field.

#### INDIAN BANKING AND SUSTAINABILITY

The banking sector is considered essential in advancing sustainable development, serving as a key catalyst for inclusive economic growth within a nation (United Nations Environment Programme Finance Initiative 2016). Over the past decades, the integration of sustainability into banking has gained momentum. Banks can integrate sustainability in two key ways. First, through CSR, they can incorporate environmental and social responsibility into their daily operations. This includes initiatives like zero waste policies, paperless banking, energy-efficient practices, financial inclusion programmes, financial literacy efforts, and community welfare projects, all of which contribute to both environmental and social well-being. Second, banks can embed sustainability into their core strategy by leveraging green finance and green innovation. This means incorporating environmental and social impact criteria into financing

decisions, developing sustainable financial products, and promoting eco-friendly loans, digital banking, and remote financial services (United Nations Environment Programme and the World Bank Group 2017). Indian banks are also increasingly acknowledging their crucial role in driving sustainable development (Kumar and Prakash 2019).

Green finance has become a crucial strategy for Indian banks in supporting sustainable development. By directing financial resources toward projects that promote efficient resource management and environmentally friendly technologies, banks play a key role in mitigating environmental challenges. Recognizing the financial risks associated with climate change, the Reserve Bank of India has introduced a draft disclosure framework to guide regulated entities in managing climate-related risks. While India's economy is among the fastest-growing globally (International Monetary Fund 2024), this rapid expansion has come at an environmental cost, with rising pollution levels and increased carbon emissions (Thapliyal et al. 2025). According to Deb and Kohli (2022), India ranks as the third-largest carbon emitter, highlighting the urgent need for sustainable interventions. In response, the Indian government has set ambitious sustainability targets, including achieving net-zero emissions by 2070 and reducing CO<sub>2</sub> emissions by 50% by 2050 (Emir et al. 2024). Meeting these goals will require substantial financial investments, positioning banks as critical facilitators in bridging the funding gap and accelerating India's transition toward a greener, more sustainable economy.

Additionally, Indian banks are increasingly leveraging CSR initiatives to enhance their environmental performance. For instance, State Bank of India has implemented green banking practices, including the installation of wind farms to generate renewable energy, thereby reducing its carbon footprint. Similarly, YES Bank has been proactive in financing renewable energy projects and promoting sustainability through its CSR activities (YES BANK 2022). These initiatives not only demonstrate the banks' commitment to environmental stewardship but also contribute to improved environmental performance by integrating sustainable practices into their operations.

Besides this, Indian banks are also increasingly adopting green innovation strategies to enhance their environmental performance. A study by Thapliyal et al. (2025) highlights that green banking practices, such as developing green products, implementing eco-friendly internal processes, and engaging in green corporate social responsibility, have significantly improved the environmental performance of banks in Uttarakhand. Sim-

ilarly, research by Gulzar et al. (2024) indicates that operational aspects of green banking, including energy-efficient operations and digital banking services, substantially contribute to environmental sustainability in both private and public sector banks across India. These initiatives not only demonstrate the banks' commitment to environmental stewardship but also position them as key players in promoting sustainable development within the financial sector.

In India, research examining the impact of CSR, green finance, and green innovation on banks' environmental performance is gaining momentum. For example, a study explored the effect of green finance on the environmental performance of Indian banking institutions, emphasizing the role of sustainable financing in enhancing environmental outcomes (Kothiyal and Tripathi 2023). While studies in other emerging economies, such as Bangladesh, have demonstrated that CSR and green finance positively impact environmental performance, with green innovation acting as a significant mediator, similar comprehensive analyses within the Indian banking sector are limited (Guang-Wen and Siddik 2022). Given India's ambitious sustainability goals and the banking sector's pivotal role in financing eco-friendly projects, investigating these relationships in the context of Indian public and private banks is both timely and essential. Such research would provide valuable insights into how these factors collectively enhance environmental performance, guiding policy formulation and strategic initiatives toward sustainable development.

#### EXISTING LITERATURE ON GREEN INNOVATION AND ENVIRONMENTAL PERFORMANCE

Environmental performance reflects how a company's operations affect the natural environment, including areas such as waste reduction, energy efficiency, and compliance with environmental regulations. An important factor in assessing environmental performance is the efficient use of materials, which involves incorporating eco-friendly components and minimizing resource consumption (Klassen and Whybark 1999; Tung et al. 2014). It involves ongoing, proactive management practices that focus on conserving natural resources while improving business efficiency, going beyond simple compliance with environmental regulations (Shaumya and Arulrajah 2017). The banking sector is widely recognized as one of the highly regulated economic domains, characterized by standardized services offered by a relatively limited number of market players. This underscores the critical imperative for banks to

adopt a customer-oriented approach (Alrubaiee 2012; Liu and Wu 2007; Tulcanaza-Prieto et al. 2020). Evaluating environmental performance in the banking industry includes initiatives like cutting back on paper use, lowering carbon emissions, and educating employees about energy efficiency and environmental preservation (Zhang et al. 2022). Environmental performance is not simply protecting the environment within an organizational culture; instead, it includes the proactive and continuous management of activities aimed at specific and long-term goals of conserving natural resources while enhancing business productivity (Shaumya and Arulrajah 2017).

In response to growing environmental concerns worldwide, many companies have adopted eco-friendly practices, with green innovation becoming a crucial strategy to improve their environmental performance. Green innovation involves enhancing products and procedures to make them more environmentally friendly, achieved through measures such as choosing eco-friendly materials and employing eco-design concepts (Albort-Morant et al. 2016). Exploration-based green innovation aims to develop entirely new methods and technologies to have a positive impact on the environment while promoting sustainability (Hart 1995; Hart and Dowell 2011). Companies that exhibit green innovativeness often achieve significant growth and outperform competitors by meeting customer demands effectively while enhancing intangible values and assets (Albort-Morant et al. 2018; Allameh 2018; Del Giudice et al. 2018). Green innovation is closely correlated with a company's environmental management strategies and serves as a catalyst for enhancing environmental performance, making it a strategic approach for fostering sustainable advancement across industries (Adegbile et al. 2016; Kammerer 2009; Chen et al. 2006). Additionally, green innovation has become a strategic tool for promoting the sustainable development of industries, leading to significant improvements in environmental conditions (Chang 2011). Research indicates that green innovation is essential for promoting sustainability and driving environmentally responsible practices within organizations, especially in the financial sector (Srouji et al. 2023).

Incorporating green innovation into business operations not only promotes environmental sustainability but also strengthens competitiveness. Companies that implement green innovation successfully can adapt to shifting customer preferences while reducing their environmental footprint. Green innovation serves as a strategic driver, helping organizations innovate and respond to changing market conditions while

supporting environmental conservation. By cultivating a culture centred on both sustainability and innovation, businesses can improve their environmental performance, secure a competitive advantage, and make a meaningful contribution to environmental well-being (Chang 2011). In conclusion, green innovation offers a forward-thinking solution to environmental challenges, providing businesses with opportunities to pursue sustainable growth while reducing their ecological impact.

#### GREEN FINANCE AND ENVIRONMENTAL PERFORMANCE

Green finance has emerged as a strategic approach for banks to enhance their environmental performance by allocating capital to initiatives that promote sustainable management of natural resources and encourage energy-efficient technologies. This involves financing projects such as renewable energy developments, green buildings, and clean transportation systems, all aimed at mitigating climate change impacts. Recent studies have underscored the substantial and positive influence of banks' green financing on their environmental performance (Gulzar et al. 2024). For instance, research indicates that green banking practices, including green financing, significantly contribute to the environmental performance of banks. Furthermore, the implementation of green banking practices, encompassing employee-related, operational, and customer-related initiatives, has been found to positively impact banks' environmental performance (Sohail et al. 2023). These findings suggest that banks' commitment to green finance not only supports environmental sustainability but also enhances their own environmental performance metrics.

Several studies have explored the relationship between green finance and environmental performance in the banking sector across different regions. Research by Zhang et al. (2022) found that green finance initiatives, such as investment in renewable energy and eco-friendly infrastructure, significantly improve banks' environmental performance by reducing carbon footprints and promoting sustainable economic activities. Similarly, Dai et al. (2022) highlighted that those banks incorporating green finance practices, such as financing clean energy projects and issuing green bonds, tend to report better environmental outcomes due to stricter environmental risk assessments and sustainability-oriented financial products. In the context of developing economies, Hussain et al. (2024) analysed the role of green finance in South Asian banking institutions and found a strong correlation between green financing and improved environmental performance, emphasizing the need for reg-

ulatory policies to encourage sustainable banking practices. Moreover, Taneja and Özen (2023) conducted an empirical study on Indian banks, revealing that while some financial institutions have adopted green finance mechanisms, the sector still faces challenges in fully integrating sustainability considerations into lending and investment decisions. These studies collectively indicate that green finance plays a crucial role in enhancing environmental performance, yet further research is needed to understand its impact in diverse banking contexts, particularly in emerging economies like India.

## Hypotheses Development

### CSR PRACTICES AND ENVIRONMENTAL PERFORMANCE

Corporate Social Responsibility, as defined by Mocan et al. (2015), encompasses strategies adopted by business organizations to operate in an ethically and socially responsible manner, with a focus on community well-being. Moreover, companies investing in CSR initiatives are more likely to achieve cost reductions, improved quality, flexibility, delivery, and long-term sustainability (Famiyeh 2017). In light of increasing environmental awareness, it becomes imperative to examine the relationship between the implementation of CSR initiatives and environmental performance (Suganthi 2020). Similarly, research on business firms in Pakistan indicated a positive impact of CSR on sustainable performance (Abbas et al. 2019), while Anser et al. (2020) observed significant positive effects of CSR commitments on both social and environmental performance. Based on the literature review, certain studies show the relationship between CSR and financial performance, yet other studies are needed to investigate the link between CSR and environmental performance. Therefore, the following hypothesis is proposed:

- H1 CSR practices have a significant positive impact on environmental performance.*

### ECONOMIC DIMENSION OF GREEN FINANCE AND ENVIRONMENTAL PERFORMANCE

According to the International Finance Corporation reports, green finance is defined as the ‘financing of investments that yield environmental gains’, playing a crucial role in promoting investment in eco-friendly projects at the corporate level (Falcone and Sica 2019). Green finance

encompasses three aspects – economic, environmental, and social, often referred to as the triple bottom line (Arulrajah and Senthilnathan 2020). Previous research has characterized green finance as advancing the economic, social, and environmental aspects of financial services, significantly impacting the growth of green economy and businesses (Zhou et al. 2020). Additionally, Guang-Wen and Siddik (2022) found that the economic, social, and environmental aspects of green finance have a positive impact on the environmental performance of financial institutions in Bangladesh. Therefore, we have proposed the following hypothesis:

*H2 The economic dimension of green finance has a significant positive impact on environmental performance.*

#### **SOCIAL DIMENSION OF GREEN FINANCE AND ENVIRONMENTAL PERFORMANCE**

The social aspect of green finance entails banks financing various green projects to enhance their reputation, build trust, satisfy customers, and provide additional benefits to employees (Zheng et al. 2021b). A study conducted in China concluded that green finance significantly influences corporate social responsibility, thereby contributing to sustainable performance (Olateju and Olateju 2023). Similarly, Zheng et al. (2021a) found a favourable relationship between the social aspect of green finance and the sustainable performance of financial institutions in Bangladesh. Moreover, Guang-Wen and Siddik (2022) found that the social dimension of green finance significantly influences the environmental performance of banks. Therefore, we have proposed the following hypothesis:

*H3 The social dimension of green finance has a significant positive impact on environmental performance.*

#### **ENVIRONMENTAL DIMENSION OF GREEN FINANCE AND ENVIRONMENTAL PERFORMANCE**

To promote long-term sustainability, the environmental aspect of green finance focuses on reducing greenhouse gas emissions from financial activities, evaluating environmental impacts faced by clients, and reducing energy consumption (Zheng et al. 2021b). Guang-Wen and Siddik (2022), Zheng et al. (2021a) and Raihan (2019) also found a positive re-

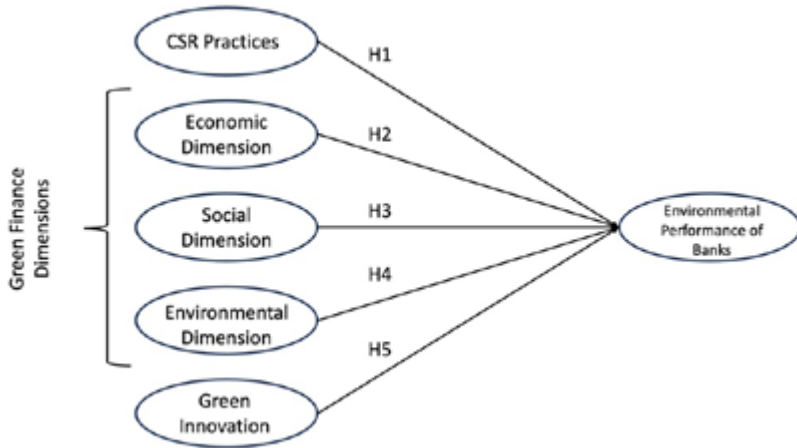


FIGURE 1 Conceptual Framework

relationship between the environmental aspect of green finance and the environmental performance of financial institutions. Existing research indicates that an increase in green finance and financial innovation leads to a decrease in CO<sub>2</sub> and greenhouse gas emissions, thereby enhancing environmental performance (Hoang and Tuan 2023). Therefore, we have proposed the following hypothesis:

- H4 The environmental dimension of green finance has a significant positive impact on environmental performance.*

#### GREEN INNOVATION AND ENVIRONMENTAL PERFORMANCE

Green innovation encompasses technological advancements aimed at reducing waste, water and air pollution, energy consumption, and addressing other environmental concerns. Li et al. (2020) emphasize that global warming poses a significant threat that requires collective action worldwide. Green innovation focuses on minimizing waste, mitigating pollution, and implementing environmental management systems (Song and Yu 2018). A study conducted in a manufacturing firm in Malaysia reported a significant impact of green innovation on environmental performance (Kraus et al. 2020). Similarly, Chiou et al. (2011) found that green innovation significantly affects environmental performance. However, the relationship between green innovation and environmental performance warrants further research (Kraus et al. 2020). Furthermore, the

relationship between green innovation and environmental performance is still under-researched. Therefore, the following hypothesis is proposed:

*H5 Green Innovation has a significant positive impact on environmental performance.*

### **Research Methodology**

A structured questionnaire was designed to collect primary data, focusing on analysing the CSR practices, green finance dimensions, green innovation, and environmental performance of public and private sector banks. The experts from banks and researchers who are actively conducting research on CSR and green finance initiatives in the banking sector helped to prepare a comprehensive questionnaire. The questionnaire comprised 22 items graded on a 5-point Likert scale (see table 1).

The survey was conducted using a structured questionnaire distributed to employees of public and private sector banks actively engaged in CSR activities and green initiatives. Purposive sampling was employed, targeting employees from four public and four private banks based on their involvement in CSR and green finance projects (see table 2). Data collection occurred both online (329 questionnaires) and offline (50 questionnaires). Offline data were gathered through personal visits to bank branches in Delhi NCR regions, including Delhi, Aligarh, Ghaziabad, and Noida. Around 50 bank branches were visited during offline data collection, made directly from employees of these public and private sector banks. As per the objective of this study, only those employees who were working at the manager level or higher position at these bank branches were contacted. Generally, management level employees are responsible for making decisions on CSR activities, thus the most suitable persons to respond to the questionnaire must be from the managerial level or higher within the banks. Online questionnaires were emailed to the nearly 100 Human Resources departments (HRs) of these banks in major cities such as Mumbai, Chennai, Kolkata, and Bangalore, requesting them to fill out the questionnaire in Google Forms and ask other employees to respond to the questionnaire. Nearly 340 responses were received back on the Google form, out of which 329 were found fit for analysis, as 11 responses were not properly filled out and were therefore discarded from final data analysis. A total of 379 samples – 50 from offline and 329 from online sources – were collected for final data analysis and interpretation of results.

TABLE 1 Items of the Study

Construct	Items
<b>CSR Practices (CSR)</b> (Currás-Pérez et al. 2018; Kraus et al. 2020)	CSR1 – Our bank is creating a balance between work and family life for employees CSR2 – Our bank ensures work safety CSR3 – Our bank is working on charitable and social projects CSR4 – Our bank is establishing renewable energy sources CSR5 – Our bank is implementing activities that promote environmental responsibility
<b>Economic Dimension of Green Finance (ECOD)</b> (Guang-Wen and Siddik 2022)	ECOD1 – Our bank focuses on reducing overall risk ECOD2 – Our bank focuses on increasing revenues and saving operating costs ECOD3 – Our bank focuses on generating more economic benefit ECOD4 – Our bank focuses on creating more competitive advantage
<b>Social Dimension of Green Finance (SOCD)</b> (Guang-Wen and Siddik 2022)	SOC1 – Our bank provides employee benefits, such as health and safety SOC2 – Our bank is enhancing brand awareness, trust and image of the institution SOC3 – Our bank is engaging local community in development programmes'
<b>Environmental Dimension of Green Finance (ENV D)</b> (Dai et al. 2022)	ENV1 – Our bank is investing more in renewable energy sectors ENV2 – Our bank is investing more in energy efficiency sectors ENV3 – Our bank is investing more in green sector development
<b>Green Innovation (GI)</b> (Kraus et al. 2020; Khan et al. 2019)	GI1 – Our bank is using green technology GI2 – Our bank is practicing green banking activities GI3 – Our bank is offering customer services online
<b>Environmental Performance of Banks (EPB)</b> (Wang et al. 2021; Guang-Wen and Siddik 2022)	EPB1 – Our bank is lowering the carbon footprint from banking activities EPB2 – Our bank is reducing energy consumption from banking activities EPB3 – Our bank is enhancing banks' adherence to environmental regulations EPB4 – Our bank is promoting environmentally friendly technologies

IBM SPSS version 23.0 and AMOS version 26.0 were utilized for data analysis, employing Structural Equation Modelling (SEM) to assess relationships among variables. A two-step analysis approach was adopted, first evaluating the measurement model's fit and then testing proposed hypotheses within the structural model. Descriptive statistics and confirmatory factor analysis were conducted prior to the SEM analysis to ensure robustness. This methodological approach aimed to comprehen-

**TABLE 2** Banks' CSR Spending 2023

Bank Name	CSR Spending 2023
State Bank of India (SBI)	Rs. 3167.6 million
Punjab National Bank (PNB)	Rs. 113.9 million
Union Bank of India (UBI)	Rs. 164.2 million
Bank of Baroda (BOB)	Rs. 135.0 million
HDFC Bank	Rs. 8208.9 million
Axis Bank	Rs. 2019.2 million
ICICI Bank	Rs. 4630.0 million
Kotak Mahindra Bank	Rs. 1879.5 million

**TABLE 3** Demographic Profile of Respondents

Gender	Male	237	62.5%
	Female	142	37.5%
Age	Less than 30	112	29.5%
	31-40	157	41.4%
	41-50	80	21.1%
	50 and above	30	8.0%
Education	Bachelor's Degree	186	49.0%
	Master's Degree	108	28.5%
	Doctoral Degree	42	11.1%
	Other	43	11.4%
Work Experiences	5 years or less	120	31.6%
	6-10 years	157	41.4%
	10 years or longer	102	27.0%
Job posts	Bank Manager	135	35.6%
	Credit Analyst	111	29.2%
	Investment Banker	79	20.8%
	Others	54	14.4%
Bank Branch	Offline survey via branch visits: Delhi NCR regions (i.e. Delhi, Aligarh, Ghaziabad, and Noida). Online survey via Google Form (bank branches from Mumbai, Chennai, Kolkata, and Bangalore)		

sively evaluate both the measurement and structural aspects of the research model.

The final sample comprised 379 valid responses from different branches of selected banks, after excluding incomplete questionnaires. This approach enabled a diverse representation of bank employees across different locations and positions within the organizations. Demographic details included gender, age, education, etc. (see table 3).

### Empirical Results

The study utilized confirmatory factor analysis (CFA) to assess the underlying factors (see table 4). All the items factor loadings of the CFA and SEM model are above the accepted limit, i.e.  $\geq 0.5$ . Descriptive statistics revealed mean scores of questionnaire items ranging from 3.24 to 4.13, indicating a consensus among respondents, while uniform standard deviation values suggested consistency among components. Additionally, skewness and kurtosis values indicated normality in the dataset, mitigating prediction issues due to data variance (see table 4). Common method bias (CMB) concerns were addressed via Herman's single-factor test, which revealed that the first factor accounted for 33.21% of the total variance, below the 50% threshold, thus affirming the absence of common method bias (Podsakoff et al. 2003). Overall, the study ensured data validity through rigorous exploratory factor analysis and effectively addressed potential biases, establishing a robust foundation for subsequent analyses.

In evaluating the measurement model, reliability analysis using Cronbach's alpha (CA) surpassing the threshold of 0.7 and composite reliability (CR) indicated values ranging from 0.85 to 0.92, affirming the scale's reliability (see table 6). Average variance extracted (AVE) values, crucial for assessing convergent validity, ranged from 0.66 to 0.76, exceeding the recommended 0.5 threshold. Construct discriminant validity was confirmed by comparing the square roots of AVE values with off-diagonal correlation coefficients (Fornell and Larcker 1981). First-order confirmatory factor analysis (CFA) yielded satisfactory fit indices for both measurement and structural models, meeting criteria such as CMIN/DF, GFI, CFI, AGFI, NFI, and RMSEA, as outlined in previous literature (Hair et al. 2011). Overall, the study confirmed the validity and reliability of the measurement model through robust analyses and fit indices, providing a solid foundation for further investigations (see table 5).

This study investigated the interplay between CSR practices, green finance dimensions, green innovation, and the environmental performance of banks in India. Regression analysis was employed to assess the proposed structural model, with the regression coefficients ( $\beta$ ) indicating the strength and direction of relationships at specific significance levels ( $\rho$  values) (see table 7). The findings revealed significant positive effects of CSR practices ( $H_1: \beta = 0.36$ , at  $\rho$  value 0.001), Economic Dimension (ECOD) ( $H_2: \beta = 0.56$ , at  $\rho$  value 0.001), Social Dimension (SOCD) ( $H_3: \beta = 0.48$ , at

TABLE 4 Descriptive Statistics and Factor Loadings

Variables	Items	Factor Loading $\geq 0.5$		Descriptive Statistics			
		CFA	SEM	Mean	Std. Div.	Skewness	Kurtosis
CSR Practices	CSR1	0.91	0.89	3.34	1.16	-0.30	-0.67
	CSR2	0.88	0.86	3.49	1.17	-0.68	-0.34
	CSR3	0.87	0.85	3.24	1.19	-0.30	-0.75
	CSR4	0.84	0.83	3.63	1.15	-0.75	-0.12
	CSR5	0.86	0.87	3.57	1.18	-0.64	-0.36
Economic Dimension	ECOD1	0.83	0.82	3.48	1.09	-0.60	-0.16
	ECOD2	0.84	0.81	3.78	1.13	-0.87	0.14
	ECOD3	0.90	0.88	3.80	1.11	-0.88	0.21
	ECOD4	0.86	0.84	3.93	1.12	-1.08	0.60
Social Dimension	S OCD1	0.83	0.81	3.61	1.12	-0.61	-0.26
	S OCD2	0.87	0.83	3.74	1.06	-0.81	0.22
	S OCD3	0.82	0.79	3.66	1.02	-0.78	0.46
Environmental Dimension	ENVD1	0.88	0.88	3.73	1.10	-0.98	0.45
	ENVD2	0.84	0.81	3.82	1.10	-1.08	0.68
	ENVD3	0.87	0.84	3.63	1.12	-0.84	0.12
Green Innovation	GI1	0.93	0.90	4.13	1.08	-1.33	1.24
	GI2	0.89	0.85	4.06	1.11	-1.17	0.70
	GI3	0.81	0.78	3.73	1.16	-0.63	-0.50
Environmental Performance of Banks	EPB1	0.74	0.71	3.61	1.06	-0.63	-0.04
	EPB2	0.79	0.77	3.60	1.19	-0.56	-0.64
	EPB3	0.82	0.80	3.61	1.11	-0.56	-0.39
	EPB4	0.81	0.79	3.49	1.17	-0.48	-0.53

NOTES CFA= Confirmatory Factor Analysis; SEM= Structural Equation Modelling.

TABLE 5 Model Fit Indices for Both Measurement & Structural Model

Model Fit Indices	Measurement Model Values	Structural Model Values	Threshold Limit	Reference
CMIN/DF	1.53	1.87		
CFI	0.95	0.91		
GFI	0.97	0.94		
AGFI	0.83	0.80		(Hair et al. 2011)
NFI	0.97	0.92		
RMSEA	0.04	0.05		

NOTES CMIN/DF – Chi-square Minimum/Degree of Freedom; CFI – Comparative Fit Index; GFI – Goodness of Fit Index; AGFI – Adjusted Goodness of Fit Index; NFI – Normed Fit Index; RMSEA – Root mean square error of approximation.

TABLE 6 Convergent and Discriminant Validity

Items	CA	CR	AVE	GI	CSR	ECOD	SOC D	ENVD	EPB
GI	0.94	0.85	0.66	0.81					
CSR	0.86	0.92	0.70	0.34	0.84				
ECOD	0.81	0.89	0.67	0.21	0.28	0.82			
SOC D	0.89	0.85	0.66	0.16	0.20	0.12	0.81		
ENVD	0.91	0.90	0.76	0.19	0.25	0.08	0.52	0.87	
EPB	0.78	0.89	0.68	0.59	0.58	0.39	0.35	0.38	0.82

NOTE CA – Cronbach's Alpha; CR – Composite Reliability; AVE – Average Variance Extracted; GI – Green Innovation; CSR – Corporate Social Responsibility; ECOD – Economic Dimension; socd – Social Dimension; ENVD – Environmental Dimension; EPB – Environmental Performance of Banks.

TABLE 7 Hypotheses Testing Summary

Hypotheses	Path direction	$\beta$	t-values	$\rho$	Remarks
H1	CSR → EPB	0.36	2.386	<0.001	Accepted
H2	ECOD → EPB	0.56	5.057	<0.001	Accepted
H3	SOC D → EPB	0.48	3.506	<0.05	Accepted
H4	ENVD → EPB	0.61	7.459	<0.05	Accepted
H5	GI → EPB	0.31	2.690	<0.001	Accepted

NOTES  $\beta$  represents standardised regression weight, and  $\rho$  represents the probability. GI – Green Innovation; CSR – Corporate Social Responsibility; ECOD – Economic Dimension; socd – Social Dimension; ENVD – Environmental Dimension; EPB – Environmental Performance of Banks.

$\rho$  value 0.05), Environmental Dimension (ENVD) ( $H_4$ ;  $\beta = 0.61$ , at  $\rho$  value 0.05), and Green Innovation (GI) ( $H_5$ ;  $\beta = 0.31$ , at  $\rho$  value 0.001) on the Environmental Performance of Banks (EPB). Additionally, the dimensions of CSR practices, green finance, and green innovation collectively explained 79% of the variance in environmental performance, denoted by an  $R^2$  value of 0.79, indicating a substantial impact (Kala Kamdjoug et al. 2021). Overall, the study underscores the significant influence of these constructs on the environmental performance of banks in India.

## Discussion

To evaluate the impact of CSR practices, green finance and green innovation, this study compares the results of previous studies with the findings shown in figure 2.

We framed H1 to explain whether CSR practices positively correlate with the environmental performance of banks. The study's results sup-

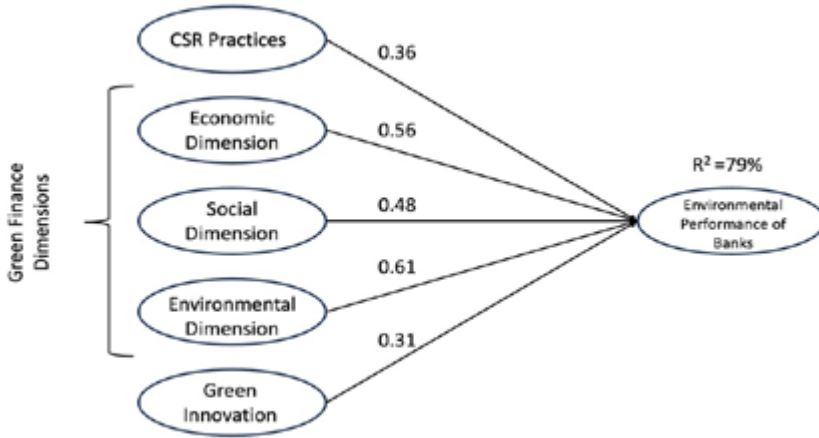


FIGURE 2 Structural Model

ported the hypothesis, aligning with previous studies of a similar nature (Guang-Wen and Siddik 2022; Ait-Sidhoum and Serra 2017; Bamgbade et al. 2018). The study's findings imply that increased societal expectations for sustainability, the commitment of banks towards sustainable activities, and regulatory frameworks promoting sustainability improve environmental performance, along with several other business benefits. Furthermore, the empirical findings align with the legitimacy theory, which posits that banking institutions spend on and employ CSR activities due to societal pressure and regulatory norms, compelling organizations to embrace CSR practices to promote environmental sustainability and social approval (Guang-Wen and Siddik 2022). In addition, this outcome also aligns with natural resource-based view theory, which proposes that organizations can attain lasting competitive advantage by addressing environmental concerns. This finding is corroborated by recent research indicating that CSR-driven sustainability policies lead to enhanced environmental and financial performance, creating competitive differentiation (Guang-Wen and Siddik 2022).

The study's findings support H<sub>2</sub>, confirming that the economic dimension of green finance positively correlates with the environmental performance of banks. The findings are in accordance with previous research (Cai and Song 2024; Guang-Wen and Siddik 2022). For example, a study on Indian banks found that green financing and environmental performance are positively related, with green initiatives significantly

impacting the environment (Kothiyal and Tripathi 2023). The economic aspect of green finance enables the allocation of capital toward sustainable projects, which contributes to lowering the carbon footprint of banks' investment portfolios and promotes cleaner, eco-friendly operations. This not only enhances environmental outcomes but also bolsters long-term organizational sustainability. Hence, green finance serves as a strategic economic tool, enabling banks to simultaneously achieve financial returns and environmental objectives by investing in resilient and sustainable business models.

We proposed H<sub>3</sub> to examine the link between the social dimension of green finance and the environmental performance of banks. The results confirm this hypothesis, indicating that the social aspect of green finance has a positive impact on environmental performance. This finding aligns with prior research in the field (Guang-Wen and Siddik 2022; Wang et al. 2022). This suggests that banks investing in socially responsible initiatives, such as improving access to green energy in underserved communities, not only tackle environmental challenges but also promote social inclusion and equity. As a result, the social aspect of green finance drives banks to move beyond basic regulatory compliance and take an active role in contributing to societal well-being. Recent studies further highlight that socially responsible investment practices strengthen stakeholder trust and enhance long-term sustainability.

The results supported H<sub>4</sub>, suggesting that the environmental dimension of green finance positively impacts the environmental performance of banks. This finding corroborates with previous studies (Guang-Wen and Siddik 2022, 2023). The findings suggest that the environmental dimension of green finance drives the adoption of green technologies and eco-friendly practices, fostering the development of innovative solutions within the banking sector and improving sustainable performance. This outcome is consistent with legitimacy theory, which asserts that companies seek to maintain legitimacy by aligning their principles, policies, and strategies with societal values. Additionally, the results support the natural resource-based view, which emphasizes that organizations address environmental challenges to gain a competitive advantage and improve performance. This theory highlights the importance of leveraging natural resources, such as sustainability and green innovation, to create economic value and stand out from competitors (Bals and Rosca 2022). As a result, banks that invest in environmentally sustainable initiatives can be seen as utilizing resources to enhance their competitive advantage.

The study's findings support H<sub>5</sub>, which suggests that green innovation positively correlates with the environmental performance of banks. The finding aligns with previous studies (Kraus et al. 2020; Lestari and Sunyoto 2023). The result suggests that banks, to enhance their sustainability efforts further, must promote the development and implementation of sustainable solutions, set standards and targets for the enhancement of environmental performance, invest and embrace energy-efficient technologies, and provide training and awareness to employees regarding the importance of sustainability in each aspect. Additionally, financial technology (FinTech) adoption has been found to significantly influence green finance, green innovation, and sustainability performance in banks, indicating the necessity of integrating digital transformation with sustainability efforts (Dai et al. 2022).

### **Conclusion**

Extensive research has been conducted globally to determine the association among CSR, green finance, green innovation, and firms' financial and sustainable performance (Nabil 2023; Saher, Zafar, and Siddique 2023; Ben Saad and Belkacem 2021). However, the existing literature regarding the association remains inconclusive and under-researched (Guang-Wen and Siddik 2023; Bahta et al. 2020; Kraus et al. 2020). As a result, the present study utilized SEM to determine the association between CSR practices, green finance dimensions (economic, social, and environment), green innovation, and environmental performance among Indian banks by proposing five hypotheses.

The hypotheses and the conceptual model were analysed based on the data collected from Indian banks. As per the outcomes of the study, it is revealed that the explanatory power of the conceptual model is strong when it comes to determining the influence of CSR, green finance dimensions, green innovation, and environmental performance of banks. The results of this study add to the body of existing research and support the evidence suggesting that CSR, green finance, and green innovation exert an influence on organizations' environmental performance. Additionally, this study offers significant theoretical and practical implications for the banking sector to enhance their environmental performance. Lastly, this study has provided novel insights into how the integration of CSR, green finance, and green innovation could substantially influence the environmental performance of banks.

### THEORETICAL IMPLICATIONS

This study adds to the existing body of knowledge on environmental performance in Indian banks by introducing a conceptual framework that integrates legitimacy theory and the natural resource-based view (RBV). Drawing from RBV, which emphasizes sustainable practices, resource conservation, and pollution control as means to achieve competitive advantage, the study offers insights into how CSR practices, green innovation, and various dimensions of green finance contribute to enhanced environmental performance. It is one of the first studies to apply both legitimacy theory and RBV simultaneously to examine environmental performance in the Indian banking sector.

Additionally, the research investigates areas that have received limited attention in previous studies, including the influence of the economic dimension of green finance on CSR practices, the role of the environmental dimension of green finance in driving green innovation, and the mediating effects of CSR and green innovation on the relationship between green finance and environmental performance. The conceptual model developed in this study accounts for 79% of the variance in environmental performance, indicating strong predictive capability.

The findings highlight that integrating CSR initiatives, green finance, and green innovation is not merely a response to regulatory requirements but a strategic approach to achieving sustainable competitive advantage. The study also encourages future research to explore how these variables interact in different economic and regulatory settings to enhance the applicability and relevance of the results across various contexts.

### PRACTICAL IMPLICATIONS

Financial institutions can improve their environmental performance by implementing and promoting green finance initiatives that support eco-friendly projects. At the same time, integrating green innovation into banking operations, technologies, services, and strategies can further strengthen sustainability efforts. The study emphasizes the partial mediating role of CSR practices and green innovation in the relationship between green finance and environmental performance. This finding suggests that supporting a range of environmentally sustainable projects can enhance both internal and external environmental performance in the banking sector, aligning with the country's Sustainable Development Goals.

The study provides practical insights for stakeholders working to advance environmental sustainability in the financial sector. Bank managers and policymakers can use these findings to reinforce CSR commitments, promote green initiatives, incorporate sustainability criteria, and raise awareness about the importance of CSR activities. Additionally, developing systems for regular monitoring and reporting on CSR practices can further support environmental sustainability initiatives within the industry. Furthermore, central banks and governments could incentivize socially responsible approaches and activities, thereby contributing to the country's long-term development goals. Banking institutions can enhance training programmes to equip employees with skills related to sustainability practices and green technologies. Additionally, partnerships with international organizations can help banks access innovative green funding sources and implement globally recognized sustainability standards.

#### LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Despite the contributions of this study, several limitations have been identified, which provide avenues for future research. One key limitation is the use of a survey approach, which poses challenges in terms of generalizability and applicability to a broader population. Moreover, this study focuses exclusively on the banking sector to assess the impact of CSR practices, green finance dimensions, and green innovation on environmental performance. Consequently, the statistical findings are specific to banks in India. Future research is encouraged to explore these relationships in other industries, such as transportation, healthcare, tourism, and other sectors, using diverse and more extensive samples.

Additionally, the study's environmental performance measurement could be expanded in future research by incorporating other factors, such as Green Human Resource Management practices, environmental management strategies, and broader aspects of social responsibility. The study was also limited by the response rate, with only 379 responses from bank employees available for analysis, partly due to restricted access. Future researchers with established networks within the banking sector may be able to secure a larger sample size, potentially leading to different outcomes.

Finally, the study employed a cross-sectional research design, which may limit the reliability and robustness of the findings. Future studies are

recommended to adopt a longitudinal research design to provide deeper insights and improve the reliability of the results over time.

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