



Elevating green CSR through green banking: the mediating role of green financing activities

Md. Abu Issa Gazi ^{a,*}, Abdullah Al Masud ^{b,*}, Shahria bin Kabir ^c, Naznin Sultana Chaity ^c,
Md. Kazi Hafizur Rahman ^d

^a School of Management, Jiujiang University, Jiujiang, 332005, PR China

^b Department of Management Studies, University of Barisal, Barisal, 8254, Bangladesh

^c School of Business, Ahsanullah University of Science and Technology, Dhaka, Bangladesh

^d Department of Business Administration, University of Global Village (UGV), Barisal, 8200, Bangladesh

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ABSTRACT

This study aims to investigate how green banking (GB) practices influence green finance activities (GFA) and green corporate social responsibility (GCSR) within private commercial banks in China, with a particular focus on the mediating role of GFA. By surveying 302 bank employees through snowball sampling and employing structural equation modelling (SEM), it explores the relationships among daily operations (BDOP), customer interaction practices (BPRCI), employee practices (BPPE), policy-related practices (BPRP), GFA, and GCSR (GCSR). The findings reveal that BDOP, BPRCI, and BPRP significantly impact GFA and GCSR, while employee practices do not. GFA has a substantial impact on GCSR and serves as a mediator in the connections between other practices and GCSR. This study provides novel insights into the connections between these practices and their collective influence on GCSR. It emphasizes the essential yet often overlooked role of green financing activities as a mediator, providing practical suggestions for advancing green financing and aligning banking operations with sustainability objectives, ultimately promoting a more environmentally conscious banking industry.

1. Introduction

Sustainable business practices, including green initiatives and CSR efforts, serve as essential strategies for addressing global warming and climate change [1]. Sustainable banking, also known as "green banking," is critical for reducing environmental damage and supporting long-term economic stability [2]. The international focus on sustainability has intensified, with initiatives like GB aimed at reducing ecological harm and promoting eco-friendly projects to protect the planet. In recent decades, GB has gained prominence, focusing on internal environmental practices while promoting sustainability among clients.

Banks in China are pivotal in advancing the nation's economic sustainability by backing environmentally friendly initiatives and tackling the challenges of climate change [3–5]. China's heightened vulnerability to climate change and global warming is reflected in its increasing emphasis on tackling these issues [6]. GB, focusing on environmental sustainability in operations and client activities, has gained traction in recent decades [1,7]. Luo et al. [3] highlight that Chinese bank play a

crucial role in economic sustainability by funding eco-friendly projects to combat climate change, a pressing concern for the country due to its high vulnerability [8].

The effective execution of China's Green Credit Policy has been crucial in encouraging Chinese banks to become more environmentally conscious and proactive in managing environmental risks [9,10]. It was expected that commercial banks in China would comply with these regulations, thereby supporting sustainable development through GCSR, GB practices, and green financing [3]. Chinese banks have taken a leading role in promoting green bonds and green credits in line with government directives. As of the end of 2018, the total green credit extended by Chinese banks and financial institutions reached RMB 8.23 trillion, indicating a 16 % increase compared to the prior year [11]. This research adopts an integrated theoretical framework that combines stakeholder theory [12,13] and the resource-based view (RBV) [14].

This combined theoretical framework allows for a comprehensive understanding of how Chinese banks engage with their stakeholders while leveraging internal resources to drive green finance initiatives

* Corresponding authors.

E-mail addresses: maigazi@yahoo.com (Md.A.I. Gazi), aamasud@bu.ac.bd (A.A. Masud).

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[15]. The environmental aspect centers on generating financial returns through environmentally friendly investments, the social component aims to balance financial objectives with social outcomes, and the sustainability perspective encompasses benefits across financial, social, and environmental dimensions [4,16]. In China, existing studies primarily concentrate on sustainable banking practices, the impact of GB activities on stakeholders, and the factors influencing green credit and performance [3,6]. Chinese financial institutions typically demonstrate positive attitudes toward environmental conservation, stewardship, and sustainability [3,17].

This study seeks to investigate the interplay between BDOP, BPRCI, BPRI and BPRP within private commercial banks in China. It examines their influence on GFA, GCSR, and sustainability, with a particular focus on the mediating role of GFA. Although some research exists on GB practices, the specific connections between BDOP, BPRCI, BPRI and BPRP, and their impact on GFA and GCSR in the context of China's private commercial banks remain underexplored. Key research questions include: RQ1: How do BDOP, BPRCI, BPRI and BPRP, affect GFA and GCSR? RQ2: What is the role of GFA in mediating these effects, particularly in the context of China? RQ3: How do customer-oriented services, policies, and GFA contribute to overall GCSR?

This research is expected to provide valuable insights into the evolving field of GB. It aims to contribute theoretically by offering a comprehensive framework linking employees' green practices, operations, customer interactions, and policies to sustainability outcomes through GFA and GCSR, emphasizing GFA's mediating role and addressing gaps in GB and CSR literature. Practically, it seeks to guide policymakers and practitioners in fostering sustainable banking by identifying key drivers, such as employee practices and customer engagement, and aligning banking operations with environmental and social responsibility objectives to achieve broader sustainability goals.

The paper will first review the literature and trace the development of relevant theories. It will then detail the research methodology used, followed by a presentation and discussion of the findings. The paper will conclude with a summary of key discoveries and recommendations for future research.

2. Literature review and hypothesis development

2.1. Green banking and green banking practices in China

Green banking (GB) focuses on modifying internal banking procedures to reduce the environmental footprint of their financial activities [18,19]. This approach involves evaluating environmental risks associated with projects before approving financing and actively supporting green initiatives [20]. The concept of GB was first introduced in 1980 by the Dutch financial institution "Triodos Bank" [21,22]. Its adoption has significantly influenced climate change mitigation, the functioning of financial markets, and the promotion of sustainable development [23]. In 1990, Triodos Bank also established a "Green Fund" to finance environmental projects, serving as a model for other banks [21,24]. Green banks are institutions that prioritize environmental sustainability, social responsibility, and ethical principles in their banking practices. They use green technologies to cut emissions, boost CSR, and drive sustainability in and out of operations [25]. Moreover, GB enables financial institutions to align with environmental principles and attract environmentally conscious customers [26–28]. Consequently, green banks play a crucial role in promoting sustainable business practices and mitigating the negative environmental impacts of banking activities through CSR investments. GB has emerged as a significant trend in the financial sector, particularly in China [29]. Initial studies highlight the emergence of GB in China as part of broader environmental policies. The shift towards GB gained momentum with the introduction of the "Green Credit Guidelines" by the China Banking Regulatory Commission (CBRC) in 2012 [30]. This was a landmark policy aiming to direct financial resources towards environmentally friendly projects and to mitigate

environmental risks in lending practices [30,31]. The government's initiatives in environmental protection, social responsibility, and corporate governance (ESG) aim to redirect funds from high-pollution and overcapacity industries to energy-efficient and eco-friendly businesses [32]. This shift is intended to enhance resource allocation efficiency and support high-quality economic growth. Banks, as the largest fund providers in the financial system, play a crucial role through their green credit offerings [3].

More recent literature emphasizes the strengthening of regulatory frameworks and guidelines. For example, the CBIRC's updated regulations and the development of the Green Bond Endorsed Project Catalogue have been pivotal in defining and standardizing green finance practices [33]. These policies have encouraged banks to adopt more rigorous environmental risk assessment practices. The People's Bank of China (PBOC), China's central bank, plays a crucial role in promoting green finance. The PBOC has implemented several measures to support GB, including integrating green finance principles into monetary policy and financial regulation [8]. For example, the PBOC has introduced the "Green Financial Guidelines" and established a green financial system to align financial institutions with environmental sustainability goals [29]. These guidelines encourage banks to incorporate environmental considerations into their lending and investment decisions.

Research indicates that green credit has become a major tool for promoting environmental sustainability in China [3,17,34]. Banks have integrated environmental risk assessments into their credit evaluation processes, and Preferential lending rates are offered to green projects. The effectiveness of these measures in fostering green investments has been discussed extensively.

2.2. Hypotheses development

2.2.1. Practices of green banking activities by employees

Bank employees' GB practices involve sustainable actions and behaviours that promote environmental responsibility within a banking institution [35]. These practices encompass promoting sustainable initiatives such as renewable energy development, enhancing energy efficiency, and conserving the environment [32,33]. Employees involved in GB show dedication to environmental responsibility [35,36] and help create financial products designed to support environmental projects, referred to as green finance [37,38]. By advocating for green financial products, employees can influence clients to make environmentally conscious choices, thereby enhancing the demand for green finance solutions [35,39]. Similarly, employees who understand and advocate for GB can better educate and encourage clients to choose green financial products, thus increasing the demand for green finance solutions. Additionally, employees equipped with knowledge and skills related to sustainability are better positioned to design and implement innovative green finance products. For example, energy-efficient loans or renewable energy project financing require specific expertise that stems from sustainable practices.

H1. BPRI activities have a positive influence on GFA.

According to empirical findings, employees actively participating in GB can influence how the bank engages with stakeholders on sustainability issues, enhancing transparency and accountability in CSR reporting and activities. These activities foster a culture of sustainability within the bank, which can improve its reputation and commitment to CSR, leading to more impactful CSR initiatives. GCSR signifies a bank's dedication to responsible operations with positive environmental and societal contributions [33], including efforts to reduce its environmental footprint and support sustainability causes [40]. When employees actively engage in GB, it strengthens the bank's GCSR efforts, promotes sustainability in the banking sector, and encourages eco-conscious practices. Moreover, According to Stakeholder Theory, employees are crucial internal stakeholders whose actions significantly influence how organizations meet their CSR obligations, particularly in environmental

domains. Their engagement and practices directly affect the bank's ability to address the expectations of external stakeholders, such as customers, regulators, and the broader community [22]. Consequently, the following hypotheses are suggested:

H2. BPRE activities have a positive impact on GCSR.

2.2.2. Green banking practices in daily operations

The integration of GB practices into daily operations is closely associated with GFA, which encompasses financial products and services aimed at promoting environmental sustainability [41]. To begin with, the adoption of sustainable daily operational practices—such as digital banking, paperless transactions, and virtual customer service—significantly reduces the ecological footprint of banking operations. These initiatives not only contribute to environmental conservation but also serve as effective tools for increasing customer awareness and engagement with green financial products. As customers become more familiar with eco-conscious practices, their likelihood of participating in green finance offerings also increases. Furthermore, banks that embed green practices in their operational framework tend to enhance their internal capabilities, particularly in terms of resource efficiency and environmental risk assessment [42]. For example, efforts toward energy efficiency, water conservation, and waste reduction contribute to more sustainable resource management. Moreover, operational sustainability—through energy efficiency and waste reduction—improves resource management and environmental risk assessment, strengthening the bank's credibility in green finance [42,43]. These practices also improve cost efficiency, enabling greater investment in eco-friendly projects, while supporting the bank's green CSR and sustainability objectives [33].

H3. BDOP services have a positive influence on GFA.

Integrating green practices into daily banking operations reflects a bank's ethical commitment to environmental and social well-being. Through the use of sustainable approaches banks lessen their environmental impact while fulfilling their duty to protect resources for future generations [42]. (). This shift toward sustainability helps banks attract environmentally conscious customers and businesses, thereby influencing their core functions and reputation [44,45]. As daily operations are repetitive and widespread, incorporating green practices at this level leads to a larger cumulative impact on Green CSR outcomes. For example, implementing energy-efficient technologies across all branches significantly amplifies the bank's environmental contributions [32]. According to RBV Theory, a bank's daily operational services aligned with sustainability practices become valuable strategic assets. These efficient and sustainable practices enhance the bank's capabilities, such as risk management, cost savings, and reputation [15]. As a result, these assets enable the bank to excel in green financing activities and CSR initiatives by improving its ability to assess, manage, and support green projects effectively.

H4. BDOP services have a positive effect on GCSR.

2.2.3. Green banking services to customers

GB services include financial products like green investments, ethical banking options, and sustainable loans all designed to support environmental sustainability [46]. By offering these services, banks meet customer demand for eco-friendly financial solutions and foster a culture of environmental responsibility among their clients [41,47]. Customer-focused initiatives, such as workshops, digital campaigns, or face-to-face consultations, highlight the economic and environmental advantages of green finance. These efforts drive demand for eco-friendly financial products and services [48]. This growing demand drives banks to innovate and expand their green financing initiatives, enhancing their portfolio with specialized green loans and investment options [44,49].

H5. BPRCI significantly influence GFA.

Meaningful customer interactions are essential for advancing GCSR with a focus on ethical and social well-being. By providing green banking services, such as eco-friendly loans and sustainable investment options, banks empower customers to make responsible choices that benefit both society and the environment [25,39]. These interactions foster a shared commitment to protecting the planet and improving quality of life for current and future generations. Drawing on Stakeholder Theory, responding to the values and concerns of stakeholders—including customers, communities, and regulators—strengthens the bank's role as a socially responsible actor in society [50]. In meeting these expectations, banks help cultivate trust and solidarity, while supporting green financing initiatives that serve the common good. Through continuous engagement that encourages sustainable choices, banks not only enhance their environmental contributions but also demonstrate a genuine dedication to humanity's collective well-being, reinforcing their GCSR commitments.

H6. BPRCI has a positive impact on GCSR.

2.2.4. Green banking policy

A "Green Banking (GB) policy" represents a thorough framework that reflects a bank's dedication to incorporating sustainable and environmentally conscious practices into its operations. This policy generally outlines strategies for incorporating green initiatives, encouraging eco-friendly choices, and creating sustainable financial offerings within the bank's portfolio [51]. Additionally, it serves as a strategic guide for aligning the bank's activities with broader environmental goals, ensuring that its services and operations contribute to long-term ecological sustainability and support the transition towards a greener economy.

By following these guidelines, banks focus on backing environmentally sustainable initiatives, making green-focused lending choices, and offering green financial products [39,52]. When banks formalize green practices in their policies, such as implementing environmental governance structures or adopting sustainability guidelines, it signals a deep institutional commitment to GCSR. This policy-driven approach ensures that the bank consistently supports sustainability through its core activities and governance structures. The policy establishes the framework for green financing activities, such as issuing green bonds and offering sustainable loans, directly influencing the scope and effectiveness of these activities.

H7. BPRP has a positive effect on their GFA.

A strong GB policy not only guides internal efforts to reduce environmental impact—such as through sustainable lending and operational efficiency—but also supports broader social initiatives like community engagement and philanthropy [51,53]. The robust nature of the GB policy impacts the bank's success in achieving GCSR objectives and enhancing sustainability, reflecting a strong commitment to environmental responsibility [49,54]. Institutions with robust sustainability frameworks are better positioned to align their operations with global environmental standards and societal expectations [49,54]. According to Legitimacy Theory, aligning with prevailing social values enhances a bank's legitimacy, trustworthiness, and public image [55].

H8. BPRP has a positive impact on their GCSR.

2.2.5. Green financing activities as mediator

GCSR has gained increasing importance among both practitioners and researchers as environmental concerns become central to corporate accountability. As a specialized branch of CSR, GCSR focuses on integrating environmentally responsible practices into corporate strategies while also addressing ethical and social responsibilities [56–58]. Sustainability, in this context, refers to the long-term ability of organizations to operate without depleting natural resources or causing environmental harm. GCSR sustainability, therefore, represents a holistic approach in which corporate actions are intentionally aligned with environmental stewardship, highlighting the critical relationship

between green practices and sustainable development [59,60]. GFA directly supports these goals by funding renewable energy projects, offering green loans, and supporting environmentally responsible businesses. These financial mechanisms not only drive tangible environmental benefits but also serve as evidence of a bank's authentic commitment to sustainability and social responsibility [32].

Organizations are placing greater emphasis on eliminating practices that harm natural resources and future generations [57,61]. For banks, GCSR can help reduce business risks and operating costs, with a growing focus on developing green products [62]. A strong GCSR reputation mitigates risks and offers cost savings, making GCSR essential rather than optional. Effective GCSR practices contribute to corporate success and are supported by regulatory frameworks [61–63]. Green corporate sustainability performance involves managing environmental, social, and economic aspects through sustainable practices [64].

Studies have demonstrated the positive impact of GB initiatives on CSR and sustainability. For example, research by Rehman et al. [65] found a strong positive link between GB policies and practices and CSR in Pakistani banks. Similarly, Vidyakala [66] and Gazi et al. [61] showed that effective execution of green projects and practices enhances sustainability in Indian banks. Gazi et al. [26] highlighted the significant role of eco-conscious training and energy-efficient measures in improving the sustainability of Nepali banks. Jha & Bhome [19] found that GB approaches, including green financial products and policies, are crucial for achieving sustainable economic development. In their study, Gazi et al. [56] highlight the mediating role of GFA in the context of private commercial banks in Bangladesh (Fig. 1).

Overall, green financing activities mediate the relationship between banking practices and GCSR, turning environmental and social goals into actionable and measurable outcomes [39]. The hypotheses outlined below were developed based on the previous discussion.

H9. *GFA positively influences GCSR.*

H10. *GFA mediates the relationship between BPRE and the GCSR.*

H11. *GFA mediates the relationship between BDOP and the GCSR.*

H12. *GFA mediates the relationship between BPRCI and the GCSR.*

H13. *GFA mediates the relationship between BPRP and the GCSR.*

3. Methodology

3.1. Sample selection

The quantitative study collected empirical data through surveys conducted with employees of private commercial banks in China.

Participants were chosen through purposive and snowball sampling methods to ensure a representative inclusion. Purposive sampling targets employees who are directly involved in or knowledgeable about GB policies and practices, providing insights that are specific to the study's focus. By leveraging referrals from initial participants, snowball sampling facilitated access to a broader network within the sector. We distributed invitations to participate through email, Facebook Messenger, and WhatsApp from April 2023 to July 2023. We sent a total of 384 invitations to employees across various positions within private commercial banks. After filtering for outliers and inconsistencies, we used 302 completed responses to validate the conceptual model, ensuring the data was both relevant and reliable for examining the impact of GB policies on green financing activities and CSR.

3.2. Measurement instruments design

The structured questionnaire was created following an extensive literature review and pre-test analysis, and it included four sections: demographic information, GBGB practices, GFA, and GCSR. Measurement instruments were designed to assess various aspects, including the bank's green initiatives (BPRE), daily operational practices (BDOP), customer interactions (BPRCI), and GB policies (BPRP), based on existing literature [24,65,67–69]. Three statements for green financing activities (GFA) were derived from prior studies [24,64,67], and four statements for GCSR were created [57,64,66,68]. An initial 24 items were refined through exploratory factor analysis, resulting in the removal of three items with low factor loadings. The final questionnaire included 21 items (See Appendix) and used a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

3.3. Overview of analyses

For data analysis, we used two methodological tools: IBM SPSS (Version 25.0) for demographic analysis and descriptive statistics and SmartPLS (Version 4.0) for confirmatory factor analysis (CFA) and SEM. To test theoretical relationships in models with latent or unobserved variables (Raines-Eudy, 2009; [70]), SEM is a strong quantitative method that has been used. We employed the standard two-step procedure for mediation analysis of the measurement model, as outlined by Anderson and Gerbing [71].

4. Analysis and results

4.1. Sample profile

The demographic details of the participants are presented in Table 1. The demographic analysis of the study sample reveals that 63 % of respondents were male, and 37 % were female. The majority were aged

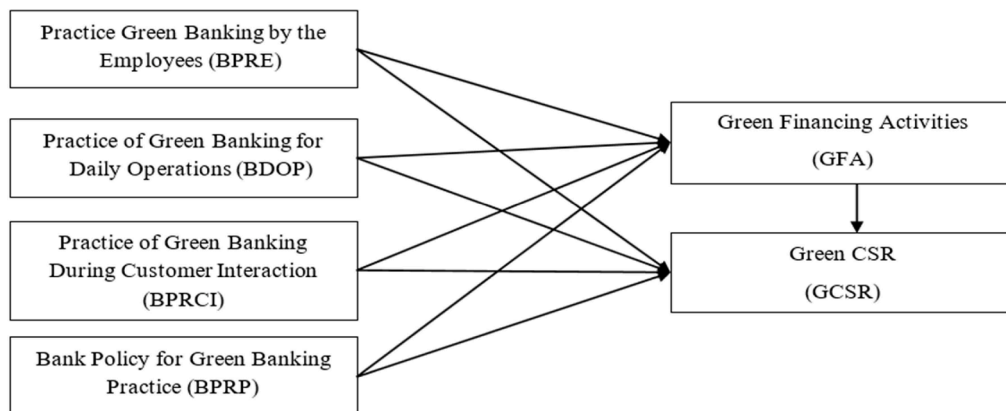


Fig. 1. Conceptual framework.

Table 1
Demographic characteristics.

Demographics	Items	Percent (%)
Gender	Female	37
	Male	63
Age	Below 25	2.4
	25 – 35	41.7
	36 – 45	37.8
	46 or above	18.1
	Diploma	10.7
Educational Qualification	Bachelor	39.7
	Master's	33.50
	Phd	6.6
	Professional Degree and Others	9.5
Experience (Year)	Below 1	1.80
	1 < 5	18.7
	5 < 10	21
	Above 10	58.5

25–35 years (41.7 %), with 37.8 % between 36–45 years, 18.1 % aged 46 or above, and only 2.4 % below 25 years. In terms of education, most respondents held a Bachelor's degree (39.7 %), followed by a Master's degree (33.5 %), with Diplomas at 10.7 %, PhDs at 6.6 %, and Professional Degrees or other qualifications at 9.5 %. Regarding work experience, 58.5 % had over 10 years, 21 % had 5–10 years, 18.7 % had 1–5 years, and 1.8 % had less than 1 year.

4.2. Measurement model analysis

We evaluated the quality of the constructs using factor loadings, reliability, and validity.

All items met the 0.7 factor loading threshold (Carmines & Zeller, 1979; [56]), ensuring reliability. Construct measurement was assessed using Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). Both CA and CR surpassed the 0.7 benchmark, while CA scores met Churchill Jr.'s (1979) recommended threshold of 0.6, indicating acceptable reliability. All constructs met Nunnally's (1978) 0.7 composite reliability criterion and showed valid measurement of latent variables. AVE values exceeded 0.5, confirming sufficient variance explanation [72]. Table 2 demonstrates convergent validity, with factor loadings exceeding 0.6 [73] and values ranged between 0.732 and 0.861. McDonald's omega (ω) also yielded reliable results [74], confirming robust internal consistency (Fig. 2).

Table 2
Convergent validity, reliability and factor loading.

Constructs	Items	Factor loading	CA	CR	AVE	ω
BPRES	BPRES1	0.843	0.861	0.871	0.715	0.845
	BPRES2	0.834				
	BPRES3	0.878				
	BPRES4	0.801				
BDOP	BDOP1	0.788	0.860	0.867	0.699	0.845
	BDOP2	0.844				
	BDOP3	0.841				
	BDOP4	0.826				
BPRCI	BPRCI1	0.771	0.784	0.810	0.710	0.812
	BPRCI2	0.882				
	BPRCI3	0.856				
	BPRCI4	0.816				
BPRP	BPRP1	0.816	0.834	0.826	0.761	0.843
	BPRP2	0.888				
	BPRP3	0.902				
	BPRP4	0.792				
GFA	GFA1	0.792	0.732	0.741	0.650	0.763
	GFA2	0.851				
	GFA3	0.793				
	GFA4	0.807				
GCSRS	GCSRS1	0.807	0.796	0.814	0.622	0.800
	GCSRS2	0.721				
	GCSRS3	0.776				
	GCSRS4	0.844				

4.3. Discriminant validity

The confirmation of discriminant validity occurs when the measurement model lacks redundant components [75]. To assess this, we compared the square root of the AVE with the correlation coefficients between constructs ([72,76]; Chin, 1998). Table 3 shows that the square root of the AVE values exceeded the inter-constructed squared correlations, ranging from 0.768 to 0.867.

4.4. Structural model analysis

The structural equation model method was used to examine the path relationships within the structural model, offering insights into the precision and significance of these connections [78]. The Variance Inflation Factor (VIF) scores for all relationships in both the outer and inner models were below 3.3, indicating no multicollinearity issues [79]. Significant paths were found from BDOP to GFA ($\beta = 0.333$, $p < 0.05$) and from GFA to GCSR ($\beta = 0.364$). Additionally, significant paths were observed from BPRCI to GFA ($\beta = 0.252$), GCI to GCSR ($\beta = 0.233$), BPRP to GFA ($\beta = 0.467$), BPRP to GCSR ($\beta = 0.292$), and GFA to GCSR ($\beta = 0.636$). These findings validate hypotheses H3, H4, H5, H6, H7, H8, and H9. In contrast, BPRES displayed positive path coefficients to GFA and GCSR but had no significant impact on GFA and GCSR ($\beta = 0.067$, $p > 0.05$; $\beta = 0.144$, $p > 0.05$), suggesting that H1 and H2 are not supported. The Q^2 metrics evaluated the predictive relevance of mediation and endogenous constructs, specifically focusing on GFA and CSR. Q^2 values of 0.02, 0.15, and 0.35 correspond to weak, moderate, and strong predictive relevance, respectively [80]. Table 5 shows that Q^2 values for GFA and GCSR were greater than zero, suggesting predictive relevance for these constructs [81]. Additionally, the R^2 values reinforce the predictive power of the model (Fig. 3).

For GFA, the R^2 value was 0.452, indicating moderate explanatory power. For GCSR, the R^2 value was 0.543, reflecting substantial predictive relevance (Chin, 1998).

4.7. Mediating effect

This study also examined the mediating role of GFA in the relationship between GB practices and GCSR. Table 6 presents the results obtained using the product of coefficients method to determine specific indirect impacts. Significant mediation effects via GFA were identified [82,83]. Table 6 shows that, with the exception of H10, the indirect effects for hypotheses H11, H12, and H13 were significant ($p < 0.05$). The indirect effect is supported by the data, as the confidence intervals for the indirect effects did not include zero [84]. Therefore, H11, H12, and H13 are confirmed to be valid.

5. Discussions

The primary purpose of this study is to investigate how GB practices influence GFA, GCSR, and sustainability within private commercial banks in China, with a particular focus on the mediating role of GFA. Our findings reveal several key insights into these relationships and their implications. The study revealed that Hypotheses 1 and 2 were not supported, indicating that the relationship between employee-related practices in GB and GCSR is insignificant. These findings align with the results of previous studies [66,68,69]. This may be due to insufficient GB training for employees, leading to limited effectiveness in implementing green practices. Additionally, low employee engagement or motivation, measurement issues, and inadequate implementation of green policies could further explain the lack of significant results. These factors suggest a need for improved training, engagement strategies, and measurement methods to better align employee practices with GCSR. Conversely, Hypotheses 3 and 4 demonstrate a direct relationship between BDOP, their involvement in GFA, and their commitment to GCSR. These findings align with research by Zheng et al. [67] and Rehman

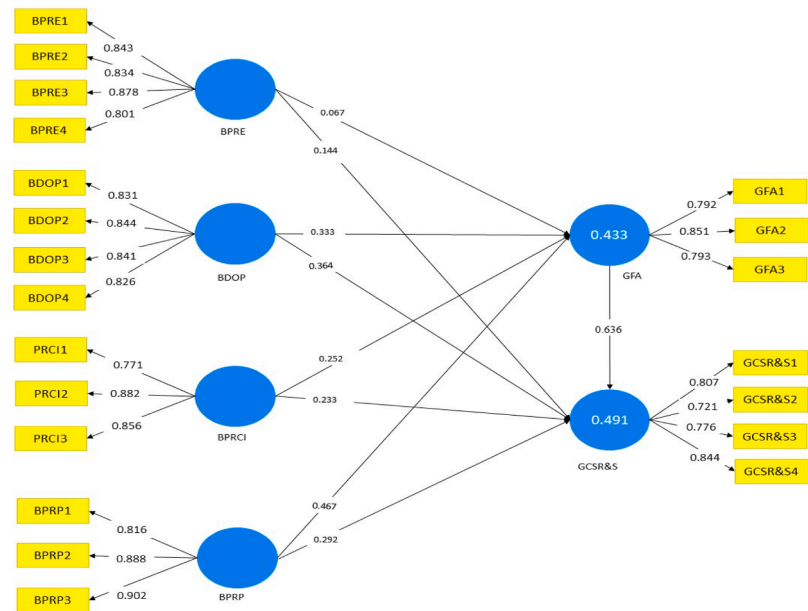


Fig. 2. Measurement model.

Table 3
Discriminant validity assessed using the Fornell–Larcker criterion.

	BPRP	BDOP	GCSR	GFA	BPRCI	BPRE
BPRP	0.867					
BDOP	0.744	0.845				
GCSR	0.526	0.512	0.768			
GFA	0.414	0.586	0.732	0.815		
BPRCI	0.624	0.637	0.273	0.313	0.844	
BPRE	0.619	0.617	0.423	0.442	0.588	0.845

To ensure the reliability of the findings, the study also calculated the HTMT value, which is considered superior to the Fornell–Larcker criterion in several respects [77]. Table 4 shows HTMT values below the acceptable threshold of 0.85 to 0.90, indicating no issues with discriminant validity [72,76,77]; Chin W, 1998).

Table 4
Heterotrait–Monotrait ratio (HTMT).

	BPRP	BDOP	GCSR	GFA	BPRCI	BPRE
BPRP						
BDOP	.872					
GCSR	.619	.622				
GFA	.790	.732	.889			
BPRCI	.759	.756	.317	.396		
BPRE	.723	.722	.478	.534	.68	

Table 5
Hypothesis testing.

Hypothesis	Std. Beta	t statistics	P values	Decision	VIF Q2
H1	0.067	1.046	0.296	Rejected	1.767
H2	0.144	1.489	0.135	Rejected	1.978
H3	0.333	3.140	**	Accepted	2.486
H4	0.364	2.938	**	Accepted	1.984
H5	0.252	2.489	**	Accepted	1.930
H6	0.233	2.168	**	Accepted	2.134
H7	0.467	4.521	***	Accepted	2.6040.407
H8	0.292	2.321	**	Accepted	2.312
H9	0.636	7.689	***	Accepted	1.8360.276

et al. [65], which shows that sustainable banking products, services, and reduced paper consumption positively impact green financing for green projects. The positive and significant relationships observed between BPRCI and GFA, as well as GCSR, validate Hypotheses 5, 6, and 9. These findings are consistent with the research of Zheng et al. [67], Risal et al. [68], Vidyakala [66], and Gazi et al. [56].

Hypotheses 7 and 8 show a significant relationship between BPRP and GFA, as well as a direct impact on GCSR and sustainability. This finding aligns with recent studies by Rehman et al. [65], which confirm the positive effect of banks’ policy-related practices on financing green projects. The study did not support the mediating role of green financing activities in the relationship between GB practices and GCSR. However, Hypotheses 11, 12, and 13 were supported, with findings that are also consistent with Gazi et al. [56], Vidyakala [66], Risal et al. [68], and Shaumya & Arulrajah [69].

6. Conclusion

This study aimed to explore the GB practices of private commercial banks, particularly about green financing initiatives for ecological projects, to achieve GCSR. Primary data for the research were collected from bank employees, and SEM was employed to test the proposed hypotheses. The findings revealed that BDOP, BPRCI, and BPRP significantly influence GFA, as well as GCSR. The study suggests that banks should implement innovative strategies to overcome existing challenges and provide a foundation for future research in this area.

6.1. Theoretical contribution

This research makes significant theoretical contributions by advancing the understanding of GB practices in private commercial banks in China and addressing key gaps in the literature. It develops a comprehensive framework and links them to GFA and GCSR. This multidimensional approach bridges existing gaps by illustrating how individual, operational, and policy-level factors collectively influence sustainability outcomes in the banking sector.

A key theoretical contribution is the exploration of GFA as a mediating factor. While green financing has been acknowledged in previous studies, its role as a conduit between internal banking practices and sustainability outcomes remains underexplored. This research highlights how GFA strengthens the relationship between green practices

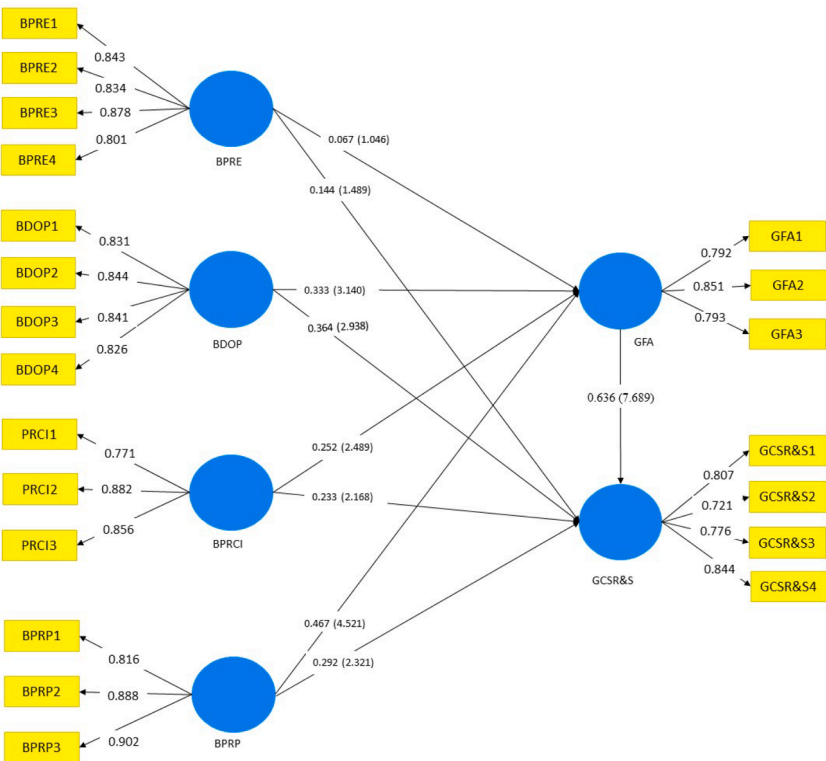


Fig. 3. Structural equation model.

Table 6
Mediation effect.

Hypothesis	Effects	Std. Beta	Standard deviation	P values	Confidence interval	Decision
H10	BP → GFA → GCSR	0.060	0.060	0.320	[−0.056, 0.275]	Rejected
H11	BD → GFA → GCSR	0.218	0.0692	0.003	[0.081, 0.360]	Accepted
H12	BPR → GFA → GCSR	0.163	0.071	0.028	[0.321, 0.040]	Accepted
H13	BPRP → GFA → GCSR	0.314	0.082	0.000	[0.177, 0.490]	Accepted

and sustainability, providing new insights into its mediating effects in sustainable banking. Furthermore, it extends the GCSR literature by emphasizing the interconnectedness of GB practices, financial activities, and CSR, thereby enriching the understanding of CSR through the lens of environmental sustainability.

By focusing on private commercial banks in China, the study contributes to the broader literature on GB within the context of emerging markets. The unique economic, regulatory, and cultural dynamics of China offer valuable insights into the relationship between GB practices and sustainability, providing a context-specific perspective often absent in global research. Additionally, the research brings a customer-oriented dimension to the theory of sustainable banking, highlighting how customer interactions and services contribute to sustainability and GCSR. This customer-centric approach offers a novel theoretical lens through which GB practices can be understood.

Finally, the study advances the theoretical understanding of the role of GB policies, shedding light on the policy mechanisms that enhance the effectiveness of green practices. By aligning operational and policy-level initiatives with sustainability goals, this research adds a policy-oriented dimension to the theoretical discourse on sustainable banking. Collectively, these contributions provide a robust foundation for future research on the interplay between GB practices, financial sustainability, and environmental responsibility.

6.2. Practical implications

These insights can assist policymakers and industry leaders in promoting practices of sustainable banking, contributing to a banking sector that is more environmentally and socially responsible. The findings suggest that banks should promote green finance to boost economic growth and sustainability. It coincides with SDGs 7, 8, 9, 11, and 13 of the UN Sustainable Development Goals (SDGs). This study recommends various sustainable banking practices. First, BP, green financing, and CSR are not well-connected in private commercial banks. Employee green finance training has to be expanded. Private commercial banks and policymakers should focus seminars, training sessions, and symposiums on GB, green finance, GCSR, and sustainability to close this gap. Second, BDOP greatly impacts green financing and GCSR. Bank management should prioritize GB activities, including minimizing plastic and paper consumption, adopting sustainable banking services, and improving digital banking. GB, green financing, and GCSR goals also depend on BPRCI. Banks should perform customer research to improve product and service understanding and personnel productivity. To meet the different needs of its stakeholders and sustain the economy, the banking industry must identify and address areas for improvement.

6.3. Limitations and future research guidelines

The study has several limitations, including the use of a sample of

302 bank employees from China, which may not represent the broader population or other regions, and the reliance on cross-sectional data that captures only a snapshot in time. Additionally, self-reported data may introduce response biases, and the focus on specific variables may overlook other influential factors such as regulatory pressures and technological advancements. Future research should address these limitations by employing a more diverse sample, conducting longitudinal studies, and exploring additional variables. Specifically, incorporating factors such as technological advancements in GB and conducting comparative and qualitative studies could provide deeper insights into these practices. Assessing the tangible outcomes of GFA on organizational performance and stakeholder satisfaction would further enrich the understanding of sustainable banking practices.

Ethical statement

This study involving human subjects did not require ethical assessment or approval from an ethics committee, as it complied with local laws and institutional regulations.

Informed consent

In line with national laws and institutional standards, written informed consent was not required from participants. No coercion was applied to obtain responses, and participation was entirely voluntary.

Appendix: Measurement constructs

Variables	Items
BPPE	BPPE1: Offering of environmental training and education BPPE2: System for evaluating performance in a sustainable manner BPPE3: Environmentally-friendly incentive programs BPPE4: Provides volunteer opportunities for employees to engage in environmental conservation initiatives.
BDOP	BDOP1: Implementation of energy-efficient equipment, such as automated teller machines (ATMs) and online banking services. BDOP2: Reduction in use of paper BDOP3: Offering environmentally sustainable banking services
BPRCI	BDOP4: Purchases its supplies, tools, and other things from companies that care about the environment. BPRCI1: Utilizes ecologically conscious banking techniques such as e-mail, intranet, e-statements, and an online approval system. BPRCI2: Evaluation of the environmental risks that clients face BPRCI3: Loans for projects that are beneficial for the environment
BPRP	BPRP1: Engages in the establishment of sustainable branches (energy-efficient buildings/green buildings). BPRP2: Enactment of an environmentally friendly policy BPRP3: Facilitation of eco-friendly collaboration between suppliers and investors
GFA	GFA1: Facilitation of eco-friendly collaboration between suppliers and investors GFA2: An increase in the amount allocated to environmentally friendly projects GFA3: Allocates resources towards doing research and development to create cutting-edge environmentally friendly solutions.
GCSR	GCSR1: Minimization of energy usage in banking activities GCSR2: Reducing carbon emissions from banking activities GCSR3: Executing initiatives that foster ecological accountability. GCSR4: Providing training to the personnel on environmental protection and energy conservation.

Data availability

Data will be made available on request.

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Before sharing the questionnaire on social media, participants were briefed on the study's purpose and its potential benefits. It was clarified that participants would not receive any monetary compensation for their involvement. An open forum was made available for participants to ask questions and learn more about the study, with the assurance that they could withdraw at any time.

CRediT authorship contribution statement

Md. Abu Issa Gazi: Writing – review & editing, Writing – original draft, Project administration, Funding acquisition, Conceptualization. **Abdullah Al Masud:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Shahria bin Kabir:** Writing – review & editing, Visualization, Validation, Software, Resources, Data curation. **Naznin Sultana Chaity:** Writing – review & editing, Visualization, Validation, Resources, Methodology, Investigation, Data curation. **Md. Kazi Hafizur Rahman:** Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

Authors are declaring there is no Conflict of Interest

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