
| RESEARCH ARTICLE

Impact of Green Banking Practices on Sustainable Bank Performance: A Study on Private Commercial Banks in Bangladesh

Lubna Jaman¹ and Md. Amdadul Hoque²

¹*Department of Finance and Banking, Comilla University, Cumilla, Bangladesh*

²*Associate Professor, Department of Finance and Banking, Comilla University, Bangladesh*

Corresponding Author: Lubna Jaman, **Email:** lubnajaman01@gmail.com

| ABSTRACT

The main objective of this research is to ascertain the impact of green banking practices on sustainable bank performance of private commercial banks in Bangladesh. This explanatory research was conducted in Bangladesh using a survey-based design. Data were collected from 300 employees of private commercial banks through online platforms. A structured questionnaire measured green banking practices and sustainable bank performance. Data were analyzed using Structural Equation Modelling (SEM) with reliability and validity tests. The results show that all five green banking strategies positively and significantly impact the sustainable bank performance. Green Investment shows the most important component among these practices, followed by Green Lending, Green Innovation, Green Processes and Procedures, and Green or Sustainable Products or Services. This study advances understanding of green banking's role in sustainability, offering empirical evidence for researchers, while guiding banks and policymakers to prioritize green investments, lending, innovation, processes, and products to enhance environmental performance and efficiency.

| KEYWORDS

Green Banking Practices, Sustainable Bank Performance, Private Commercial Banks, Bangladesh.

| ARTICLE INFORMATION

ACCEPTED: 15 October 2024

PUBLISHED: 02 November 2025

DOI: 10.32996/jbms.2025.7.7.3

1. Introduction

The 21st century has experienced swift industrialization and economic advancement propelled by globalization and technical innovations. Although these transformations have expedited growth, they have concurrently exacerbated environmental degradation, global warming, and climate change threats (Rahman et al., 2023). Sustainability has become a critical issue across all businesses, including finance. Banks, as principal financial intermediaries, are essential in directing investments and funding sustainable initiatives. Green banking, which incorporates environmental and social factors into banking practices, has become significant as a strategy to diminish carbon footprints, fund sustainable activities, and foster long-term sustainability (Bahl, 2012; Choubey & Sharma, 2022). Globally, green banking has developed into a strategic instrument for augmenting corporate accountability, strengthening sustainability performance, and advancing sustainable development goals (SDGs). By financing renewable energy initiatives, endorsing energy-efficient technologies, and implementing sustainable practices, banks can markedly diminish their environmental footprint while concurrently enhancing financial performance (Butt et al., 2025; Elias & Ogunraku, 2024). In industrialized nations, green banking practices (GBP) have been extensively examined and acknowledged for their

capacity to improve environmental, social, and economic outcomes (Kumar & Singh, 2023). Nonetheless, the efficacy and execution of green banking in underdeveloped economies remain inadequately examined.

In Bangladesh, a nation particularly susceptible to climate change and environmental hazards, the implementation of green banking is notably important. The Bangladesh Bank, as the central authority, has instructed commercial banks to adopt green banking policies to finance ecologically sustainable projects, mitigate pollution, and align banking operations with national sustainable development objectives (Shakil et al., 2014). In addition, the Bangladesh Bank has been instrumental in advancing green banking through the implementation of several policies and regulatory measures. This encompasses the dissemination of environmental circulars and the establishment of refinancing mechanisms to incentivise banks to fund renewable energy initiatives (Khairunnessa et al., 2021). Notwithstanding these regulatory initiatives, research indicates that the implementation of green banking practices in Bangladesh remains nascent, with numerous banks encountering difficulties in incorporating these practices into their fundamental operations (Khairunnessa et al., 2021; Lalon, 2015). This prompts essential enquiries concerning the influence of GBP on sustainable banking performance about financial, social, and environmental results.

Existing studies indicate that green activities, including green financing, green investments, eco-friendly operations, and sustainable products and services, bolster banks' competitiveness, boost corporate reputation, and reduce environmental hazards (Zhao et al., 2022; Mir et al., 2022). However, the majority of these studies have been undertaken in industrialised or growing economies, such as India and China, resulting in a research deficiency in developing contexts like Bangladesh. The local banking sector functions within distinct socio-economic and regulatory contexts, which may affect the conversion of GBP into sustainability performance. For example, although green innovation is demonstrated to improve efficiency and environmental results in developed economies (Suki et al., 2023), its adoption in Bangladesh encounters obstacles including substantial initial costs, inadequate technological infrastructure, and insufficient stakeholder awareness (Sharif et al., 2022). In light of this discrepancy, it is imperative to investigate the impact of GBP on the sustainability performance of Bangladeshi banks. This study concentrates on private commercial banks, a significant section of the financial system, which are progressively anticipated to conform to international sustainability criteria. This research examines five critical dimensions of Green Banking Practices (GBP)—Green Innovation (GIN), Green Investment (GI), Green Lending (GL), Green Processes and Procedures (GPP), and Green Products and Services (GPS)—to furnish empirical evidence regarding their impact on economic, social, and environmental sustainability performance in Bangladesh.

2. Review of Literature and Hypotheses Development

Green banking has become an essential instrument for advancing sustainability by incorporating environmental and social accountability into financial operations. It encompasses funding sustainable initiatives, advancing green technologies, and reducing the carbon footprint of banks (Choubey & Sharma, 2022). Research in India indicates that green banking practices promote competitiveness and innovation while also improving company reputation and facilitating access to green capital (Butt et al., 2025; Kumar & Singh, 2023). Comparable findings indicate that banks implementing GBP can alleviate climate-related risks, decrease expenses, and enhance consumer trust (Jain & Sharma, 2023). Internationally, green banking is associated with funding environmental initiatives and deterring ecologically detrimental activities (Rahman et al., 2023). In developed economies, GBP is integrated into conventional banking practices, enhancing environmental sustainability and long-term competitiveness (Zhixia et al., 2018). Research reveals that whereas wealthy nations have made considerable progress, countries like India and Nepal are hindered by inconsistent adoption and increasing environmental footprints (Shaumya & Arulrajah, 2016; Rai et al., 2019).

In Bangladesh, green banking has received policy focus, with the Bangladesh Bank requiring its incorporation into financial institutions (Shakil et al., 2014). Researchers assert that GBP is essential for aligning banking with the nation's sustainable development objectives (Khairunnessa et al., 2021), improving environmental performance, and bolstering financial results (Mir et al., 2022; Zhao et al., 2022). Notwithstanding regulatory frameworks, the execution is incomplete, indicating deficiencies in technology preparedness, institutional dedication, and awareness (Lalon, 2015).

While substantial literature from India, China, and other economies illustrates favourable correlations between green innovation, lending, investment, and sustainability outcomes (Suki et al., 2023; Elias & Ogunraku, 2024), research about Bangladesh is still scarce. The influence of five principal green strategies—Green Innovation (GIN), Green Investment (GI), Green Lending (GL), Green Products and Services (GPS), and Green Processes and Procedures (GPP)—on sustainable bank performance (SBP) in Bangladesh remains inadequately examined. This gap underscores the necessity for empirical research within Bangladesh's own socio-economic and regulatory context to assess the impact of GBP on sustainable banking performance.

Green Innovation and Sustainable Bank Performance

Green innovation is acknowledged as a crucial catalyst for sustainability, enhancing environmental, economic, and social performance across several industries (Suki et al., 2023; Tang et al., 2023). It improves energy efficiency, lowers operational

expenses, and alleviates ecological damage by promoting the use of sustainable technology (Sharif et al., 2022). Empirical evidence demonstrates that green innovation capacity markedly enhances financial performance and environmental outcomes (Wang & Juo, 2021), while concurrently aligning with global sustainability objectives, such as SDG 9, through energy conservation and emissions reduction (Adebayo & Kirikkaleli, 2021). Furthermore, research indicates that integrating green innovation into corporate identity enhances environmental legitimacy and organisational resilience, thereby fostering long-term competitiveness (Soewarno et al., 2019; Farooq et al., 2024).

Notwithstanding its established advantages, obstacles such as substantial initial expenditures, inadequate policy backing, and absence of standardized measurements persistently hinder green innovation, especially in developing nations (Sharif et al., 2022; Kumar et al., 2024). In Bangladesh, characterized by financial and infrastructural constraints, the implementation of cost-effective and policy-backed green innovations might significantly improve the sustainability performance of banks. In light of its capacity to enhance operational efficiency, foster environmentally sustainable banking practices, and conform to global sustainability standards, the following hypothesis is offered.

H₁: Green innovation has a significant positive relationship with the sustainable bank performance in Bangladesh.

Green Investment and Sustainable Bank Performance

Green investment is acknowledged as a crucial catalyst for sustainable development, with evidence from China and other emerging economies demonstrating its capacity to mitigate environmental degradation, foster renewable energy adoption, and improve long-term sustainability outcomes (Fan et al., 2022; Zahan et al., 2021). Research indicates that although green innovation aids in mitigating local pollution and promoting environmental advancements, obstacles such as restricted spillover effects and implementation inefficiencies remain (Ren et al., 2022). However, the amalgamation of GI with renewable energy technologies can markedly diminish carbon emissions, decrease reliance on fossil fuels, and enhance environmental conservation (Ahmed et al., 2022). Empirical research indicates that both green investments and corporate social responsibility (CSR) initiatives favourably influence organizations' financial performance and sustainability results (Indriastuti & Chariri, 2021). Furthermore, GI is closely associated with sustainable business results, since financial institutions are increasingly anticipated to fund environmental sustainability initiatives (Ye & Dela, 2023; Asyura et al., 2023). Evidence indicates that banks implementing green innovation alongside green innovation and corporate social responsibility (CSR) policies achieve competitive advantages and resilience in changing market environments (Le et al., 2022). In Bangladesh, the implementation of green investment is constrained by regulatory, budgetary, and infrastructural limitations. Consequently, this study proposes that

H₂: Green Investment has a significant positive relationship with the sustainable bank performance in Bangladesh.

Green Lending and Sustainable Bank Performance

Green lending has become an essential tool for promoting sustainable development, especially in developing and emerging nations. The global need for green financing has surged due to escalating environmental concerns and advancements in governance, with research indicating that green lending bolsters enterprises' ability to undertake eco-friendly practices and fosters sustainable growth (Pham & Vu, 2024). Empirical research demonstrates that green lending advantages both banks and borrowers by enhancing banks' financial performance through increased net interest margins and diminished default risks, especially among SMEs (Mirza et al., 2023). Furthermore, green lending enhances banks' contribution to sustainability goals by directing capital towards environmentally responsible enterprises.

In Bangladesh, green lending is strategically aligned with the country's sustainable development objectives and serves as an intermediary between green banking practices and the overall sustainability performance of banks (Zhang et al., 2022). Subsequent research indicates that green and blue loans improve credit profiles and profitability while reducing default risks, underscoring their significance in reconciling financial stability with environmental accountability (Mirza et al., 2024). Al-Qudah et al. (2023) similarly discovered that green lending rules positively impact credit risk management and financial sustainability in the UAE, highlighting their broader significance. Notwithstanding these shown advantages, adoption in Bangladesh is restricted, hindered by legal, institutional, and market obstacles. Consequently, analyzing the correlation between green lending and sustainability performance in Bangladeshi banks is necessary, resulting in the hypothesis that

H₃: Green Lending has a significant positive relationship with the sustainable bank performance in Bangladesh.

Green Process and Procedures and Sustainable Bank Performance

Green Processes and Procedures are increasingly acknowledged as vital catalysts for sustainability performance, as they integrate environmentally responsible practices into organisational operations, including procurement, waste management, eco-design, and sustainable supply chains (Zhu & Sarkis, 2004). Previous research indicates that GPP improves both environmental results and

financial and operational efficiency, as evidenced in Chinese manufacturing (Zhu & Geng, 2013) and logistics companies (Golalic & Smith, 2013). Empirical evidence indicates that green process innovations enhance financial performance by utilising social capital and addressing environmental needs (Xie et al., 2022). In contrast, Arulrajah et al. (2020) demonstrated that employee green behaviour mediates the positive relationship between green public procurement (GPP) and sustainability outcomes. Zheng et al. (2021) identified GPP, along with green lending and goods, as essential factors for sustainable performance in the banking industry of Bangladesh; nevertheless, its implementation is still constrained relative to other industries. The successful implementation of GPP necessitates leadership dedication, employee engagement, and investments in sustainable technologies (Sarkis, 2003; Hervani et al., 2005). In light of the escalating regulatory and stakeholder pressures in Bangladesh, the implementation of cost-effective green processes can augment banks' environmental accountability and operational efficiency, hence enhancing sustainability performance. Consequently, it is postulated that

H₄: *Green Process and Procedures have a significant positive relationship with the sustainable bank performance in Bangladesh.*

Green Products and Services and Sustainable Bank Performance

Green products and services are increasingly acknowledged as essential components of sustainability, boosting organizational competitiveness and environmental responsibility. According to Chiang et al. (2024) and García-Salirrosas et al. (2022), businesses can enhance their reputation, gain the trust of their customers, and increase their profitability by promoting eco-friendly products, services, and marketing strategies, including eco-labels, green branding, and quality assurance. According to studies on consumer behaviour, adoption of green offerings is strongly influenced by perceived value, trust, and satisfaction, which enhances customer loyalty and long-term sustainability (Román-Augusto et al., 2022; Chitra, 2015). Furthermore, earlier research has shown that green products and services reduce environmental impact by reducing waste and using resources efficiently. They also increase brand equity and involve stakeholders (Dangelico & Vocalelli, 2017; Ottman et al., 2006).

Research demonstrates that GPS programs enhance operational effectiveness, customer satisfaction, and ethical compliance, all of which have a positive correlation with sustainable performance in a variety of industries (Pujari, 2006; Peattie & Crane, 2005; Chen, Lai, & Wen, 2006). While GPS has proven beneficial to sectors around the world, there is still little and conflicting data about its impact on Bangladesh's banking sector, especially when it comes to improving sustainable performance (Mir et al., 2022). In light of the increasing focus on green finance in both regulations and society, incorporating GPS into banking operations could help Bangladeshi banks stand out from the competition, enhance sustainability results, and adhere to global environmental norms. Consequently, the hypothesis is that.

H₅: *Green Products and Services have a significant positive relationship with the sustainable bank performance in Bangladesh.*

2.1 Conceptual Framework

This research developed the conceptual framework depicted in **Figure 1** by reviewing relevant literature and creating hypotheses.

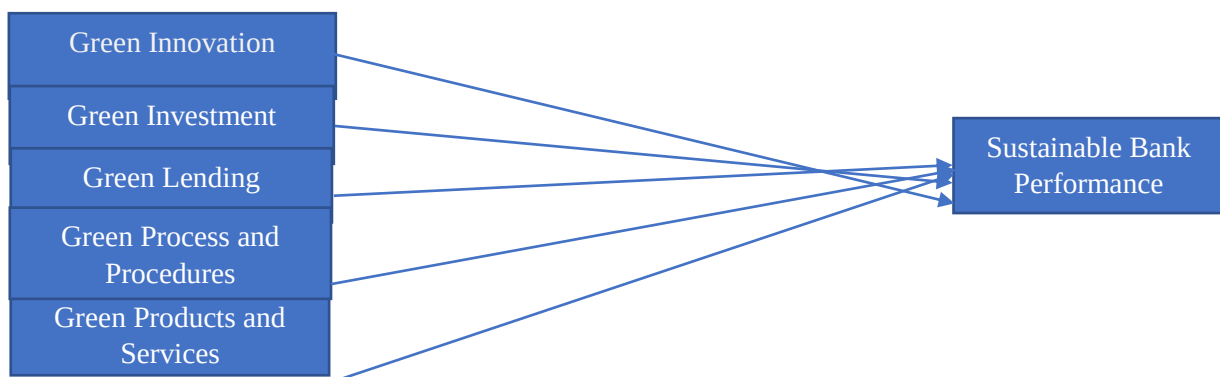


Fig.1 Conceptual Framework

3. Research Methodology

3.1 Research Design

The data for this explanatory research were collected from employees at private commercial banks in Bangladesh. Participation links were sent to bank personnel via email and social media platforms, including Facebook, Messenger, Telegram, and WhatsApp. From February to May 2025, 310 invitations were dispatched to individuals occupying diverse positions within the banking sector.

The conceptual model was validated using 300 completed replies, which were screened for inconsistencies and outliers. According to Lee (2011), the ideal number of samples for a Structural Equation Modelling (SEM) study should range from 150 to 400. Nunnally (1978) posited that a sample size of 100 to 150 is optimal for practical SEM analysis and significant statistical results. Compliance with these rules is enough for assessing the hypotheses in this study.

3.2 Survey Instrument Development

A review of the relevant literature identified scales that can be used to evaluate the variables (GIN, GI, GL, GPP, GPS, and SBP) pertinent to this investigation. The research utilized systematic surveys through a questionnaire modified from various earlier studies to gather the primary data necessary for evaluating the potential effects of Green Banking Practices on Sustainable Bank Performance. The questionnaire comprises two sections: the first section gathers demographic information from respondents, while the second section poses questions concerning the endogenous and exogenous factors investigated in this study. The measurement tools included Green Innovation (GNI) (Li et al., 2023), Green Investment (GI) (Indriastuti et al., 2021), Green Lending (GL) (Del Gaudio et al., 2022; Mirza et al., 2022; Belova et al., 2023), Green Products and Services (GPS) (Hariadi et al., 2023), and Green Process and Procedures (GPP) (Zheng et al., 2021). A total of 23 statements derived from exploratory factor analysis were included. Responses were rated using a five-point Likert scale, where 1 indicated "strongly disagree" and 5 represented "strongly agree."

4. Results and Analysis

Structural equation modelling (SEM) is a sophisticated statistical method for evaluating theoretical connections within structural models that include latent or unobserved variables (Tabachnick et al., 2013; Meyers et al., 2023; Anderson & Gerbing, 1988; Podsakoff et al., 2003; Gazi et al., 2024). Following the standard two-step process for mediation analysis, the researcher evaluated the measurement model as recommended. The research employed two methodological approaches. The demographic assessment and exploratory factor analysis (EFA) were conducted using IBM SPSS (Version 25.0). Concurrently, confirmatory factor analysis (CFA) and structural equation modelling (SEM) were performed with SmartPLS-Partial Least Squares (Version 3.0).

4.1 Profile of the Respondents

Table 1: The demographic profile of respondents

Variables	Particulars	Frequency	Percentage
Gender	Male	222	74
	Female	78	26
Age	Below 30 Years	54	18
	30-40 Years	87	29
	41-50 Years	90	30
	50-60 Years	51	17
	Above 60 years	18	6
Educational Qualifications	Bachelor Degree	39	13
	Master's Degree	51	17
	Bachelor Degree with other Professional degree	54	18
	Master's Degree with other Professional degree	96	32
	Others	60	20
Current Working Department	Loan and Advance	57	19
	Investment Division	36	12
	Credit Supervision	93	31
	Recovery	36	12
	Credit Risk Management	36	12
	Others	42	14
Banking/Industry Experiences	01-02 years	75	25
	03-05 years	69	23
	06-10 years	57	19
	11-15 years	39	13

	16-20 years	36	12
	Above 20 years	24	8

The demographic profile of the respondents provides valuable insights into the characteristics of employees working in private commercial banks in Bangladesh who participated in this study on the impact of green banking practices on sustainable bank performance. Out of the total 300 respondents, the majority were male (74%), while females accounted for 26%, indicating a male-dominated workforce in the banking sector. In terms of age distribution, a considerable portion of the respondents belonged to the middle-age group, with 30% aged between 41–50 years and 29% between 30–40 years, while only 6% were above 60 years, suggesting that most employees were in their productive working years. Regarding educational qualifications, the largest group (32%) held a master's degree combined with other professional qualifications, followed by 20% with other educational backgrounds, highlighting a relatively well-educated sample. In terms of job placement, credit supervision (31%) and loan and advance departments (19%) had the highest representation, while investment, recovery, and credit risk management divisions each accounted for 12%. Concerning professional experience, most respondents had early to mid-level exposure, with 25% having 1–2 years and 23% having 3–5 years of experience, while 20 years or more experience was limited to 8%. Overall, the sample reflects a balanced mix of gender, education, and professional experience relevant to the study.

4.2 Measurement Model Analysis

Before conducting the structural model analysis, the measurement model was evaluated to ascertain the validity and reliability of the constructs. The three main criteria examined were convergent validity, discriminant validity, and internal consistency reliability. Figure 3 illustrates this study's measuring model.

Table 2 depicts the outcomes of the measurement model, emphasizing the construct's validity and reliability. The study evaluated multiple parameters to verify the model's reliability and validity. A loading of 0.7 or above is generally considered a dependable threshold, indicating that latent variables explain a significant proportion of the variance in observable variables (Hair et al., 2019; Fornell & Larcker, 1981).

We estimated Cronbach's alpha (CA) and composite reliability (CR) values to assess the internal reliability of the constructs, with values over 0.60 considered satisfactory (Hair et al., 2012). An average variance extracted (AVE) over 0.50 is deemed appropriate for assessing composite dependability (Fornell & Larcker, 1981).

The empirical findings indicate that the individual factor loadings with the lowest and highest values are 0.434 and 0.843, respectively. As most outer loadings exceeded the recommended cutoff of 0.7, indicator reliability was confirmed. Despite having loadings below 0.7, several indicators—GL_3 (0.434), GL_4 (0.537), and GPS_4 (0.469)—were retained to ensure the constructs' content validity, given their theoretical importance and acceptable thresholds in exploratory research.

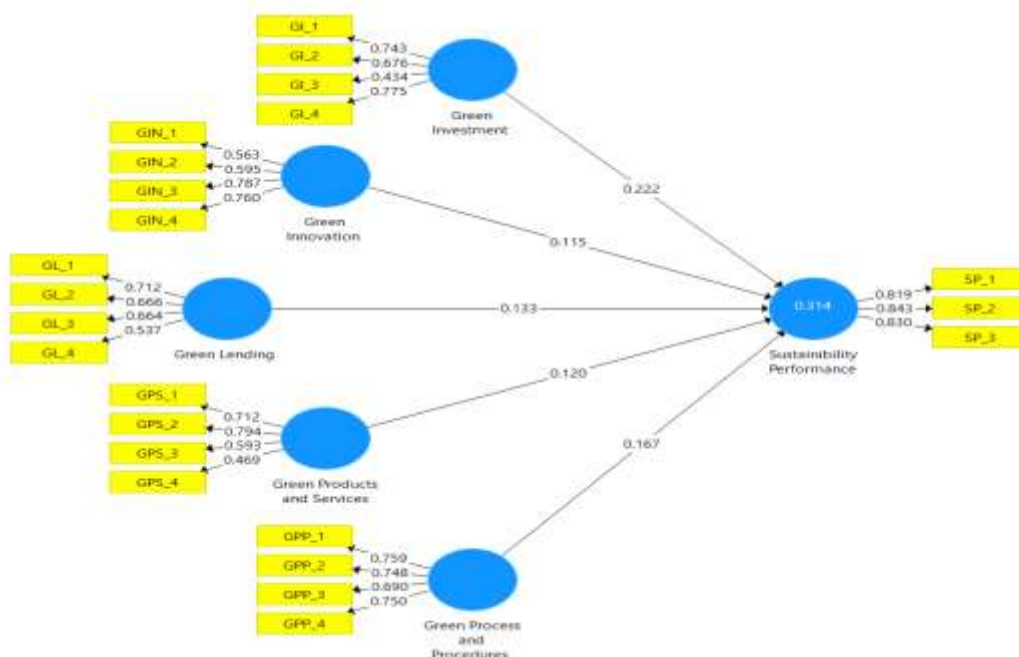


Fig.3 Measurement Model

Cronbach's Alpha (CA) was utilized to assess the internal consistency of the constructs. While a few constructs exhibited slightly lower CA values, most achieved CA values exceeding the recommended threshold of 0.7. Hair et al. (2019) noted that CA values ranging from 0.6 to 0.7 are acceptable in exploratory research or when creating new scales. Since this study is exploratory, the marginally lower CA values are considered adequate. Furthermore, all constructs displayed Composite Reliability (CR) values above 0.7, reinforcing the internal consistency reliability of the measurement model.

Table 2 Outcomes of the Measurement Model

Variables	Items	Factor loadings	CA	CR	AVE	R ²
Sustainable Bank Performance (SBP)	SBP_1	0.819	0.776	0.87	0.69	0.314
	SBP_2	0.843				
	SBP_3	0.830				
Green Innovation (GIN)	GIN_1	0.563	0.626	0.774	0.567	
	GIN_2	0.595				
	GIN_3	0.787				
	GIN_4	0.760				
Green Investment (GI)	GI_1	0.743	0.593	0.759	0.550	
	GI_2	0.676				
	GI_3	0.434				
	GI_4	0.775				
Green Lending (GL)	GL_1	0.712	0.536	0.741	0.520	
	GL_2	0.666				
	GL_3	0.664				
	GL_4	0.537				
Green Process and Procedures (GPP)	GPP_1	0.759	0.721	0.826	0.544	
	GPP_2	0.748				
	GPP_3	0.690				
	GPP_4	0.750				
Green Products and Services (GPS)	GPS_1	0.712	0.561	0.742	0.627	
	GPS_2	0.794				
	GPS_3	0.593				
	GPS_4	0.469				

CA, Cronbach's alpha; CR, composite reliability; AVE, average variance explained

Source: SmartPLS 3.0

Table 2 presents the outcomes of the measurement model used to assess the reliability and validity of the constructs in this study. For Sustainable Bank Performance (SBP), the factor loadings range from 0.819 to 0.843, with Cronbach's Alpha (CA) of 0.776, Composite Reliability (CR) of 0.87, and Average Variance Extracted (AVE) of 0.69, indicating strong internal consistency and convergent validity. Green Innovation (GIN) shows acceptable reliability (CA = 0.626, CR = 0.774, AVE = 0.567), though some items load moderately. Green Investment (GI) and Green Lending (GL) have lower CA values (0.593 and 0.536 respectively) and moderate factor loadings, but CR values above 0.70 suggest satisfactory construct reliability. Green Process and Procedures (GPP) demonstrates good reliability (CA = 0.721, CR = 0.826, AVE = 0.544). Green Products and Services (GPS) also shows acceptable reliability (CA = 0.561, CR = 0.742, AVE = 0.627). Overall, the measurement model supports reliability and convergent validity across constructs.

4.3 Discriminant Validity

To ascertain that each construct in the model is unequivocally distinct from the others, we assessed discriminant validity—the evaluation utilized two methods: the Heterotrait-Monotrait Ratio (HTMT) criterion and the Fornell-Larcker criterion.

Table 3 Discriminant validity

Variables	GNI	GI	GL	GPP	GPS	SBP
Fornell-Larcker Criterion						
GNI	0.683					
GI	0.398	0.671				
GL	0.325	0.427	0.648			
GPP	0.480	0.472	0.318	0.737		
GPS	0.463	0.456	0.425	0.469	0.654	
SBP	0.382	0.458	0.369	0.425	0.409	0.831
HTMT Criterion						
GNI						
GI	0.627					
GL	0.546	0.716				
GPP	0.706	0.709	0.513			
GPS	0.777	0.756	0.774	0.778		
SBP	0.519	0.638	0.569	0.565	0.578	

Source: SmartPLS 3.0

Table 3 presents the results of discriminant validity using the Fornell-Larcker criterion and the HTMT ratio. According to the Fornell-Larcker approach, the square root of AVE (diagonal values) should be higher than the correlations with other constructs. The results confirm this requirement for all constructs. For instance, Sustainable Bank Performance (SP) shows the highest square root of AVE (0.831), exceeding its correlations with Green Innovation (0.382), Green Investment (0.458), and other variables, ensuring discriminant validity. Similarly, Green Process and Procedures (0.737) and Green Products and Services (0.654) also demonstrate acceptable distinctions from other constructs.

The HTMT criterion values, which should be below 0.85 (conservative threshold) or 0.90 (liberal threshold), are also within acceptable ranges. For example, the HTMT between GI and GL is 0.716, and between GPP and GPS is 0.778, both below the threshold. Therefore, the results collectively confirm that the constructs are empirically distinct, supporting the model's discriminant validity.

4.4 Structural Modeling and Hypothesis Testing

The study employed Structural Equation Modeling (SEM) and path analysis to validate the proposed research hypotheses, following the measurement methodology described in the preceding section. The path linkages in the structural model were evaluated using the bootstrapping technique (Figure 4). This statistical assessment confirms the significance and robustness of the interrelationships among the constructs (Hair, Ringle, & Sarstedt, 2011). To test the hypotheses, the t-values and p-values were examined: a hypothesis is supported if the t-value exceeds 1.96 or the p-value falls below 0.05; otherwise, it is rejected.

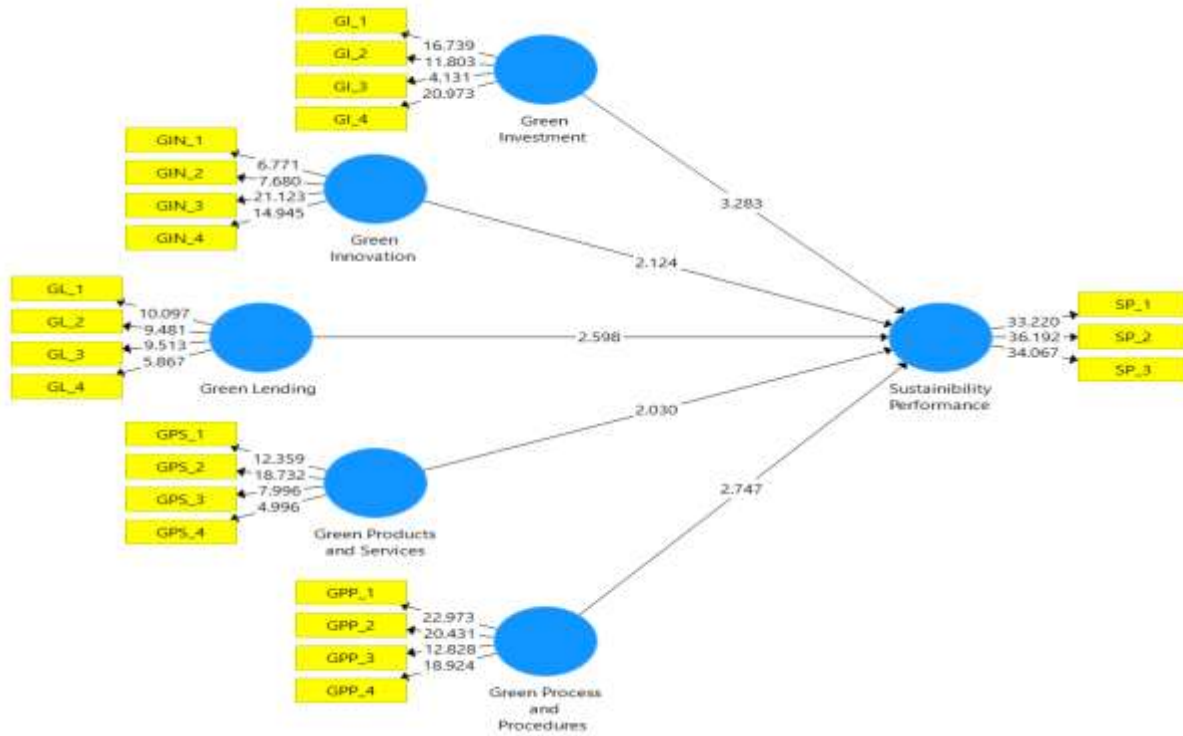


Fig.4 Structural Equation Model

The results in Figure 4 demonstrate that Green Investment (GI) exerts the strongest influence on Sustainability Performance (SP) (path coefficient = 3.283), underscoring its central role in promoting sustainability. Green Lending (GL) also shows a substantial effect on SP (path coefficient = 2.598), followed by Green Products and Services (GPS) (path coefficient = 2.030), which has a weaker yet meaningful impact. Green Innovation (GNI) contributes significantly to SP (path coefficient = 2.124), while Green Policies and Practices (GPP) exert a strong positive influence (path coefficient = 2.747).

As presented in Table 5 and Figure 4, all hypothesized paths are statistically significant and align with the proposed research model. Specifically, the path from Green Innovation (GNI) to Sustainable Bank Performance (SBP) ($\beta = 0.054$, t -value > 1.96, p -value < 0.05) is significant, reinforcing the critical role of green banking practices in enhancing banks' sustainability performance.

Likewise, the associations from Green Investments (GI) to SP ($\beta = 0.068$, t -value > 1.96, p -value < 0.05), Green Lending (GL) to SP ($\beta = 0.051$, t -value > 1.96, p -value < 0.05), Green Process and Procedures (GPP) to SP ($\beta = 0.061$, t -value > 1.96, p -value < 0.05), and Green Products and Services (GPS) to SP ($\beta = 0.059$, t -value > 1.96, p -value < 0.05) are statistically significant. This corroborates hypotheses H₁, H₂, H₃, H₄, and H₅, affirming a significant correlation. Thus, Green Banking Practices substantially impact Sustainable Bank Performance.

Table 5 Outputs of research hypotheses

Hypotheses	Path Coefficients	Original Sample (O)	Sample Mean (M)	Std. Beta	t-Statistics	P-Values	Results
H ₁	GIN→SBP	0.114	0.119	0.054	2.124	0.034	Accepted
H ₂	GI → SBP	0.222	0.220	0.068	3.283	0.001	Accepted
H ₃	GL→ SBP	0.132	0.137	0.051	2.598	0.009	Accepted
H ₄	GPP→SBP	0.167	0.165	0.061	2.747	0.006	Accepted
H ₅	GPS→SBP	0.120	0.126	0.059	2.030	0.042	Accepted

Source: SmartPLS 3.0

5. Findings and Discussion

This study examined the impact of green banking practices, specifically green innovation, green investment, green lending, green policies and procedures, and green products and services, on the sustainable performance of private commercial banks in

Bangladesh. The findings confirm that all presented hypotheses (H1–H5) were supported, exhibiting positive and statistically significant route coefficients. Green investment emerged as the predominant catalyst for sustainable performance, succeeded by GPP, GL, GIN, and GPS. These studies emphasise that banks' involvement in sustainable investments, operational procedures, lending practices, innovations, and product creation jointly improves their environmental and social performance. This corresponds with previous research indicating that green banking initiatives are crucial for enhancing efficiency, minimizing environmental damage, and bolstering long-term competitiveness (Rahman et al., 2023; Butt et al., 2025).

Green innovation greatly enhances sustainability outcomes by promoting eco-friendly technology and digital banking solutions that diminish carbon footprints and enhance regulatory compliance. This study, akin to the findings of Aftab et al. (2022), demonstrates that innovations like paperless banking and energy-efficient technologies reduce ecological impacts while simultaneously bolstering stakeholder trust and bank profitability. Green investment has shown a significant impact, corroborating previous findings by Indriastuti et al. (2021) that the allocation of financial resources to renewable energy, sustainable firms, or clean infrastructure positively enhances both financial and environmental performance. Green lending has also become a crucial factor in sustainability performance, corroborating Mirza et al. (2023), who emphasised the significance of ecologically responsible financing in promoting sustainability objectives. By directing loans to sustainable sectors and deterring high-carbon companies, banks enhance ecological goals while bolstering their market reputation.

Furthermore, the results validate the importance of green policies and practices in improving sustainability performance. Echoing Zheng et al. (2021), this study demonstrates that operational changes such as energy-efficient technologies, waste reduction, and digital documentation can substantially enhance sustainability outcomes in the banking sector. Finally, the adoption of green products and services was also found to positively impact sustainability, consistent with Hariadi et al. (2023), who emphasized that offering eco-loans, green bonds, or sustainability-linked accounts promotes responsible consumer behavior and meets rising demand for environmentally conscious financial solutions. By integrating these practices, Bangladeshi banks not only align with global sustainability trends but also contribute to the nation's sustainable development agenda. Overall, the findings expand the existing literature by offering evidence from a developing country context, where regulatory frameworks and financial resources differ significantly from those of developed economies (Mirza et al., 2024), yet the positive influence of green banking on sustainability remains evident.

6. Implications of the study

This research has substantial theoretical and practical implications. This study experimentally validates the association between green banking practices and sustainable bank performance in the context of Bangladesh, thereby contributing to the existing literature on green banking. This study enhances academic discourse by illustrating that green investment, lending, innovation, processes, and sustainable products positively impact bank sustainability, thereby reinforcing the relevance of sustainability and stakeholder theories in emerging markets, despite prior research primarily concentrating on developed economies. The results offer pragmatic guidance for policymakers and banking professionals. They emphasize the necessity for banks to prioritize green investment and lending as essential catalysts for sustainability, while concurrently implementing innovative methods, environmentally sustainable processes, and green financial products. These measures boost banks' operational efficiency and market reputation while supporting national sustainable development goals, allowing financial institutions to align profitability with environmental responsibility.

7. Limitations and future research direction

Despite its valuable contributions, this study has several limitations that provide opportunities for future research. First, the sample was limited to 300 employees from private commercial banks in Bangladesh, which restricts the generalizability of the findings to public or foreign banks and other countries with different regulatory and economic contexts. Second, the cross-sectional design only captures relationships at a single point in time, limiting insights into the long-term impact of green banking practices; future longitudinal studies could better explain their sustainability effects over time. Third, reliance on self-reported data may have introduced respondent bias, as perceptions might not fully reflect actual practices or outcomes. Lastly, Bangladesh's unique financial and regulatory environment may limit the transferability of results to other economies. To address these gaps, future research should consider broader and more diverse samples, cross-country comparisons, and mixed-method approaches to capture both quantitative impacts and qualitative insights into green banking practices.

8. Conclusion:

This study illustrates that green banking practices—such as green innovation, investment, lending, policies and procedures, and products and services—substantially and positively improve the sustainable performance of private commercial banks in Bangladesh. Among these practices, green investment was recognized as the most significant driver, followed by green policies and processes, lending, innovation, and green products. These findings underscore that banks' proactive involvement in eco-

friendly programs, responsible financing, innovative technology, and sustainable solutions collectively enhances environmental performance, operational efficiency, and stakeholder confidence. This study theoretically enhances the literature by empirically substantiating the correlation between green banking practices and sustainability within a developing country framework, thus broadening the relevance of sustainability and stakeholder theories beyond wealthy nations. The findings offer practical recommendations for banking professionals and policymakers, highlighting the importance of prioritizing green investments and lending, as well as innovative processes and sustainable financial products, to enhance environmental performance and market competitiveness. This research highlights the strategic significance of incorporating green banking practices in financial institutions to harmonies profitability with environmental accountability, providing a basis for further investigations on long-term and cross-national impacts.

9. Statements and Declarations

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

Acknowledgments: The authors would like to acknowledge the participants from private commercial banks in Bangladesh who generously contributed their time and insights to this study. Gratitude is also extended to colleagues and mentors for their valuable suggestions during the research process.

References

- [1] Aftab, J., Abid, N., Sarwar, H., & Veneziani, M. (2022). Environmental ethics, green innovation, and sustainable performance: Exploring the role of environmental leadership and environmental strategy. *Journal of Cleaner Production*, 378, 134639. <https://doi.org/10.1016/j.jclepro.2022.134639>
- [2] Ahmed, S. F., Mofijur, M., Parisa, T. A., Islam, N., Kusumo, F., Inayat, A., ... & Ong, H. C. (2022). Progress and challenges of contaminate removal from wastewater using microalgae biomass. *Chemosphere*, 286, 131656. <https://doi.org/10.1016/j.chemosphere.2021.131656>
- [3] Al-Qudah, A. A., Hamdan, A., Al-Okaily, M., & Alhaddad, L. (2023). The impact of green lending on credit risk: evidence from UAE's banks. *Environmental Science and Pollution Research*, 30(22), 61381-61393. <http://dx.doi.org/10.1007/s11356-021-18224-5>
- [4] Anderson JC, Gerbing DW. Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychol Bull.* 1988;103(3):411-23. <https://psycnet.apa.org/doi/10.1037/0033-2909.103.3.411>
- [5] Arulrajah, A., & Senthilnathan, S. (2020). Mediating role of employee green behavior towards sustainability performance of banks. *Malsha, KPPHGN, Arulrajah, AA, & Senthilnathan, S.(2020). Mediating role of employee green behaviour towards sustainability performance of banks. Journal of Governance & Regulation*, 9(2), 92-102. DOI: 10.22495/jgrv9i2art7
- [6] Asyura, A., Ramadania, R., Wendy, W., Mustarudin, M., & Syahputri, A. (2023). Green banking, green investment, and sustainability development banking in Indonesia. *International Journal of Applied Finance and Business Studies*, 11(3), 662-674. <https://doi.org/10.35335/ijafibs.v11i3.169>
- [7] Bahl, S. (2012). Green banking-The new strategic imperative. *Asian Journal of Research in Business Economics and Management*, 2(2), 176-185.
- [8] Belova, N., Posadneva, E., Plaksa, J., Tesalovsky, A., & Volkodavova, E. (2023). Opportunities of green lending to finance environmental projects to achieve the principles of sustainable development. *Journal of Law and Sustainable Development*, 11(1), e0268-e0268. <https://doi.org/10.37497/sdgs.v11i1.268>
- [9] Bos-Brouwers, H. E. J. (2010). Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice. *Business strategy and the environment*, 19(7), 417-435. <https://doi.org/10.1002/bse.652>
- [10] Butt, S., Ashfaq, M., Chohan, M. A., Iftikhar, R., Awan, M. A., Mazlan, A. N. B., & Mahmood, T. (2025). Impact of Green Banking Practices on Sustainable Performance of Banks Through Analysis of the Mediating Effect of Green Finance. In *Algorithmic Training, Future Markets, and Big Data for Finance Digitalization* (pp. 361-386). IGI Global Scientific Publishing. DOI: 10.4018/979-8-3693-6386-7.ch014
- [11] Chen, J., Siddik, A. B., Zheng, G. W., Masukujjaman, M., & Bekhzod, S. (2022). The effect of green banking practices on banks' environmental performance and green financing: An empirical study. *Energies*, 15(4), 1292. <https://doi.org/10.3390/en15041292>
- [12] Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of business ethics*, 67, 331-339. DOI:10.1007/s10551-006-9025-5
- [13] Chiang, P. C., Ma, H. W., Wen, L., & Lin, C. H. (2024). Green Products and Services. In *Introduction to Green Science and Technology for Green Economy: Principles and Applications* (pp. 99-117). Singapore: Springer Nature Singapore.
- [14] Chitra, B. (2015). A study on Evolution of Green products and Green Marketing. *Journal of Research in Business and Management*, 3(5), 35-38. <http://www.questjournals.org/>
- [15] Choubey, A., & Sharma, M. (2022). Green banking: the case of the commercial banking sector in Delhi NCR. *Journal of Environmental Planning and Management*, 65(11), 1975-1998. <https://doi.org/10.1080/09640568.2021.1955336>
- [16] Dangelico, R. M., & Vocalelli, D. (2017). "Green Marketing": An analysis of definitions, strategy steps, and tools through a systematic review of the literature. *Journal of Cleaner production*, 165, 1263-1279. <https://doi.org/10.1016/j.jclepro.2017.07.184>
- [17] Del Gaudio, B. L., Previtali, D., Sampagnaro, G., Verdoliva, V., & Vigne, S. (2022). Syndicated green lending and lead bank performance. *Journal of international financial management & accounting*, 33(3), 412-427. <https://doi.org/10.1111/jifm.12151>

- [18] Elias, O., Awotunde, O. J., Oladebo, O. I., Azuikpe, P. F., Samson, O. A., Oladele, O. R., & Ogunraku, O. O. (2024). The evolution of green fintech: Leveraging AI and IoT for sustainable financial services and smart contract implementation. *World Journal of Advanced Research and Reviews*, 23(1), 2710-2723. <https://doi.org/10.30574/wjarr.2024.23.1.2272>
- [19] Fan, Q.; Liu, J.; Zhang, T.; Liu, H. An Evaluation of the Efficiency of China's green investment in the "Belt and Road" countries. *Struct. Chang. Econ. Dyn.* 2022, 60, 496–511. <https://doi.org/10.1016/j.strueco.2022.01.003>
- [20] Farooq, U., Thavorn, J., & Tabash, M. I. (2024). Exploring the impact of environmental regulations and green innovation on corporate investment and cash management: evidence from Asian economies. *China Finance Review International*. <https://doi.org/10.1108/CFRI-06-2024-0337>
- [21] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- [22] García-Salirrosas, E. E., & Rondon-Eusebio, R. F. (2022). Green marketing practices related to key variables of consumer purchasing behavior. *Sustainability*, 14(14), 8499. <https://doi.org/10.3390/su14148499>
- [23] Gazi MAI, Rahman MKH, Yusof MF, Masud AA, Islam MA, Senathirajah ARS, et al. Mediating role of entrepreneurial intention on the relationship between entrepreneurship education and employability: a study on university students from a developing country. *Cogent Bus Manag.* 2024;11(1):2294514. <https://doi.org/10.1080/23311975.2023.2294514>
- [24] Golicic, S. L., & Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of supply chain management*, 49(2), 78-95. <https://doi.org/10.1111/jscm.12006>
- [25] Gulzar, R., Bhat, A. A., Mir, A. A., Athari, S. A., & Al-Adwan, A. S. (2024). Green banking practices and environmental performance: navigating sustainability in banks. *Environmental Science and Pollution Research*, 31(15), 23211-23226. <https://doi.org/10.1007/s11356-024-32772-6>
- [26] Hair JF, Ringle CM, Sarstedt M. PLS-SEM: Indeed a Silver Bullet. *J Mark Theory Pract.* 2011;19(2):139-52. <https://doi.org/10.2753/MTP1069-6679190202>
- [27] Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. *Eur Bus Rev.* 2019;31(1):2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
- [28] Hariadi, S., Moengin, P., & Maulidya, R. (2023). Impact of green practices through green product and service innovation: sustainable product-service system performance model. *International Journal of Sustainable Engineering*, 16(1), 1-15. <https://doi.org/10.1080/19397038.2023.2205873>
- [29] Hasina, S. S., & Afgan, S. M. (2014). Concept paper on green banking infrastructure (Housing and SME Finance Department). *Pakistan: State Bank of Pakistan*.
- [30] Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- [31] Hervani, A. A., Helms, M. M., & Sarkis, J. (2005). Performance measurement for green supply chain management. *Benchmarking: An international journal*, 12(4), 330-353. <https://doi.org/10.1108/14635770510609015>
- [32] Indriastuti, M., & Chariri, A. (2021). The role of green investment and corporate social responsibility investment on sustainable performance. *Cogent Business & Management*, 8(1), 1960120. <https://doi.org/10.1080/23311975.2021.1960120>
- [33] Indriastuti, M., & Chariri, A. (2021). The role of green investment and corporate social responsibility investment on sustainable performance. *Cogent Business & Management*, 8(1), 1960120. <https://doi.org/10.1080/23311975.2021.1960120>
- [34] Jain, P., & Sharma, B. K. (2023). Impact of green banking practices on sustainable environmental performance and profitability of private sector banks. *International Journal of Social Ecology and Sustainable Development (IJSESD)*, 14(1), 1-19. DOI: 10.4018/IJSESD.330135
- [35] Khairunnessa, F., Vazquez-Brust, D. A., & Yakovleva, N. (2021). A review of the recent developments of green banking in Bangladesh. *Sustainability*, 13(4), 1904. <https://doi.org/10.3390/su13041904>
- [36] Khan, N. R., Ameer, F., Bouncken, R. B., & Covin, J. G. (2023). Corporate sustainability entrepreneurship: The role of green entrepreneurial orientation and organizational resilience capacity for green innovation. *Journal of Business Research*, 169, 114296. <https://doi.org/10.1016/j.jbusres.2023.114296>
- [37] Kirikkaleli, D., & Adebayo, T. S. (2021). Do renewable energy consumption and financial development matter for environmental sustainability? New global evidence. *Sustainable Development*, 29(4), 583-594. <https://doi.org/10.1002/sd.2159>
- [38] Kumar, G. S., Reddy, N. R., Siddiqui, Q. T., Yusuf, K., Pabba, D. P., Kumar, A. S., ... & Joo, S. W. (2024). A facile green synthesis of gold nanoparticles using *Canthium parviflorum* extract sustainable and energy efficient photocatalytic degradation of organic pollutants for environmental remediation. *Environmental Research*, 258, 119471. <https://doi.org/10.1016/j.envres.2024.119471>
- [39] Kumar, P., Singh, A. B., Arora, T., Singh, S., & Singh, R. (2023). Critical review on emerging health effects associated with the indoor air quality and its sustainable management. *Science of The Total Environment*, 872, 162163. <https://doi.org/10.1016/j.scitotenv.2023.162163>
- [40] Lalón, R. M. (2015). Green banking: Going green. *International Journal of Economics, finance and management sciences*, 3(1), 34-42. doi: 10.11648/j.ijefm.20150301.15
- [41] Le, T. T., & Ferasso, M. (2022). How green investment drives sustainable business performance for food manufacturing small-and medium-sized enterprises? Evidence from an emerging economy. *Corporate Social Responsibility and Environmental Management*, 29(4), 1034-1049. <https://doi.org/10.1002/csr.2252>
- [42] Lee HW. An application of latent variable structural equation modeling for experimental research in educational technology. *Turkish Online J Educ Technol.* 2011;10(1):15-23.
- [43] Li, H., Li, Y., Sarfarz, M., & Ozturk, I. (2023). Enhancing firms' green innovation and sustainable performance through the mediating role of green product innovation and moderating role of employees' green behavior. *Economic research-Ekonomska istraživanja*, 36(2). <https://doi.org/10.1080/1331677X.2022.2142263>
- [44] Lin, R.J., Chen, R.H. and Huang, F.H. (2014), "Green innovation in the automobile industry", *Industrial Management & Data Systems*, Vol. 114 No. 6, pp. 886-903. <https://doi.org/10.1108/IMDS-11-2013-0482>
- [45] Meyers LS, Gamst GC, Guarino AJ. Performing Data Analysis Using IBM SPSS. Available from: <https://www.wiley.com/en-us/Performing+Data+Analysis+Using+IBM+SPSS-p-9781118363577>. Accessed on 31 Jul 2023.

- [46] Mir, A. A., & Bhat, A. A. (2022). Green banking and sustainability—a review. *Arab Gulf Journal of Scientific Research*, 40(3), 247–263. <https://www.emerald.com/insight/1985-9899.htm>
- [47] Mirza, N., Afzal, A., Umar, M., & Skare, M. (2023). The impact of green lending on banking performance: Evidence from SME credit portfolios in the BRIC. *Economic Analysis and Policy*, 77, 843–850. <https://doi.org/10.1016/j.eap.2022.12.024>
- [48] Mirza, N., Afzal, A., Umar, M., & Skare, M. (2023). The impact of green lending on banking performance: Evidence from SME credit portfolios in the BRIC. *Economic Analysis and Policy*, 77, 843–850. <https://doi.org/10.1016/j.eap.2022.12.024>
- [49] Mirza, N., Umar, M., Sbiba, R., & Jasmina, M. (2024). The impact of blue and green lending on credit portfolios: a commercial banking perspective. *Review of Accounting and Finance*, (ahead-of-print). <https://doi.org/10.1108/RAF-11-2023-0389>
- [50] Nunnally JD. *Psychometric Theory*. 2nd ed. New York (US): McGraw-Hill; 1978.
- [51] Ottman, J. A., Stafford, E. R., & Hartman, C. L. (2006). Avoiding green marketing myopia: Ways to improve consumer appeal for environmentally preferable products. *Environment: science and policy for sustainable development*, 48(5), 22–36. <https://doi.org/10.3200/ENV.48.5.22-36>
- [52] Peattie, K., & Crane, A. (2005). Green marketing: legend, myth, farce or prophesy?. *Qualitative market research: an international journal*, 8(4), 357–370. <https://doi.org/10.1108/13522750510619733>
- [53] Pham, K. D., & Vu, T. T. (2024, July). Green lending, credit risk and financial performance of Commercial banks in Vietnam. In *THE INTERNATIONAL CONFERENCE ON ECONOMICS, LAW AND GOVERNMENT (ELG 2024)* (p. 2).
- [54] Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol*. 2003;88(5):879.
- [55] Pujari, D. (2006). Eco-innovation and new product development: understanding the influences on market performance. *Technovation*, 26(1), 76–85. <https://doi.org/10.1016/j.technovation.2004.07.006>
- [56] Rahman, M. H., Rahman, J., Tanchangya, T., & Esquivias, M. A. (2023). Green banking initiatives and sustainability: A comparative analysis between Bangladesh and India. *Research in Globalization*, 7, 100184. <https://doi.org/10.1016/j.resglo.2023.100184>
- [57] Rai, R., Kharel, S., Devkota, N., & Paudel, U. R. (2019). Customers perception on green banking practices: A desk. *The Journal of Economic Concerns*, 10(1), 82–95.
- [58] Ren, S.; Hao, Y.; Wu, H. How Does Green Investment Affect Environmental Pollution? Evidence from China. *Environ. Resour. Econ.* **2022**, *81*, 25–51.
- [59] Ren, X., Zhang, X., Yan, C., & Gozgor, G. (2022). Climate policy uncertainty and firm-level total factor productivity: Evidence from China. *Energy Economics*, 113, 106209. <https://doi.org/10.1016/j.eneco.2022.106209>
- [60] Román-Augusto, J. A., Garrido-Lecca-Vera, C., Lodeiros-Zubiria, M. L., & Mauricio-Andia, M. (2022). Green marketing: drivers in the process of buying green products—the role of green satisfaction, green trust, green WOM and green perceived value. *Sustainability*, 14(17), 10580. <https://doi.org/10.3390/su141710580>
- [61] Sarkis, J. (2003). A strategic decision framework for green supply chain management. *Journal of cleaner production*, 11(4), 397–409. [https://doi.org/10.1016/S0959-6526\(02\)00062-8](https://doi.org/10.1016/S0959-6526(02)00062-8)
- [62] Seman, N. A. A., Govindan, K., Mardani, A., Zakuan, N., Saman, M. Z. M., Hooker, R. E., & Ozkul, S. (2019). The mediating effect of green innovation on the relationship between green supply chain management and environmental performance. *Journal of cleaner production*, 229, 115–127. <https://doi.org/10.1016/j.jclepro.2019.03.211>
- [63] Shakil, M. H., Azam, M. K. G., & Raju, M. S. H. (2014). An evaluation of green banking practices in Bangladesh. *European Journal of Business and Management*, 6(31), 8–16.
- [64] Sharif, A., Saqib, N., Dong, K., & Khan, S. A. R. (2022). Nexus between green technology innovation, green financing, and CO2 emissions in the G7 countries: the moderating role of social globalisation. *Sustainable Development*, 30(6), 1934–1946. <https://doi.org/10.1002/sd.2360>
- [65] Shaumya, K., & Arulrajah, A. (2016, December). Measuring green banking practices: Evidence from Sri Lanka. In the *University of Sri Jayawardenepura, Sri Lanka, 13th International Conference on Business Management (ICBM)*.
- [66] Soewarno, N., Tjahjadi, B., & Fithrianti, F. (2019). Green innovation strategy and green innovation: The roles of green organizational identity and environmental organizational legitimacy. *Management decision*, 57(11), 3061–3078. <https://doi.org/10.1108/MD-05-2018-0563>
- [67] Suki, N. M., Suki, N. M., Sharif, A., Afshan, S., & Rexhepi, G. (2023). Importance of green innovation for business sustainability: Identifying the key role of green intellectual capital and green SCM. *Business Strategy and the Environment*, 32(4), 1542–1558. <https://doi.org/10.1002/bse.3204>
- [68] Tang, W., Mai, L., & Li, M. (2023). Green innovation and resource efficiency to meet net-zero emission. *Resources Policy*, 86, 104231. <https://doi.org/10.1016/j.resourpol.2023.104231>
- [69] Thapliyal, K., Gupta, C., Jindal, P. et al. Measuring the impact of green banking practices on banks' environmental performance and sources of green financing: a study on Indian banks. *Discov Sustain* **6**, 169 (2025). <https://doi.org/10.1007/s43621-024-00678-5>
- [70] Wang, C. H., & Juo, W. J. (2021). An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability. *Business Strategy and the Environment*, 30(7), 3241–3254. <https://doi.org/10.1002/bse.2800>
- [71] Xie, X., Hoang, T. T., & Zhu, Q. (2022). Green process innovation and financial performance: The role of green social capital and customers' tacit green needs. *Journal of Innovation & Knowledge*, 7(1), 100165. <https://doi.org/10.1016/j.jik.2022.100165>
- [72] Ye, J., & Dela, E. (2023). The effect of green investment and green financing on sustainable business performance of foreign chemical industries operating in Indonesia: the mediating role of corporate social responsibility. *Sustainability*, 15(14), 11218. <https://doi.org/10.3390/su151411218>
- [73] Zahan, I.; Chuanmin, S. Towards a green economic policy framework in China: Role of green investment in fostering clean energy consumption and environmental sustainability. *Environ. Sci. Pollut. Res.* **2021**, *28*, 43618–43628. <https://doi.org/10.1007/s11356-021-13041-2>
- [74] Zhang, X., Wang, Z., Zhong, X., Yang, S., & Siddik, A. B. (2022). Do green banking activities improve the banks' environmental performance? The mediating effect of green financing. *Sustainability*, 14(2), 989. <https://doi.org/10.3390/su14020989>

-
- [75] Zhao, X., Ma, X., Chen, B., Shang, Y., & Song, M. (2022). Challenges toward carbon neutrality in China: Strategies and countermeasures. *Resources, Conservation and Recycling*, 176, 105959. <https://doi.org/10.1016/j.resconrec.2021.105959>
- [76] Zheng, G. W., Siddik, A. B., Masukujjaman, M., & Fatema, N. (2021). Factors affecting the sustainability performance of financial institutions in Bangladesh: the role of green finance. *Sustainability*, 13(18), 10165. <https://doi.org/10.3390/su131810165>
- [77] Zheng, G. W., Siddik, A. B., Masukujjaman, M., & Fatema, N. (2021). Factors affecting the sustainability performance of financial institutions in Bangladesh: the role of green finance. *Sustainability*, 13(18), 10165. <https://doi.org/10.3390/su131810165>
- [78] Zhixia, C., Hossen, M. M., Muzafary, S. S., & Begum, M. (2018). Green banking for environmental sustainability-present status and future agenda: Experience from Bangladesh. *Asian Economic and Financial Review*, 8(5), 571-585. DOI: 10.18488/journal.aefr.2018.85.571.585 Vol. 8, No. 5, 571-585
- [79] Zhu, Q., & Geng, Y. (2013). Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers. *Journal of cleaner production*, 40, 6-12. <https://doi.org/10.1016/j.jenvman.2013.04.009>