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The Impact of Green Banking Activities on Banks' Green Financing and Environmental Performance

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Abstract

This study aims to empirically assess the impact of green banking activities on banks' green financing and environmental performance. Likewise, it seeks to identify the mediating effect of green financing on the relationship between banks' environmental performance and green banking activities. It also examines the trends and challenges on the topic. Structural equation modeling was used to evaluate the relationship between the variables identified from primary data collected through a structured questionnaire administered to 321 Colombian bankers, who were selected using convenience sampling. According to the results, green banking activities have a positive impact on banks' environmental performance, and banks' sources of green financing significantly influence their environmental performance. Notwithstanding, green banking is regarded as a promising strategy for banks because it enhances their competitiveness and reputation, helps them reduce their carbon footprint and costs in the long term, and enables them to be included in sustainability indexes.

Keywords

Green banking, Sustainability, Green finance, Financial inclusion, Green financing, Environmental performance

JEL Classification

F65, Q01, Q56

Introduction

In recent years, concepts like sustainability and sustainable development have gained increasing importance due to the urgent need to address issues like hunger, climate change, and inequality (Gore, 2015; Valencia et al., 2021). Although various initiatives, such as the United Nations (UN) Sustainable Development Goals (SDGs) (Gupta & Vegelin, 2016) and the frames for innovation policy (Schot & Steinmueller, 2018), have been launched to tackle these challenges, but they are still in their early stages. Additionally, more initiatives that may be implemented at the local level and that are based on the actions of each stakeholder still need to be developed (Khatib et al., 2021). These efforts may include environmentally friendly projects for sustainable development, as well as financing and financial inclusion initiatives that positively impact local economies (Valencia et al., 2021; Villa et al., 2020).

In this context, it is essential to analyze the role of banking and financial institutions, which have a substantial impact on economies, particularly through their credit and liquidity functions, and on mitigating environmental risks (Miroshnichenko & Mostovaya, 2019). The term "Green Financing" (GF) refers to investments allocated to projects and efforts for sustainable development, eco-friendly products, clean technologies, and policies that promote a more sustainable economy, and a wide range of environmental objectives (Sinha et al., 2021). Similarly, Green Banking (GB), also known as sustainable banking or socially responsible banking, is a form of banking whose primary goal is to protect the environment and natural resources while considering all social and environmental factors (Mozib Lalon, 2015a). Incorporating the "green" concept into the banking sector is necessary because, since banks are the main source of funding for industrial projects and facilitators of growth, they must also act as intermediaries between socioeconomic development and environmental conservation, thus promoting environmentally and socially responsible investments (X. Zhang et al., 2022). GB is, therefore, a type of banking that seeks to reduce internal carbon emissions and fosters environmentally friendly products and practices.

In developing countries, the challenges are no less significant. In addition to the fundamental need to identify the role of financial institutions, there is a requirement for regulatory frameworks that facilitate the adoption of

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environmentally friendly practices and promote sustainable economies. Similarly, there is a need for the widespread use of indicators that assess and compare operations from this perspective and contribute to the achievement of the Sustainable Development Goals, such as green bonds and carbon market-based instruments (Ruiz et al., 2016). Studies such as the work of Khairunnessa et al., (2021) in Bangladesh characterize the role of a central bank and trace the initiatives and policies that it can develop from its qualities as a regulatory body and a part of the government. Similarly, panel CO2 models have been proposed to analyze the effect of economic growth, renewable energy consumption, and financial development on CO2 emissions in Latin American and Caribbean countries. These models reveal that financial development can improve environmental quality due to its long-term negative effect on CO2 emissions (Al-mulali et al., 2015).

This study attempts to contribute to the understanding of GB by identifying the relationship between GB activities, environmental performance, and sources of green financing based on the analysis of primary data sources. The case study focuses on the banking sector in Colombia, which, according to Berndsen et al., (Berndsen et al., 2018), represents a country with a stable, competitive, and growing banking system. Studies such as that of Al-Sheryani and Nobanee (2020) and reports by the UN's Green Growth Knowledge Partnership (United Nations, 2022) reveal that the opportunities and challenges for GB in Colombia are related to coverage, operating costs, investment risks, and the lack of environmental regulations. Moreover, some authors have identified a lack of familiarity with green products and services, as well as a lack of customers' awareness of GB products and technologies as other barriers to GB development (Al-mulali et al., 2015; Sarma & Roy, 2021a).

This document also analyzes the mediating effect of green financing in assessing banks' environmental performance and their adoption of GB. Finally, it outlines the difficulties and challenges of GB development, particularly in developing countries like Colombia, that recently released a green protocol that sets forth basic guidelines for the analysis of environmental and social risks, as well as a roadmap for the creation of green bonds. Likewise, efforts have been made in the country to develop a FinTech ecosystem that, besides encouraging the use of online tools and technology in the banking sector, promotes financial inclusion and the formulation of sustainable policies (Ioannou & Wójcik, 2022). Despite this, the country's gap in financial coverage and financial products and services is above 60%, making it a market that should focus on sustainable coverage and access (Mejia-Escobar et al., 2020).

Therefore, the main purpose of this study is to investigate the effect of GB activities on green financing and banks' environmental performance, as well as to identify the challenges and emerging trends regarding GB. To that end, this study aims to answer the following two questions: How GB activities impact the green financing and environmental performance of private commercial banks? What are the main difficulties and challenges of GB development in a developing country?

The rest of this paper is structured as follows. Section 2 presents a theoretical background and the research hypotheses, as well as the challenges and trends of GB development. Section 3 describes the sampling and data collection process. Section 4 provides the empirical results. Section 5 discusses the findings. Finally, Section 6 draws the conclusions.

Literature Review

Green financing

In recent years, an increasing number of documents have discussed green finance, drawing upon the theory of social responsibility as applied to financial institutions. For example, there are important questions that emerge regarding the primary objective of companies. What should their focus be, and how can they effectively balance profitability with broader sustainability concerns that impact the entire community? Moreover, at the macroeconomic level, there is a need to strike a delicate balance between promoting economic growth and addressing social priorities, such as environmental protection while adhering to moral and ethical standards (Dörry & Schulz, 2018). According to Dörry and Schulz (2018), green finance sees finance as an investment vehicle focused on preserving and protecting the natural environment. Some authors, however, believe that businesses and banks' "greening" efforts are nothing more than a marketing strategy to make the economy "greener" (Mozib Lalon, 2015b; Petschow & Hofmann, 2017).

Insufficient comprehensive academic analysis exists on the topic at hand. When examining the definition of green finance, scholars have presented divergent interpretations (J. Chen et al., 2022; Gilchrist et al., 2021; X. Zhang et al., 2022) . However, certain connotations persistently emerge, forming a common ground among these definitions. First and foremost, the fundamental premise of green finance lies within the realm of finance itself. It encompasses not only financial products and markets but also encompasses financial policies and institutions. This comprehensive approach recognizes the broad influence of financial systems on green finance. Secondly, these financial activities hold a direct correlation with the domains of energy conservation and environmental protection, as they are specifically designed to contribute to the advancement of sustainable and environmentally conscious economic development (Wang et al., 2021). Earlier research endeavors concerning green finance have primarily focused on elucidating the pivotal role financial institutions play in driving environmental protection and sustainable

development initiatives (Gilchrist et al., 2021).

The corporate investments made in eco-friendly projects by companies can be justified due to the following two benefits: an insurance-like hedging strategy as a precautionary tool for corporate environmental risks, and a reputation-building strategy to accumulate valuable social capital (Gilchrist et al., 2021).

Green finance can be regarded as more than just an environmental practice, as it drives socioeconomic development and growth in the long term by combining aspects such as coverage, environmental stability, economic security, and the general benefit of all stakeholders (Zhou et al., 2020). According to Zhang et al. (2019), green financing activities, as a component of GB strategies, are tools that contribute to the economic growth of society. In addition, they may have an impact on the development of emerging countries through a variety of projects, including the design of financial products, waste management, sustainable consumption, and the use of clean energies.

Green banking

The term “green banking” comprises all actions that Private Commercial Banks (PCBs), financial institutions, and financing firms may take to support environmental protection and foster sustainable socioeconomic development (Haron et al., 2020). It was first used in the 1980s by European organizations looking to raise funds for eco-friendly initiatives. It later became a model practice and is currently a topic of growing interest due to the external social pressure exerted on banks to develop banking initiatives that reduce the carbon footprint (Mozib Lalon, 2015b). Presently, banks actively participate in development systems that substantially contribute to the promotion and implementation of public policies to lessen the negative effects of banking activities and their repercussions on other sectors of the economy (Sarma & Roy, 2021b). Studies on reputation and portfolio profitability have demonstrated that green investments have a significantly better credit performance and present higher rates of return than traditional products (Mejia-Escobar et al., 2020).

As part of their green banking initiatives, numerous banks and non-banking financial institutions (NBFIs) worldwide have implemented eco-friendly mechanisms for financing and transforming their internal operations towards sustainability. For example, private banks in countries such as India, Brazil, Bangladesh and Colombia, have embraced green banking practices, aligning them with the policy framework in place (Sharma & Choubey, 2022).

Challenges and trends

Implementing GB initiatives presents numerous challenges. Both customers and bank employees lack awareness and accurate information about the concept of "green banking" (Wang et al., 2021). This gap in understanding extends to the disparity between banks' intentions and public perceptions regarding green banking practices (Z. Chen et al., 2022). The prevalence of greenwashing has further exacerbated consumer skepticism towards environmental advertising, negatively impacting the equity of green brands (X. Zhang et al., 2022). Surprisingly, a significant proportion of online banking users remain unaware of the term "green banking" or confuse it with digital banking (Cardona-Valencia, 2020).

To achieve inclusive economic growth, it is essential to establish robust and sound banking practices (Berrou et al., 2019). Green banks primarily focus on activities such as online services, apps and paperless banking. However, research indicates that banks are inadequately equipped to fully implement green banking initiatives and still have a long way to go (Gilchrist et al., 2021).

The banking sector in Colombia is faced with significant challenges in terms of GB, as it is required to improve its offer of green services and products and implement e-banking and FinTech strategies (Igual Molina, 2019; Ioannou & Wójcik, 2022). According to Mejia-Escobar et al. (2020), one of the major obstacles to GB development in the country is the lack of awareness of these strategies, as well as of the advantages of conducting environmental campaigns or reducing carbon footprints. Hence, the need to create incentives to persuade customers and employees. Another important barrier is banks’ short-termism. They believe that implementing these measures entails higher operating costs, start-up costs, reputational risks, and new segmentations to offer specialized products to individuals or firms with environmental requirements, which could result in new credit risks for which credit risk management and assessment systems are not yet prepared (Chamorro Gonzalez & Herrera Mendoza, 2021). Beyond creating a comprehensive environmental management system, these challenges contribute to identifying the target market and persuading individuals to trust in and become familiar with eco-friendly products and accept the challenges of “going green” (Mejia-Escobar et al., 2020).

GB strategies require employees to be trained and become aware of them, activities to be oriented towards sustainable economic development, and their implementation to be justified by the long-term cost savings, tax benefits, contributions to the banks’ reputation, and the adoption of a business philosophy that promotes sustainability and energy conservation (Valencia et al., 2021). In this regard, the green protocol released by the Colombian banking association stands out. This initiative was launched to encourage banks (from their capabilities) to help mitigate climate change by developing eco-efficient processes and managing environmental and social risks (Turriago Campuzano & Cardona Acevedo, 2019).

Regarding trends in GB, it is important to discuss the widespread need for the digitalization of banking services as

a strategy to save paper, eliminate the need to travel to the bank, use less printed money, and increase coverage (Chitra & Gokilavani, 2020; Mozib Lalon, 2015b). Additionally, along with the emergence of crowdfunding and cross-sourcing as financing alternatives for the achievement of the SDGs, green microfinancing products for agricultural projects or projects designed under high environmental standards are also starting to gain relevance (Sahay et al., 2020).

The next steps for the expansion of GB are (i) to design regulations and protocols that define operational areas, (ii) to establish green businesses, and (iii) to define the necessary technical adjustments and scope regarding customers and social development (Pal & Russel, 2015).

Methods

To assess the impact of green banking activities on banks' green finance and environmental performance, a Structural Equation Study (SEM) is proposed based on data collection from primary sources. This technique, according to Chi (2012), provides accurate and reliable results and allows analyzing patterns of relationships and making qualitative assumptions about causality. SEM is considered an appropriate statistical method to examine the relationship between latent variables. For data analysis, RStudio was used to obtain descriptive statistics and conduct factor analyses and IBM SPSS Amos was employed to analyze the structure of the equations. After model validation (reliability and validity analysis), the SEM was used to test the proposed hypotheses based on the criteria defined by Bentler and Hu (1999).

Data collection: The main PCBs in Colombia, according to the Inverse Index published by Milenium Group (Milenium Group, 2021) and the Dow Jones Sustainability World Index (S&P Global, 2021), which identifies businesses as leaders in sustainability, were selected for this study. The primary goal was to assess the effects and benefits of the GB activities carried out by such financial institutions. For that purpose, a structured questionnaire was designed, and a convenience sampling method was used to collect relevant data from February to May 2022.

Convenience sampling is one of the most common non-probabilistic sampling techniques. It restricts participants to those who meet certain predefined criteria such as ease of access, expertise, ease of responding, or geographic closeness (Stratton, 2021). The sample size was determined based on the criteria set forth by Barclay et al. (1995), who proposed a sampling rule in which the maximum number of indicators used in the Structural Equation Modelling (SEM) method is multiplied by 10. As a result, 140 (10 x 14) responses were required for this case. Table 1 presents the demographic information of the participants. As observed, 81% of respondents were male, and only 19% were female. Regarding age, most respondents (56%) were between the ages of 26 and 35.

Table 1. Demographic information.

Variable	Classification	Frequency	Relative frequency
Gender	Male	261	81.31%
	Female	60	18.69%
Age (in years)	18–25	45	14.02%
	26–35	179	55.76%
	36–45	70	21.81%
	46 years and older	27	08.41%
Educational level	Undergraduate	87	27.10%
	Master	227	70.72%
	PhD	7	02.18%
Working experience	Less than 1 year	124	38.63%
	2–4 years	170	52.96%
	More than 4 years	27	08.41%

The GB activities were formulated based on the studies by J. Chen et al. (2022), Mozib Lalon (2015a), Shaumya and Arulrajah (2016), Tu and Dung (2017), and Zheng et al. (2021), who identified the factors that influence green financing, such as Green Banking Activities (GBA), Sources of Green Financing (SGF), and Banks' Environmental Performance (BEP). The questionnaire was constructed using a 5-point Likert scale, which was proposed by Joshi et al. (2015) as a quantitative method to measure people's response, attitude, and behavior toward statements or items on a scale from one (strongly disagree) to five (strongly agree).

Data analysis: A multivariate data analysis was performed on the collected data. This technique, according to Raykov and Marcoulides (2008), is used to study several characteristics and correlations between various elements of the same problem. Structural Equation Modeling (SEM) is a multivariate statistical method often employed to examine patterns of relationships between variables, make comparisons, and test hypotheses (Escobedo Portillo

et al., 2016). In this study, the collected data were analyzed using the statistical software R. Also, a confirmatory factor analysis was conducted, and construct reliability was assessed using the Cronbach's alpha coefficient (with acceptable values being above 0.7). For such purpose, the consistent values as indicated by Chi (2012) and the goodness-of-fit indices suggested by Raykov and Marcoulides (2008) were used.

Table 2. Questionnaire items.

Variable	Item	Description	Source
Green Banking Activities (GBA)	GBA1	Introduction of energy efficient systems	Chen et al., 2022; Shaumya & Arulrajah, 2016
	GBA2	Incorporation of more online banking services	
	GBA3	Provision of special loans for eco-friendly projects	
	GBA4	Establishment of green branches	
	GBA5	Reduction in paper use	
	GBA6	Encouraging customers to participate in environmental activities	
	GBA7	Customers' online documentation	
Banks' Environmental Performance (BEP)	BEP1	Reduction in energy consumption	Mozib Lalon, 2015a; Tu & Dung, 2017
	BEP2	Reduction in carbon emissions	
	BEP3	Employee training on sustainable consumption	
Sources of Green Financing (SGF)	SGF1	Investments in renewable energy projects	Shaumya & Arulrajah, 2016; Zhang et al., 2022
	SGF2	Investments in energy efficiency projects	
	SGF3	Investments in recycling projects	
	SGF4	Investments in waste management projects	

Discriminant validity: Discriminant validity was assessed by the difference between the square root of the Average Variance Extracted (AVE) of each construct and the correlation coefficient between the constructs. As shown in Table 3, the square root of the AVE of each construct ranged from 0.673 to 0.790, which exceeded the inter-factor correlation. This confirms that there was no discriminant validity between the variables used in the analysis.

Table 3. Discriminant validity.

	GBA	SGF	BEP	AVE	CR	Cronbach's alpha
GBA	0.673			0.624	0.833	0.760
SGF	0.587	0.732		0.532	0.795	0.765
BEP	0.648	0.579	0.790	0.423	0.745	0.819

Descriptive statistics: Table 4 summarizes the results of the statistical analysis, as well as those of the Exploratory Factor Analysis (EFA), which was conducted to calculate the factor loading of each variable proposed in this study. When assessing the correlation matrix, the suitability of the data for factor analysis was evaluated, and a significant correlation between the measurements was observed. The number of factors to be retained was estimated using the eigenvalue criterion (Cattell, 1966). The resulting factor loadings were between 0.688 and 0.859, exceeding the minimum standard level of 0.6 (Cortina, 1993). The Bartlett's test of sphericity produced a p-value below 0.000, which confirms the goodness-of-fit of the correlation matrix.

Table 4. Descriptive statistics and exploratory factor analysis results.

Variables	Standard deviation	Mean	Eigen Value	Factor Loading
GBA1	0.954	4.41	3.645	0.742
GBA2	0.933	4.53		0.738
GBA3	0.986	4.42		0.731
GBA4	0.931	4.50		0.725
GBA5	0.994	4.55		0.726
GBA6	0.961	4.13		0.722
GBA7	0.932	4.42		0.701

BEP1	1.534	3.50	1.682	0.707
BEP2	1.344	3.48		0.721
BEP3	1.245	2.61		0.764
SGF1	1.134	3.69	2.702	0.688
SGF2	1.193	3.48		0.813
SGF3	1.215	3.72		0.850
SGF4	1.198	3.98		0.859

Based on the mean and the standard deviation, the reduction in paper use, the incorporation of more online banking services, the establishment of green branches, and the provision of special loans for eco-friendly projects were found to be the main challenges influencing GB development in Colombia.

Results

Table 5 presents the results of the confirmatory factor analysis, as well as the scale components for each construct and their corresponding items. The model was evaluated using the values of the standardized coefficients, critical ratios, and goodness-of-fit indices, as suggested by Chi (2012). The critical ratio of all the items ranged between 6.311 and 14.325, indicating that the path coefficient was significant (i.e., greater than 0.001). In addition, all the model fit indices were within acceptable ranges, as recommended by Ahmadisharafa and Kalyanapub (2016).

Table 5. Confirmatory factor analysis results.

Variable	Construct	Item	Standarized regression weight	Critical ratio	P-Value	Standard error
Green banking activities (GBA)	GBA →	GBA1	0.829	9.618	***	0.084
	GBA →	GBA2	0.866	10.006	***	0.082
	GBA →	GBA3	0.679	11.064	***	0.090
	GBA →	GBA4	0.954	11.200	***	0.087
	GBA →	GBA5	0.684	*		*
	GBA →	GBA6	0.962	11.305	***	0.087
	GBA →	GBA7	0.721	11.401	***	0.086
BankS' environmental performance (BEP)	BEP →	BEP1	0.725	*		*
	BEP →	BEP2	0.726	6.0145	***	6.154
	BEP →	BEP3	0.897	6.3110	***	6.271
Sources of green financing (SGF)	SGF →	SGF1	0.816	*		*
	SGF →	SGF2	0.778	14.325	***	14.125
	SGF →	SGF3	0.715	13.129	***	13.421
	SGF →	SGF4	0.637	12.043	***	12.001

With these results, we have a positive evaluation of construct validity and reliability for this model, where a positive and explanatory relationship is observed between green banking activities and both banks' environmental performance and sources of green financing.

Fig. 1 illustrates the structural model used in this study, which reflects the impact of the relationships between the variables (GBA, SGF, and BEP) and the constructs. As observed, the practices considered are significant and have positive values. Regarding the model fit indices, the x2/df was 1.653, the Goodness-of-Fit Index (GFI) was 0.952, the Incremental Fit Index (IFI) was 0.947, the Standardized Root Mean Square Residual (SRMR) was 0.069, the Tucker–Lewis Index (TLI) was 0.964, the Adjusted Goodness-of-Fit Index (AGFI) was 0.924, the Root Mean Square Error of Approximation (RMSEA) was 0.043, the Comparative Fit Index (CFI) was 0.963, and the p-value was 0.000. Based on these results, the overall structure of the model is satisfactory and accurately represents the relationship between the variables.

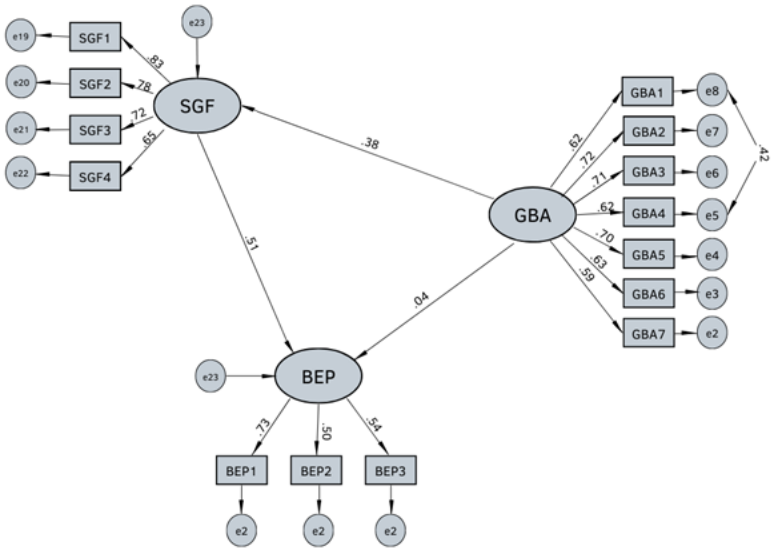

Fig. 1. Structural model with standardized estimates.

Hypothesis testing: As suggested in some studies conducted in Southeast Asian countries, there is a positive relationship between GB practices and banks' green initiatives. Particularly, the authors of such studies report an improvement in banks' environmental performance because of the activities they carry out to reduce the negative impact of their operations regarding paper use, carbon emissions, and energy consumption (Aziz & Naima, 2021; Zheng et al., 2021). It has also been demonstrated that banks can have positive effects on local communities by promoting GB activities and training in waste management and ecology, operating in green buildings, and providing loans for eco-friendly projects (Siddik et al., 2016). Considering these arguments, the following research hypotheses are put forward:

H1: GB activities have a significant impact on banks' environmental performance.

H2: GB activities have a significant impact on the sources of green financing.

H3: SGB have a significant impact on their environmental performance.

H4: The relationship between GB activities and banks' environmental performance is significantly influenced by their sources of green financing.

The hypotheses were tested using the SEM, and the results of such testing are shown in Table 6. All the hypotheses presented a significance level below 0.0001. According to the results, H1 was accepted, which means that GB activities have a significant impact on banks' environmental performance (b=0.272, p<0.01). H2 was also accepted, indicating that GB activities have a significant impact on the sources of green financing (b=0.402, p<0.01). Likewise, H3 was accepted, which suggests that the sources of green financing have a significant impact on their environmental performance (b=0.489, p<0.01). H4, however, which states that the relationship between GB activities and banks' environmental performance is significantly influenced by their sources of green financing, was not found to be statistically significant (b=0.043, p<0.01).

Table 6. Hypothesis testing.

Hypothesis	Path	Standardized Estimate	Decision
H1	GBA→BEP	0.274***	Accepted
H2	GBA→SGF	0.392***	Accepted
H3	SGF→BEP	0.512***	Accepted
H4	GBA→SGF→BEP	0.185	Rejected

With these results, and according to the hypothesis H1, we find that investments in renewable energy, recycling projects, and waste management (GBA) have an impact of 0.38 on the BEP. According to Wang et al., (Wang et al., 2021), the implementation of institutional policies is an indicator of good practices and is relevant when measuring sustainability indicators. These policies have a positive impact on the perception of the company.

Likewise, based on the acceptance of hypothesis H2, we assume that Green Banking Activities (GBA) have an impact on Sustainable Green Finance (SGF). In other words, by engaging in activities within the company's environmental policy, it influences the interest of banks in developing projects for their stakeholders focused on

energy consumption, recycling, and waste reduction. Sharma and Choubey (2022b) argues that banks' commitment to green policies should start within their own facilities but should transcend to the development of projects that have a broader scope, where their sustainable interests are reflected in society.

We can also establish that having investments in renewable energy projects, energy efficiency, recycling, or waste management (SGF) has a positive impact on the BEP. The transformation of banking institutions, in addition to willingness, requires resources to be invested in pursuit of sustainability. This investment is understood as an investment that will be rewarded in terms of reputation and social impact (Gilchrist et al., 2021).

Finally, hypothesis H4, which suggests a significant relationship of influence between Green Banking Activities (GBA) and Banking Environmental Performance (BEP), is not accepted.

Discussion

Although GB has gained popularity thanks to the implementation of the SDGs and the creation of green financial indicators based on sustainability, there are still concerns regarding its true extent and that of banks' green banking practices. As stated by Chitra and Gokilavani (2020), green banks and their projects related to green financing only extend to customers who meet specific requirements, making this issue and its focus exclusively directed at a limited group, which goes against the principles of equity and sustainability promoted by the transformative innovation frames and the UN in its SDGs. Notwithstanding, authors such as Miroshnichenko and Mostovaya (2019) and Chen et al. (2022) emphasize that the purpose of creating green loans as an incentive for those who develop green projects is to raise environmental awareness and encourage the adoption of sustainable practices through green financing, where all businesses are accountable for their carbon footprint.

According to the results of this study, the relationships between the variables under analysis have positive effects, which is contrary to what was reported by Zhonglu Chen et al. (2022), who claim that green loans and green financing have negative impacts on administrative costs. In addition, these authors state that green loans and green financing are a result of regulatory pressures and do not adequately reflect the economic gains for banks beyond cost savings from managing physical resources in bank branches.

Conclusion

By identifying the causal relationships generated by Green Banking Activities (GBA) on Banking Environmental Performance (BEP) and Sustainable Environmental Financing (SEF), it can be concluded that the "green" concept of banks should be applied internally within the organization. This entails developing policies that transform and improve daily activities based on sustainable principles, leading to improvements in energy consumption reduction, carbon emissions, and increased investments in eco-friendly projects.

The results of this study demonstrate that GB activities have a positive and significant impact on banks' green financing, as well as on their environmental performance, which confirms the validity of hypotheses 1, 2, and 3. According to this, GB practices play a crucial role in banks' effort to reduce environmental pollution and maintain their reputation as supporters of green causes and sustainable growth. These findings are in line with those of Chen et al. (2022) and Zhang et al. (2022), who also highlight the positive effects of GB activities in their studies conducted in other developing countries.

These findings are useful for academics, banking institutions, and policy makers in Colombia and in other economies that are also transitioning to GB because, by understanding the positive relationships between green financing, environmental performance, and GB activities, they could assist banks and nations in improving their environmental outcomes. These benefits can be translated into reduction of environmental risk (by incorporating environmental criteria into their investment and lending decisions, banks can mitigate the risks associated with projects that may have a negative impact on the environment), improvement of energy efficiency (banks can promote energy efficiency practices among their clients by encouraging the adoption of technologies and processes that are more efficient in terms of energy consumption), promotion of investment in renewable energy (banks can play a key role in financing renewable energy projects. By providing financing for these initiatives, banks contribute to the development of cleaner and more sustainable energy sources), promotion of corporate social responsibility (promoting transparency in environmental information disclosure, supporting community projects related to sustainability, and fostering ethical and socially responsible business practices) and generation of competitive advantages (increasingly, consumers value the environmental responsibility of financial institutions and prefer to partner with those that demonstrate a clear commitment to sustainable financial practices).

Importantly, GB has been extensively researched and explored in countries such as Bangladesh, India, and China, where several qualitative studies have been conducted and have provided tools and models to be replicated in emerging economies. In Colombia and Latin America, however, there is little literature and scholarly interest in the subject. Moreover, during the data collection process, participants were found to be unfamiliar with the terms "green financing" and "green banking," although they were aware of the actions that they can take to support these practices.

One of the limitations of this study is that the questionnaire was only administered to bankers from the main financial institutions in Colombia, which have already been identified as leaders in GB. Hence, future research could consider other groups of interest and other types of organizations (e.g., financing firms, neobanks, cooperatives, and state-run banks) to gain a more comprehensive understanding of the relationship between the variables under analysis.

Abbreviations

AVE: average variance extracted
SDGs: sustainable development goals
GB: green banking
GBA: green banking activities
BEP: banks' environmental performance
SGF: sources of green financing
EFA: exploratory factor analysis
SRMR: standardized root mean square residual
TLI: Tucker–Lewis index
IFI: incremental fit index
RMSEA: root mean square error of approximation.
GFI: goodness-of-fit index
CA: Cronbach's alpha
SEM: structural equation modelling
PCBs: private commercial banks
CFI: comparative fit index

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