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Greening the Ledger: Green Banking Practices and Financial Performance in Pakistan's Commercial Banking Sector

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Abstract
Emerging financial institutions are under increased pressure to integrate environmental sustainability in core business. This paper reviews the empirical studies on the link between green banking practices and financial performance of commercial banks in a systematic way, especially the banking sector in Pakistan. The review shows that profitability (return on assets and return on equity) and market valuation (Tobin's Q) of green banking are positively related, with most empirical studies demonstrating this, based on 38 studies from a larger screened pool, operating primarily through operational efficiency, lower non-performing loan ratios and better stakeholder engagement. There are also some studies with small, though significant, negative short-term impacts, which were linked to high initial capital needs and variable regulation enforcement. Green financing and stakeholder engagement are two mechanisms which have the highest frequently found mediation between green banking practices and financial outcomes, while regulatory stringency is found to be one of the moderating factors that varies according to institutional context. On this synthesis, the paper proposes a conceptual framework and a series of testable hypotheses that would be useful for future panel data research specific to Pakistan and suggest the empirical design for such research. The paper provides a unified, conceptually coherent description of a body of literature that has been scattered over countries, institutional categories and performance measures.

Keywords: *Commercial Banks, ESG, Financial Performance, Green Banking, Panel Data, Sustainable Development Goals (SDGs), Stakeholder Theory*

1. Introduction

Financial institutions around the world have had to rethink their role as intermediaries, due to environmental degradation and climate related risk. There is a shift in the criteria used to evaluate banks, as they are expected to not only be profitable but also have a good management of the environmental impact of their activities as well as the projects they fund (Adil et al., 2024). This change has led to the introduction of the green banking concept which encompasses paperless processes, energy efficient infrastructure, green lending guidelines, environmental risk screening during credit appraisal etc. Green banking is acknowledged as a contribution by the financial sector to the United Nations Sustainable Development Goals (SDGs), namely SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure) and SDG 13 (Climate Action), because financial institutions can direct investments into, or out of, environmentally sustainable economic activity.

Pakistan is especially vulnerable to climate risk and its banking sector is nascent in the stage of formal green banking regulation. The State Bank of Pakistan released Green Banking Guidelines in 2017 but in Pakistan, implementation of the green banking policies is inconsistent and there is limited empirical evidence of their association with the financial outcomes compared to other markets, like Bangladesh, China, and Indonesia where the relationship between these policies and financial outcomes has been studied more extensively (Bose et al., 2021; Lindblom, 2022; Siswanti et al., 2024).

The published work is also split. Most papers have shown a positive relationship between green banking and profitability indicators like return on assets (ROA) and return on equity (ROE), which they argued was due to better operational efficiencies and risk management.Most studies have reported positive relationship between green banking and profitability measures such as return on assets (ROA) and return on equity (ROE) and explained that this was because of the improvement of risk management and operational efficiencies. However, a lesser number of studies reveal no or even adverse short-term impacts, suggesting that the initial capital expenses for implementing green technology are significant (Budiarto et al., 2023; Galán & Tan, 2022). This disparity, together with the lack of any specific studies based in Pakistan, calls for the current research.

1.1 Problem Statement

Although the State Bank of Pakistan provided regulatory guidance for green banking practices, to date, there is no single empirical evidence whether the green banking practices provide any measurable financial benefits for commercial banks operating in Pakistan. Current Pakistani research on green project screening, for example, by Mohammad and Khan (2022), is limited in scope and lacks empirical testing of the practice-performance relationship with the panel financial data. This leaves an opportunity for academic research and policy making.

1.2 Objectives of the Review

The objectives of the Review are to:

a. To collate empirical evidence of the impact of green banking practices on bank profitability (ROA and ROE).
b. To provide evidence-based findings on how green banking practices affect the market value of banks (Tobin's Q).

c. To uncover the mechanisms (mostly green financing and stakeholder engagement) that buffer the link between green banking practices and financial performance.
d. To test the moderate effect of regulatory regimes over various institutional settings.
e. To find out the lacunae in the literature and to suggest a conceptual framework and hypotheses to be tested in future empirical studies in Pakistan.

1.3 Significance of the Review

In this paper, I make three contributions to literature. First, it brings together a body of evidence from fragmented sources from Bangladesh, China, Indonesia, India and Pakistan into a thematic synthesis of the evidence in the context of banking in Pakistan. Second, it uncovers mediating and moderating mechanisms – green financing and regulatory stringency – that are common across studies but are not typically discussed in the same review (Jillani et al., 2024; Ojha, 2025). Thirdly, it brings the synthesis to a practical level of concreteness and testable hypotheses that can guide bank policymakers and regulators like the State Bank of Pakistan for future policy and research.

2. Review Methodology

The method used for this paper is a systematic literature review. In order to answer the original research question, "How do green banking practices affect financial performance?" Direct practice-performance link, the mediation of green finance, and the moderation of regulatory regimes were extended to three additional search statements for the impact of green banking practices on financial performance, specifically from Pakistani commercial banks. These queries were conducted in a large multiprofessional research database, with specific inclusion and exclusion criteria, and an initial group of 73 candidate papers was retrieved.

This first pool was enlarged using citation chaining (both backward and forward) to capture more background papers and more current studies that cite them for a more comprehensive pool to use for further studies. This resulted in 130 additional papers from which candidates were drawn. The candidates were then marked for relevance with respect to the research question with 129 papers found relevant and 59 papers were rated as highly relevant. For the thematic synthesis in Section 3, 38 different empirical studies within this pool have been identified and selected that directly address empirical challenges of both green banking practices and financial performance outcomes at the bank level.

The review is not necessarily chronological; the same performance measures (ROA, ROE, non-performing loan ratio, cost-to-income ratio, and Tobin's Q) appear over time and in various studies from a variety of countries. Section 3.6 provides a chronological reading to illustrate the evolution of the research interest in this area.

3. Literature Review and Findings

3.1 Green Banking and Profitability

Empirical studies generally suggest improved profitability performance of green banking based on the adoption of green banking. The empirical studies generally reveal a positive association between adopting green banking and profitability performance measures. Adil et al. (2024) concluded that, in Pakistan, green banking is statistically significantly related with bank profitability and Aslam and Jawaid (2022) observed that adopting green banking practices has a positive impact on financial and operational performance. Similar results are reported worldwide: Ireen et al. (2022) and Hossain et al. (2020) report

a positive correlation between green banking practices and RoAs as well as RoE among banks in Bangladesh, whereas Bose et al. (2021) attribute this correlation mostly to cost efficiency gains.

However, findings are not consistent. The implementation of green banking in Indonesia does not immediately impact bank profitability, as shown by Budiarto et al. (2023), and the empirical results of Nguyen and Phan (2025) reveal that there is no evidence that green credit policy positively affects bank profitability in Vietnam despite the quality of bank loans. This is in line with the findings by Hasanah and Hariyono (2022) that there is no relationship between green financing and the return on assets of Islamic banks. The profitableness effect of green banking might be time-dependent, bank dependent or institutional maturity dependent, which indicates that it may not be everywhere.

3.2 Green Banking, Risk, and Asset Quality

Some studies have been correlated green banking with asset quality. Sauletkan and Kuanova (2024) show that green finance boosts risk management capability and lowers the environmental and social risk costs; Lindblom (2022) reports that the green credit policy in China contributed to an increase in bank profitability in part due to a decrease in non-performing loan ratios. Gangwani and Kashiramka (2024) conclude that there is a negative association between banks' ESG disclosure scores and insolvency and banks' leverage risk. On the other hand, Mouti et al. (2025) suggest that a higher degree of environmental risk exposure is linked to a drop in profitability and lower solvency, which means that the risk channel may run either way, depending on the nature of a bank's green exposure.

3.3 Green Financing as a Mediating Mechanism

The third area of concern is Green Financing, an intervening factor.

A common finding in the literature reviewed is that the direct impact of green financing is not directly found to impact performance but rather the impact of broader green banking practices is found to have a channel effect on performance. Jillani et al. (2024) identified that stakeholder influence is the mediating factor between the green banking practices and bank performance and Hazmi et al. (2025) found that green banking impacts sustainable bank performance particularly via green finance. Such a mediating position aligns with the stakeholder theory, which posits that banks meet the expectations of green-minded investors, regulators, and customers, and finance projects that are environmentally sustainable, thereby enhancing financial results.

3.4 Regulatory Environment as a Moderator

Regulatory context seems to play an important role as a moderating variable between the green banking-performance relationship. Bose et al. (2021) explore the mandatory green banking regulatory regime in Bangladesh, and it does strengthen the relationship between green banking performance and financial outcomes, while Mohammad and Khan (2022) find that the implementation of green project screening policy in Pakistan has led to a reduction in NIE and thereby to an improvement in loan ratios after the policy was introduced. Concurrently, this review reveals that regulatory frameworks can also cause high costs at the beginning of implementation, which reduces the time until financial benefits, thus potentially the moderating effect can vary according to the design and implementation of the regulatory framework.

3.5 Conventional versus Islamic Banking

A comparison between conventional banking and Islamic banking.

There is a less stream of literature which has done comparative study between conventional and Islamic banking response to the green mandates. The findings show that the implementation of green banking has significant relations with Islamic banks profit in Indonesia, whereas Hasanah and Hariyono (2022), who also examined an Islamic banking context, revealed that green financing was not found to have a significant influence on ROA. Islamic banks' greater tendency to be environmentally friendly can be attributed to their adherence to the Maqasid Shariah, as suggested by Julia and Kassim (2020), but the empirical investigations of the link between Islamic banking and financial performance have reported mixed findings. This distinction is directly linked to the sample design for the proposed study as the banking sector in Pakistan has a significant presence of Islamic banking.

3.6 Research Gap

The literature presented here indicates three conclusions that are pertinent to this review. First, the relationship between green banking and profitability is not a universal one and is susceptible to the time frame and institutional framework. Second, green financing and regulatory stringency are mechanisms rather than an effect, and rarely have been tested together in one model specific to Pakistan. Third, there is limited panel data evidence from the commercial banking sector of Pakistan, rather than from single-country studies, such as in Bangladesh, China or Indonesia. The conceptual framework and the hypotheses presented in this paper aim at directly addressing that gap.

4. Theoretical Framework

The present research is based on three theories that are prevalent in the literature on green banking and are used throughout. As per the resource based view, the green banking capability is considered as an intangible asset of the bank, which can create competitive advantages and enhance the financial performance of the bank (Aslam and Jawaid, 2022; Gangwani and Kashiramka, 2024). Stakeholder theory provides a rationale for green practices in banks: to fulfill the demands of investors, regulators, and increasingly customers who are more environmentally aware, as described by Jillani et al. (2024) and Hazmi et al. (2025). Legitimacy theory is complementary to this, as it sets the green disclosure and green lending as a response to societal and regulatory demands, safeguarding the bank's long-term operating licence and its reputation.

These three lenses validate the structure that this study proposed: green banking practices are a strategic resource (RBV) that is used by banks to respond to stakeholder and legitimacy pressures, which is then translated through the channel of green financing into banks' financial performance, and is moderated by the regulatory environment.

5. Conceptual Framework and Hypotheses

The proposed conceptual model is that green financing serves as a mediator between green banking practices and financial performance while regulatory stringency is considered as a moderator between the variables. The control variables used in the study are those variables which are consistently mentioned in the reviewed literature such as bank size, leverage and non-performing loan ratio (NPLR) (Gangwani & Kashiramka, 2024; Ramdani et al., 2023).

5.1 Hypotheses

H1: There is a significant positive relationship between green banking practices and ROI of Pakistani commercial banks.

H2: There is significant positive relationship between the green banking practices and ROE of commercial banks in Pakistan.

H3: Green banking practices positively significantly affect the Tobin's Q of commercial banks in Pakistan.

H4: Green financing mediates the relationship between green banking practices and financial performance.

H5: The relationship of green banking practices and financial performance is mediated by regulatory stringency.

6. Proposed Methodology for Future Empirical Testing

6.1 Research Design and Philosophy

The study uses a positivist approach with a quantitative research design, adhering to the research method used by most of the literature reviewed. Most of the literature reviewed uses panel data regression to test the relationship between practice and performance (Gangwani & Kashiramka, 2024; Ramdani et al., 2023; Mohammad & Khan, 2022).

6.2 Population and Sample

The target population is Commercial Banks (Conventional and Islamic Banks) listed on the Pakistan Stock Exchange for a proposed time of 10 years (2015-2024). This timeframe includes the years prior to and following the issuance of the State Bank of Pakistan (SBP) Green Banking Guidelines in 2017, which can be analysed as part of the moderating analysis. The final sample size will be determined when data is collected following annual reports and SBP disclosures.

6.3 Data Sources and Variable Measurement

Data will be gathered from audited annual reports, sustainability reports and from publications of the State Bank of Pakistan. Content analysis of annual and sustainability reports will be used to create a Green Banking disclosure index, similar to the disclosure-index approach adopted by Khan et al. (2021) and Ireen et al. (2022). As in most of the literature reviewed in Section 2, the financial performance measures will be return on assets, return on equity, and Tobin's Q. The disclosure of the value or share of green loans in the total loan portfolio will be used as proxy for green financing, while regulatory stringency will be captured via a period dummy variable which contrasts the two guideline periods (pre-2017 and post-2017).

6.4 Model Specification

The baseline model for testing H1-H3 takes the following general panel data form, estimated separately for each performance measure:

$Performance_it = \beta_0 + \beta_1(GreenBanking_it) + \beta_2(BankSize_it) + \beta_3(Leverage_it) + \beta_4(NPLRatio_it) + \varepsilon_it$

where i indexes the bank and t indexes the year. The mediation model for H4 will follow a standard three-step approach, and the moderation model for H5 will introduce an interaction term between the green banking index and the regulatory-period dummy.

6.5 Estimation Technique

The study will follow the standard methodology used by authors in this literature, such as Gangwani & Kashiramka (2024), Gaba & Sharma (2024), Ramdani et al. (2023), and estimate both fixed-effects and random-effects panel regressions; the Hausman test will be employed to determine which specification is the more appropriate. Considering the repeated literature review results that there could be a relationship between green banking and financial performance which can be jointly determined, robustness checking will be carried out by using System Generalized Method of Moments (GMM) estimation to overcome the potential endogenous and reverse causality.

6.6 Limitations

Just like other studies reviewed in the literature, the study will rely on the extent of voluntary disclosure of green information in the annual reports of banks in Pakistan which may differ from bank to bank (Ireen et al., 2022; Julia & Kassim, 2020). Findings will also pertain to the Pakistani regulatory and banking environment and may need to be generalized with caution.

7. Discussion

The findings from the literature reviewed here all reach an overall conclusion: green banking is ultimately a value-enhancing business model and not a pure cost centre, although the quantitative and qualitative dimensions of the resulting financial impact differ significantly due to a variety of factors, including time horizon, institutional context, and the way in which green banking is measured. Longer observation windows and more developed regulatory environments, like Bose et al. (2021) on Bangladesh, or Lindblom (2022) on China, generally yield more unambiguous positive effects via cost efficiency and NPL reduction. The upfront impact of green banking is less likely to be found in earlier stages of green banking adoption, as per Budiarto et al. (2023) in Indonesia, consistent with that of an investment-style where the impact can only be measured after the initial investment.

This phenomenon has a very significant implication for Pakistan. The State Bank of Pakistan's Green Banking Guidelines have been granted in 2017, making the Pakistani banking sector more at the early adoption stage of those studies that took place in Indonesia (Budiarto et al., 2023) and Vietnam (Nguyen & Phan, 2025), in comparison to the more developed regulatory environments in Bangladesh and China. Therefore, a Pakistan specific empirical study should be designed to assess instant and delayed impact of green banking practices on financial performance, not a contemporaneous relationship between green banking practices and financial performance.

Moreover, the relationship between green financing and stakeholder engagement as mediating factors has been consistently identified (Jillani et al., 2024; Hazmi et al., 2025), which implies that the direct-effects model would underestimate the relationship. Likewise, the moderating effect of regulatory

stringency (Bose et al., 2021; Mohammad & Khan, 2022) suggests that combining pre- and post-guideline years without being mindful of the regulatory change could lead to an underestimate of the effect. The two observations directly support the mediation and moderation hypotheses (H4 and H5) presented in Section 5.

8. Limitations of the Review

This review has its limitations, typical of systematic literature reviews. First, it is limited to studies that have been included in the databases where it is searched and may not include non-English language studies such as Urdu language studies on Pakistani banks that are published but not included in the databases. Secondly, the size of the primary studies is diverse, with many focusing on limited sub-segments and different time periods, along with various definitions and methods of operationalising green banking, which constrains the quality of any qualitative synthesis of effect direction. Thirdly, it is noted from Section 3.6, very few of the reviewed studies have been conducted specifically in Pakistan, this is not a weakness of the review process but is rather the intent of this review.

9. Conclusion and Implications

The current review aimed to synthesize 38 empirical studies on the link between green banking practices and bank financial performance with special focus on commercial banking sector in Pakistan. The overall pattern indicates that a positive (but not necessarily unconditional) relationship between green banking adoption and profitability and market valuation is mediated primarily by green financing and stakeholder engagement, and moderated by the level of regulatory enforcement. The largest differences between studies occur regarding the short-term costs and the uncertainty about green disclosure.

From a bank management perspective, the synthesis recommends that green banking investment should be assessed on a long-term basis rather than short-term, quarterly basis, and that the disclosure of green financing is transparent and likely to enhance, not only report, the financial gains of adopting green banking. With respect to regulators, especially the State Bank of Pakistan, the review indicates that with consistent and clearly defined guidelines in green banking, the time required for the initial cost of adoption to be recovered will be reduced.

The key contribution of the paper is the conceptual framework and hypotheses proposed in Section 5 that serve as a direct basis for the panel-data study proposed in Section 6. Based on the paucity of the empirical testing for such hypotheses in Pakistan found in this review, it is recommended that further research be conducted in this stream using empirical data on financial and disclosure practices of banks listed on the Pakistan Stock Exchange.

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