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Green Finance and Profitability of Banks: An Empirical Study of Banks in Pakistan

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Abstract

In the last two decades, green banking and sustainability of banks have emerged as important concepts in response to dealing with climate change and nations are expected to respond responsibly. However, developing countries are still far behind the expectations. The fundamental reason behind this low compliance is the financial matrices of banks, such as the profitability of banks. Most of the management of the banks believe that green banking and financing for sustainable projects might not lead to profitable banking; however, the picture might be different. Therefore, this study investigates the relationship between green finance and the profitability of banks in Pakistan. To get more accurate responses, this study focused on those banks that have already practiced these concepts in their systems. A sample of 460 employees working in 14 different banks was selected through cluster sampling from the main branches of Islamabad and Rawalpindi regions. SmartPLS 4.0 was used to assess the relationship between two latent constructs. Findings revealed that green financing has a strong positive influence on financial performance of these banks. These findings support the assumption that investing in sustainable projects can enhance the long-term profitability of banks. This study can motivate those banks that are still thinking about the adoption of these concepts in their system due to misconceptions about these inevitable changes to overcome the issue of climate change and ultimately get financial stability.

Keywords: Climate change, Green banking, Green finance, Profitability of banks, Scale validation

Introduction

Environmental experts contend that climate change (CLC) is a complex phenomenon and should not be considered as only an environmental concern. It can influence all domains of life: political, personal and financial (Qazi, Niazi, Saleem, Basit, & Ahmed, 2023). Its multifaceted nature instigated experts in various fields, leading to the creation of an enormous amount of literature that tried to answer associated questions related to this phenomenon. A substantial proportion of this literature has been trying to provide the best practices and solutions for environmental degradation and preservation of the natural environment (Malhi

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et al., 2020). With the involvement of the World Bank, CLC got priority from the financial sector, especially banking systems. This system has to adopt their suggestions and try to align itself with international markets (Sachs, Woo, Yoshino, & Taghizadeh-Hesary, 2019).

The global banking sector faces pressure to embrace sustainable practices in response to environmental concerns (Ringel & Mjekic, 2023). However, it should be kept in mind that managing CLC-related issues needs enormous investments and cannot be dealt with solely by any Government (Park & Kim, 2020). The financial sectors, especially banks, need to work proactively. In compliance with these issues, a relatively new concept was introduced by the banking industry called green banking (GB). The concept gained prominence in the early 21st century as a proactive response by financial institutions to address ecological challenges (Siddik, Yong, & Sharif, 2023). However, this response is still in the primal stage, especially in the field of climate finance or green finance (GF) (Park & Kim, 2020). Therefore, it is not a simple phenomenon to study and implement in banking sectors, especially in developing countries like Pakistan.

Recent studies have highlighted that banks can play an essential role in promoting sustainable activities by investing in renewable energy projects and providing eco-friendly mortgages and loans to consumers which is collectively called GF. These offers and products can help financial institutions attract socially conscious customers who are becoming increasingly concerned with sustainability and the environment (Anis, Gani, Fauzi, Hermawan, & Adhariani, 2023; Hossain & Kalince, 2014). These researchers contend t that GBP and GF contribute to a more sustainable future by reducing the adverse impacts that traditional banking practices have on the natural world and elevating the importance placed on social responsibility within the banking industry.

With the involvement of the Planning Commission of Pakistan and the State Bank of Pakistan (SBP), detailed suggestions and guidelines were introduced in the local financial system (Ghosh, Ghosh, & Chowdhury, 2018). However, the Pakistani banking system is still far behind in adopting GBP and GF, as a recent study highlighted that out of 41, only 14 banks were involved in GBP and GF initiatives (Qazi et al., 2023). There are various contextual factors behind this low adaptability in the literature. Lack of internal capacity, technology, capital cost and formal guidelines are considered the strongest barriers to the implementation of green economy concepts in Pakistani banks (Niazi, Qazi, Butt, Niazi, & Basit, 2023). It means things need to be addressed by following radical steps; otherwise, severe CLC will be the fate of this country.

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Especially in developing countries, banks are more concerned about their profitability. They need to raise their profits if they want to continue holding a significant position in the competitive industry. Because of the perceived cost or the unpredictability of the return on investment, certain institutions can require additional time before adopting GF. It is a fact that financial institutions are reluctant to embrace GF because they are concerned about achieving optimal levels of profitability. However, there is evidence that by implementing GF, financial institutions can considerably enhance their profitability and ensure their continued viability in the long run (Mirza, Umar, Afzal, & Firdousi, 2023). This can significantly help banks maintain their profitability and compatibility. Most of the literature highlighted the importance of GF in enhancing the sustainable performance of banks (García, Herrero, Miralles-Quirós, & del Mar Mirallles-Quirós, 2023; Sachs et al., 2019). It is generally obvious that banks are mostly interested in financial matrices like profitability of banks (PFB). Therefore, there is a need to examine the impact of GF on PFB so that those banks that are still in the process of adopting GF can be motivated. This is only possible if they are provided with local empirical evidence that GF can lead to PFB in the long run. No doubt, objective measurement of PFB is also an important concern in the literature. There are two scales that can help in measuring PFB (Al-Dalaien & Dalayeen, 2018; Inegbedion, 2024), but they need to be validated in the context of Pakistan. Therefore, this study has two main objectives (1) firstly, to validate the adapted scale of profitability of banks in Pakistani settings and (2) secondly, to investigate the influence of green finance on profitability of banks.

Methodology of Study

This is a quantitative study in which positivism philosophy was adopted to test the empirical relationship between GF and PFB. A well-structured questionnaire was used to collect the data through a survey-based strategy. This questionnaire was mainly based on two constructs, GF and PFB, in addition to some basic demographics. The GF scale was adopted from the recent literature (Chen, Siddik, Zheng, Masukujjaman, & Bekhzod, 2022). The scale for PFB was adapted from Inegbedion (2024) and Al-Dalaien and Dalayeen (2018). There is always a local aura that affects the scale, therefore, there happens to be a need of validating an adapted questionnaire in the in the local contest--Pakistan. Therefore, after the content and face validity of the items of PFB, statistical validity through exploratory factor analysis (EFA) was also performed using the pilot study dataset. After the construct validity, the reliability of the construct was also assessed through Cronbach alpha as suggested in the literature.

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Later, a detailed cross-sectional study was executed through sampling from banks in Pakistan that have been practicing the GB and GF. The list of these 14 banks was obtained from a recently published research article (Qazi et al., 2023). A sample of 460 bank employees was chosen from these banks through cluster sampling. The selected bank from Islamabad and Rawalpindi region was considered a cluster. Therefore, all employees who were working in these banks at the time of study and had more than 3 years of banking experience were selected as potential respondents of this study. The current research took this sample size for the study using relevant literature and the Daniel Soper formula (Soper, 2021). The study employed partial least square-based structure equation modelling (PLS-SEM) to assess the relationship between GF and PFB after the validation of these constructs. PLS-SEM is a combination of two types of models; measurement and structural model. SmartPLS 4.0 was used for the assessment of measurement and development of the structural model. Figure 1 exhibit the complete flowchart of the process.

Psychometric Evaluation of Profitability of Banks (PFB) Scale

Profitability of Banks (PFB) is the scale that was adapted from the literature. Items of this scale were retrieved from two sources, therefore, it was essential to perform the psychometric evaluation of this merged scale. A pilot study was executed on a sample of 100 bank employees after the face and content validity of merged items. Initially, there were 9 items on which experts provided their opinions in terms of representativeness and clarity. The content validity index (CVI) was also computed on these items. As per the opinion of experts there were 3 items which were overlapped and provided meaning which was not aligned with the context. Therefore, these 3 items were deleted. Later, the reliability and statistical validity of this scale were tested which is collectively called psychometric evaluation. All items of PFB were measured on a 5-point Likert scale. Now, in the subsequent sub-section, two types of evaluation for the PFB construct, reliability and validity of scale, were reported. A sample of 100 was chosen considering the guidelines of literature and statistical requirements for reliability and statistical validity assessment (Goretzko, Pham, & Bühner, 2021). This particular type of validity was assessed through EFA.

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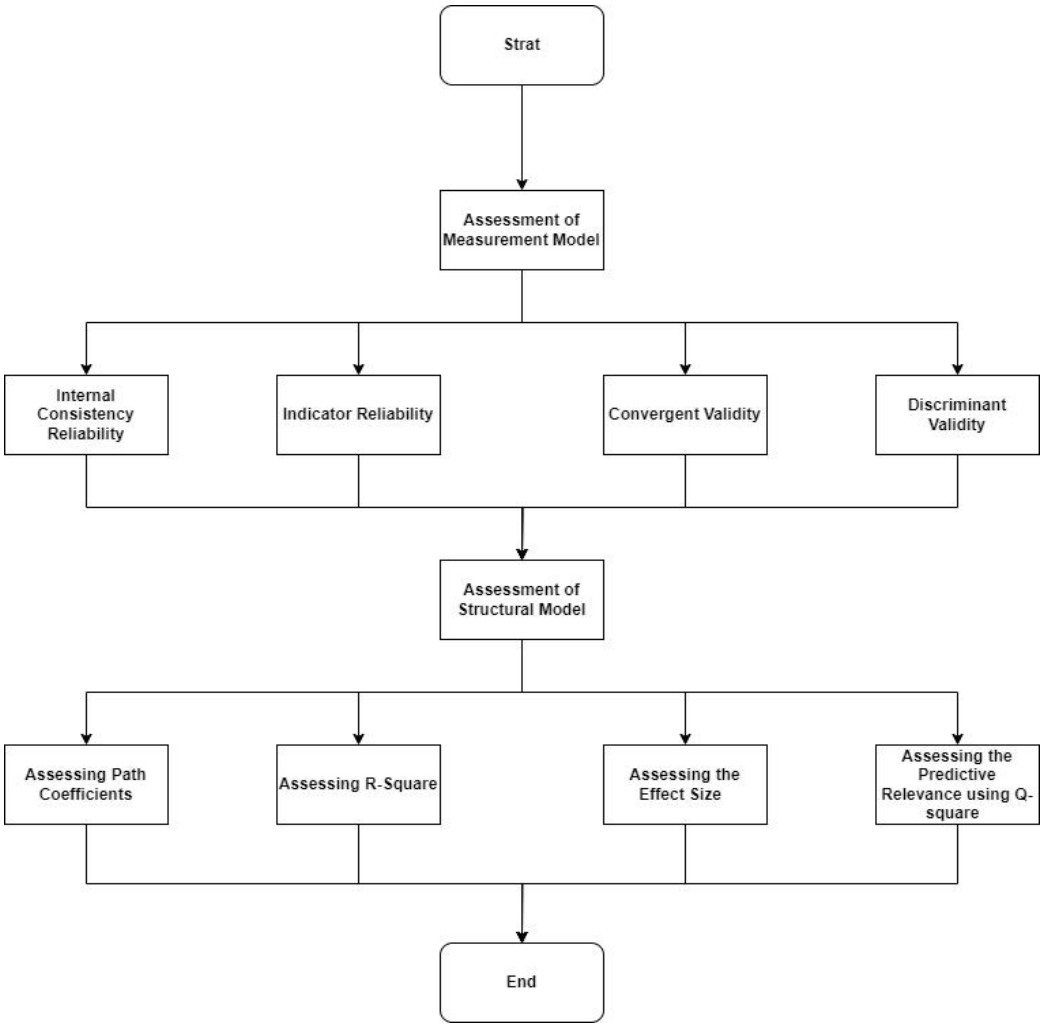

Figure 1: Flowchart for Developing SEM Model

Statistical Validity and Reliability of PFB

Factor analysis findings provided a one-factor solution (because only one factor has an Eigenvalue > 1.0). It means that assumed 6 items of PFB were placed in one group due to reflection of various dimensions of the same construct or factor. In EFA, the Kaiser-Meyer-Olkin (KMO) test showed that data is appropriate for performing EFA. Its recommended value should be ≥ 0.60 (Kline, 2014), and findings of the pilot study dataset showed the estimated value was 0.847, which reflected the suitability of the dataset for further processing. Similarly, Bartlett's test of sphericity also provided significant results with a p-value of 0.000, indicating data can be factorized. These two tests are important before the application of EFA (Kline, 2014). Furthermore, communalities, which are the indications of correlations among items of the scale, were also computed. All items provided values in the range of 0.652-0.714 which indicate that all items are contributing to the common variance that leads to good factor analysis (Table 1). Experts (e.g., Goretzko et al., 2021) recommend these values should

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be greater than 0.40. The item "*I think that my bank offers such green practices that help in retaining valuable customers"* was the most vital item in this analysis as it has the highest communality value. This single factor explained an amount of 68.81% variation which is higher than the recommended threshold ≥ 0.60. In simple terms, it means the 6 items of PFB are genuinely concentrated in a single factor and valid for further processing.

Table 2 reports the factor loadings of each item on the extracted single factor, PFB. The higher the value of factor loading higher the importance of that item in the factor composition. It means the item "*I think that my bank offers such green practices that help in retaining valuable customers*" is the most important item in this construct of PFB. All other items have also significant factor loads on the derived factor of PFB. It means this 6 items based scale of PFB can be processed further after reliability assessment. The overall reliability of the construct was 0.91 which is excellent as per guidelines in the literature where ≥ 0.70 is the recommended value (Sajid, Muhammad, & Zakaria, 2019). Findings of the pilot survey have shown that the 6 items of PFB significantly contribute to form this assumed factor, and this single factor can be used further in the main study as both psychometric properties have been fulfilled.

Table 1 *Estimated Communalities of Items and Total Variance Explained*

Questions	**Statements**	**Initial**	**Extraction**	**Initial Eigen values**	**% of variance explained**
PFB1	I think that my bank is operating profitably.	1.000	0.714	4.128	
PFB2	I think that my bank's non-performing loans are negligible.	1.000	0.675	0.740	
PFB3	I think that my bank is highly liquid.	1.000	0.652	0.389	
PFB4	I think that my bank is highly viable.	1.000	.651	0.330	68.806%
PFB5	I think that my bank offers such green practices that help in retaining valuable customers.	1.000	0.757	0.247	

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PFB6	I think that my bank offers green practices that help in reducing operational costs and enhance profitability.	1.000	0.680	0.165

Table 2: *Factor Loadings or Component Matrix*

Questions	Statements	Component
		1
PFB1	I think that my bank is operating profitably.	.845
PFB2	I think that my bank's non-performing loans are negligible	.822
PFB3	I think that my bank is highly liquid.	.807
PFB4	I think that my bank is highly viable.	.807
PFB5	I think that my bank offers such green practices that help in retaining valuable customers.	.870
PFB	I think that my bank offers green practices that help reduce operational costs and enhance profitability.	.824

Results of the Study

There are three qualitative variables in the demographic information. Results have shown that males are predominantly in large numbers (70.0%) as compared to their counterparts. Similarly, the majority (86.1%) of bank employees were married, and a significant count (66.3%) of employees have a Master's level of education. The average age of the participants was around 34 years with a standard deviation of 6.57 years. Further, the average total experience of the employees was almost 11 years.

Assessment of Measurement Model

There are two phases of SEM models as already described; measurement model and structural model. The first type of model is used when we have latent constructs and need to assess their convergent, divergent and composite reliability. In this study, the model has 2 latent constructs. Therefore, it is essential to assess the measurement model of the study. The measurement model mainly tests the validity and reliability of the proposed model's constructs (Joe F Hair, Ringle, & Sarstedt, 2011). This measurement will reflect the suitability of constructs in the proposed framework and later help to estimate the proposed structural paths.

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This assessment consists of two elements; validity and reliability (Joe F Hair et al., 2011). There are two types of validity which was assessed here; convergent and divergent. Individual factors loading or item loading and average variance extracted (AVE) have been used to assess the convergent or construct validity (Joseph F Hair, Risher, Sarstedt, & Ringle, 2019). Further, the Fornell-Larcker criterion, Heterotrait-Monotrait (HTMT) ratios and cross-loadings have been used to assess the divergent validity of all constructs. The reliability of constructs was assessed through composite reliability (CR) and Cronbach alpha. Here the measurement model has been presented with factor loadings and composite reliability of the constructs in Figure 2.

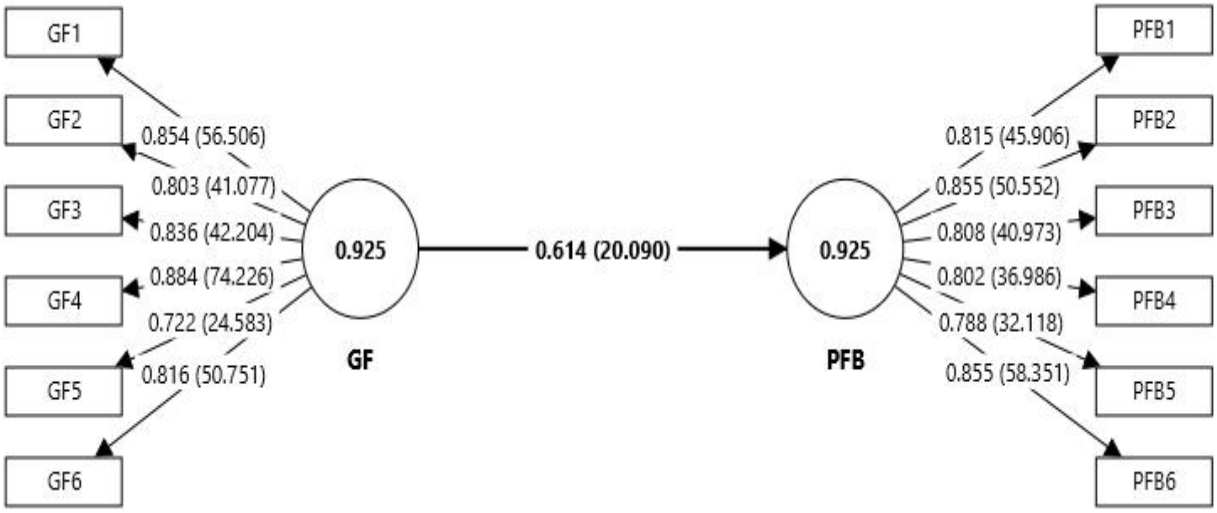

Figure 2: Factor Loadings and Composite Reliability of Measurement Model

Internal consistency reliability (ICR) of constructs in the measurement model was assessed through Cronbach alpha and composite reliability (CR). This study employed both of them as suggested by Joseph F Hair et al. (2019). Both types of reliability for both constructs have been reported in table 3. Both Cronbach alpha and composite reliability of both constructs are greater than 0.70, which means that both constructs, GF and PFB, are reliable. The indicator reliability of the construct is the next measurement in the measurement model. It is suggested that factor loading; the correlation between an item and its assumed construct, should be higher than 0.5 as per literature. However, on the safer side, SmartPLS used some higher levels of factor loadings, 0.708, which is based on the guidelines suggested by experts of PLS-SEM Hair et al., 2019). The findings have shown that factor loadings of both constructs have a sufficient amount of correlation or factor loadings as suggested in the guidelines (table 3 & Figure 2). Results have shown that this loading ranges from 0.722-

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0.884. It means both constructs have indicator reliability and there is no need to delete any item in the revised model.

Convergent validity is another important assessment in the measurement model. This validity explains the amount of correlation that observed items have to measure the same theoretical construct (Memon et al., 2021). This type of validity is measured through a test called average variance extracted (AVE), which is based on outer factor loadings, which are already explained in the previous subsection, indicator reliability of the constructs. The minimum value of the AVE for each reflective construct should be higher than 0.50. The findings of the measurement model (table 3) reported that both constructs have AVE values higher than 0.50. Therefore, both constructs of the proposed measurement model have a sufficient amount of convergent validity.

Table 3: *Results of the Measurement Model*

Constructs	Items	Outer loadings	Cronbach Alpha	CR	AVE
GF	GF1	0.854	0.903	0.925	0.674
	GF2	0.803			
	GF3	0.836			
	GF4	0.884			
	GF5	0.722			
	GF6	0.816			
PFB	PFB1	0.815	0.902	0.927	0.675
	PFB2	0.855			
	PFB3	0.808			
	PFB4	0.802			
	PFB5	0.788			
	PFB6	0.855			

Discriminant validity of constructs is the last assessment for the measurement model. This is another dimension of the validity of a construct in which it is assumed that a construct should discriminate from another construct in the same theoretical model. Cross-loadings, Fornell-Larcker (F&L) criterion and HTMT ratio were considered in this study to assess this very important type of validity (Hair et al., 2019). Outer loadings of each item on the intended construct should be higher than cross-loadings on other constructs. Table 4 shows that the cross-loading of all items is lower than the cross-loadings of other construct. We can view these cross-loadings vertically and horizontally in Table 4.

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Table 4. *Cross Loadings of Constructs Items*

	GF	PFB
GF1	**0.854**	0.491
GF2	**0.803**	0.462
GF3	**0.836**	0.520
GF4	**0.884**	0.552
GF5	**0.722**	0.364
GF6	**0.816**	0.590
PFB1	0.514	**0.815**
PFB2	0.459	**0.855**
PFB3	0.462	**0.808**
PFB4	0.475	**0.802**
PFB5	0.502	**0.788**
PFB6	0.592	**0.855**

Fornell-Larcker criterion examines the square root of the AVE values with the latent variable correlations. In order for the F&L criterion to be achieved, the square root of each construct's AVE should be greater than its highest correlation with any other construct. Table 5 shows the values of the F&L criterion and reflects that there is no issue of discriminant validity with these constructs. Lastly, the HTMT ratio was also assessed and its value was 0.665. Discriminant validity can be achieved if this ratio is less than 0.90. It means items of these two constructs have a sufficient amount of divergent validity, and now we can move to the next step of modelling: the structural model.

Table 5. *Findings from Fornell-Larcker Criterion*

Constructs	**GF**	**PFB**
GF	0.821	
PFB	0.614	0.821

Assessment of Structural Model

After assessing the measurement model, the researcher used the PLS algorithm to estimate the path coefficients, which are the relationship between exogenous and endogenous constructs. This model also determines the predictive capabilities of exogenous constructs in the overall structural model. Hair et al. (2019) suggested a systematic approach to estimating

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and interpreting the structural model. The subsequent sub-sections will elaborate on various components of this structural model.

In the SEM model, the coefficient of determination or R^2 is the amount of explained variation in the endogenous construct due to exogenous constructs. It means this measure is the reflection of the predictive strength of any model. It ranges from 0 to 1 and a higher value indicates the better model and vice versa. In this study, the R^2 value was 0.378, which is reflected in Figure 3. The model yielded a value of 0.378, which indicates a substantial value according to Cohen (1992); however, a moderate level was suggested by (Joseph F Hair et al., 2019). As we have only two constructs in the model, therefore only one path coefficient was computed and depicted in Figure 3. SmartPLS bootstrapping function was used to estimate the t-statistic corresponding to each structural path. Figure 3 shows that GF has a positive and significant impact on PFB because the regression coefficient was 0.614. The positive value indicates that the higher the amount of GF in the banking sector, the higher the PFB, and vice versa. In literature, in addition to $R^{2,}$ another important measure, which is called f^2 is also used to augment the concept of predictive capabilities of constructs. It determines whether or not an exogenous construct has a meaningful influence on the endogenous construct in the studied phenomenon. The computed value of f^2 can be explained through the following thresholds as discussed in the literature; values of 0.02, 0.15 and 0.35 are small, medium and large effects of excluded construct in the model, respectively (Cohen, 1992, 2016). A value less than 0.02 indicates no effect of construct in the model. This study's findings found that the relationship between GF and PFB had a sufficient amount (large) effect size (0.674). Overall, these findings showed that the assumed relationship between GF and PFB is confirmed through the SEM model.

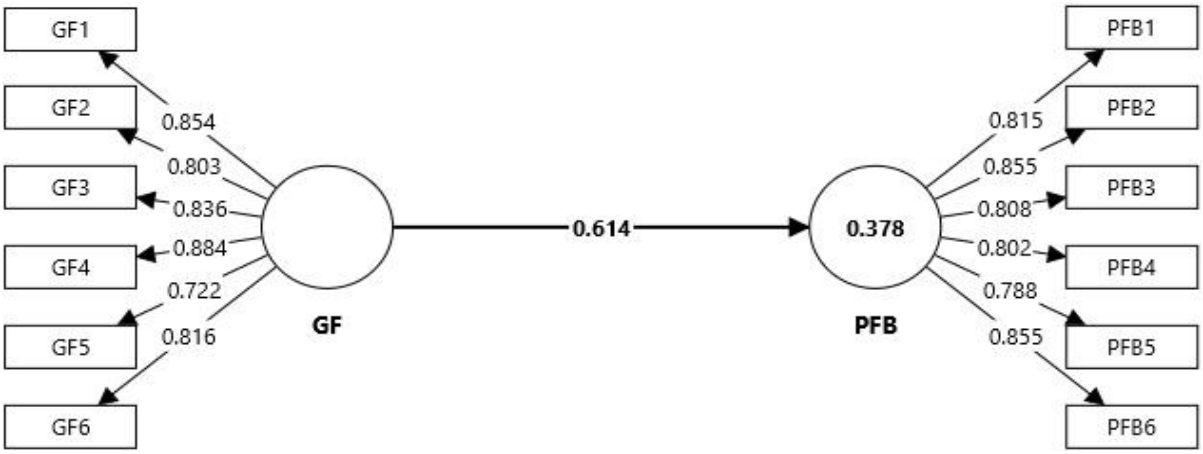

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Figure 3: Structural Model of the Study

Discussion

This study has focused on an important concern of the modern banking system; GF and its influence on PFB. This study has used a recently developed scale to measure the PFB. The validity of the data collection tools is always an important concern of practitioners. This study showed that the adapted scale of PFB can be used in a Pakistani setting. Further, GF is an important determinant of PFB in the long run. Generally, it was perceived that GB and GF are important practices for the sustainable performance of banks: environmental, economic and social sustainability. However, this study reflected that banks that have adopted the GF and its related practices believed that these strategies would help them achieve long-term financial profitability. This study has adopted a unique methodology by focusing on banks already on the track of GB and GF. It means the assumed relationship between GF and PFB will not be perceived anymore as the respondents of our study are those employees who are practicing such services. Further, the average working experience of employees was almost 10 years, which is an indication of middle-career employees. Therefore, it is quite possible to get mature responses from the respondents of the study.

This study found that PFB, which is generally measured through various financial matrices, can also be gauged through latent constructs as practiced in the literature (Al-Dalaien & Dalayeen, 2018; Inegbedion, 2024). Our study also augmented this fact because expert opinions and pilot study findings showed that the 6-item scale can be utilized in the banking sector. Generally, PFB is considered purely a financial and mathematical aspect of the banking system. A study conducted in Bangladesh with the PFB using various established proxies like return on asset, return on equity etc. and found that even these proxies are significantly associated with GF (Julia & Kassim, 2016). The current study assessed the cross-sectional PFB using general statements collected from employees. However, these statements are the reflections of this complex construct.

The study findings showed that GF can affect long-term financial matrices, such as PFB. The results of the current study are in line with the findings of the extant literature, which indirectly assumes that green banking practices and investments in sustainable projects can lead to long-term financial sustainability. The scholarly discourse surrounding the relationship between GF and the financial performance of banks has experienced a surge in interest during the past several years (Smith, 2020). Recent studies have investigated multiple facets of this phenomenon to comprehend the possible influence of environmentally

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sustainable financial practices on the financial efficacy of banking institutions (Chowdhury, 2023; García et al., 2023; Lee & Lee, 2022). One viewpoint emphasizes the possible beneficial association between GF activities and banks' profitability. It has been contended by scholars that the incorporation of environmental, social, and governance (ESG) factors into the process of making financial decisions has the potential to foster long-term financial stability and bolster profitability for banks (Eccles, Ioannou, & Serafeim, 2014; Scholtens, 2017).

The relationship between GF and PFB can be determined through GF strategies adopted by banks. The current study found that this relationship is positive and confirmed the hypothesized path. This means that GF has a dual role in terms of PFB: long-run and short-run. In the short run, these financing schemes build and redefine the image of banks and attract customers from the market ultimately enhancing the market worth of that bank. Conversely, it will achieve long-run profitability in terms of financial matrices. In the context of Pakistan currently, many banks have adopted these financing schemes and their employees have a good perception of their banks' short and long-run profitability. Further, they felt that their banks are pretty flexible and viable in funding green projects. Various banks like Allied Bank, Bank Alfalah, Bank Islami, United Bank Ltd, Habib Bank Ltd, MCB Bank Ltd. and Bank Al-Habib have received sufficient market-based recognition due to their continuous efforts in GBP and GF. Overall, these trends are inspiring; however, the adoption of these changes in the system is inevitable and needs radical steps by the State Bank of Pakistan, being the regulator of the whole banking system. The findings of this study can motivate and help in this regard to ensure the PFB in response to higher investments in sustainable projects.

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Conclusion

This study explored the positive influence of GF on PFB in with sample from banks in Pakistan. In simple terms, it means that GF is an important service for the PFB. However, banks need to understand the nature of these long-term investments and a quick grasp of customers from the market. It looks like a trade-off, but in the near future, both aspects will lead to PFB. There are a number of banks that recognize the true potential of this dual relationship and support such schemes. These banks already have a better position in the market and hold a big share of customers and, ultimately, finances, which indicates the benefit of introducing GF-based schemes. However, this is a long way that should be adopted by every bank in Pakistan to achieve long-term financial stability and contribute to achieving an ideal climate for future generations.

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