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Evaluation of Green Banking in Pakistan Using Framework of the Central Bank: Employing TOPSIS Approach

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Abstract

The purpose of current research is to evaluate commercial banks' performance regarding Green Banking (GB) practices using State Bank of Pakistan's (SBP) framework as criteria. The study aims to rank and compare commercial banks with respect to their acceptance, adoption and implementation of green guidelines issued by SBP. The research design comprises of systematic review of literature, data extraction and analysis. Literature review consists of overview of GB practices in global banking industry as well as local industry of Pakistan. SBP has issued guidelines and required its commercial banks to transform banking practices towards green practices as a step towards sustainable green economy. The study is cross-sectional; the data collection involves content analysis of annual reports of commercial banks of Pakistan for the year 2021. Out of total forty-one banks, fourteen banks are shortlisted, using purposive sampling method, that have disclosed information about their GB practices in their annual reports. Analysis is performed using Multi-Criteria Decision Making technique (MCDM) of 'Technique for Order Preference by Similarity to Ideal Solution' (TOPSIS). As per findings, Habib Bank Ltd. is at the top of bank rankings, Allied Bank is at the second and Soneri Bank is at the third rank in initiating, implementing, disclosing and obtaining positive outcomes out of their green banking initiatives. The study has implications for regulators, policy makers and practitioners. It can fill the gap in literature by adding a discussion on an important topic that is being ignored by previous researchers. The regulatory institution (i.e. SBP) can learn performance of its banks on GB guidelines. The practitioners can evaluate themselves on green practices scale and learn on how to improve their practices to perform better ahead of competitors.

Keywords: Green Banking, MCDM, Ranking, State Bank of Pakistan, TOPSIS

1. Introduction

Climate change not only affects our environment, rather, all the sectors of life viz. personal, political as well as financial. According to Kablana (2015), individuals as well as organizations are becoming increasingly concerned towards protecting and improving our natural environment from the harms of climate change. It is creating physical and transitional risk, specially, for the financial sector. Countries around the globe have taken initiatives to contribute towards environmental safety. For example China, has issued a series of green policies i.e. green tax, procurement, credit, insurance and green security policies. Among these 'green credit policy' is the latest (Aizawa & Yang, 2010). Another survey by Weber and Hurst (2016) revealed that environmental performance of Chinese banks improved during the period of 2009-2013 due to these green credit policies. To avoid climatic repercussions on financial sector, both private as well as public banks are taking steps i.e. adoption of climate protection and green financial strategies to address the implications of the climate change (Park & Kim, 2020). Major banks, both in the United States and globally, have begun to assert an active role in the transition to a low-carbon economy and the reduction of climate risk (Light & Skinner, 2021). Banks themselves have started efforts to be green (Light & Skinner, 2021). Banks can play a major role in transforming the financial system and adopting green practices for sustainable development. Organizational structure is important parameter for a paradigm shift. A study by Pertusa-Ortega et al. (2018) indicated that organizational design influences the environmental management initiatives. A survey conducted by Sharma and Choubey (2022) indicates that 63% of their bankers accepts the fact that banks participate in developing green products, 53% said that their banks adopt green practices in daily operations, 78% said that their banks adopt green Corporate Social Responsibility (CSR) initiatives and 60% believed green practices help banks in enhancing customers trust through green brand image. In fact, 'Going Green (GG)' or 'Green Banking (GB)' is a hottest trend to achieve environmental protection and sustainable development (Khan et al., 2016). The concept GB refers to adoption of paperless, technology-driven products and services, eco-friendly light system, solar powered ATMs, and digitalization of the bank's daily operations (Herath & Herath, 2019; Khan & Szegedi, 2019; Shah & Ali, 2022; Shah & Ali, 2023). Review of GB literature revealed several drivers of GB practices in banking industry viz. customers, employees, management, society, competitors etc. Among these drivers, stakeholders play an eminent role in promoting green economy, stakeholders' pressure influence institutions to adopt green practices. However, this pressure can't make institutions really go green, rather, the financial institutions setup superficial negative strategies to appear green. In fact, the institutions with socially responsible drive tend to adopt positive green measures in real sense (Allet, 2014). Apart from the role of the stakeholders, another survey of 322 private commercial banks in Bangladesh by Chen et al. (2022) revealed some other important drivers of green practices. The study concluded that bank' employees, daily-operations, and policy-related GB practices have significant positive effects on green financing. Customers are not aware of different forms of green banking and different procedures adopted by banks to use this concept such as green banking systems, green loans etc. (Borah & Baruah, 2020). Whether green banking initiatives are admired by customers is really dependent upon security, trust, convenience, ease of use, value creation and environmental & social concern features of green banking (Herath & Herath, 2019; Audi & Ali, 2023). As far as advantages are concerned, GB practices benefits banking sector directly and other sectors (viz. political, society and economy at broader level) indirectly. Researchers i.e. Hossain (2020) and Khan & Szegedi (2019)) are increasingly stressing on GB practices for sustainable developments as GB has positive relationship with financial performance. In return, GB adoption strengthens the relationship between CSR and going concern of banks (Dewi & Dewi, 2017).

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Other drivers of GB includes, GB-policy, daily operations, and investments (Rehman et al. 2021). A study by Majumder (2013) pointed out the factors that play important part in adoption of GB practices in Bangladesh, including environmental risk, technological change, CSR, technology, customer awareness, pressure from stakeholders, potential profitability, environment, risk acceptance, and brand image etc. (Javeria et al., 2019).

One takeaway that can be learned from above discussion of literature on GB is that, a plentiful research is available on GB adoption motives, GB benefits, GB implications, GB strategies. Furthermore, the majority of the previous researches address GB issue in the context of developed countries. It is being noted that research addressing the issues in adoption, implementation and its outcomes are scarcely researched in developing economies, especially in Pakistan (Rehman et al., 2021). Given the environmental threats posed by climate change, environmental protection has been the priority agenda of most of the countries. Emerging countries like Pakistan do not have strong environmental ministries and enough resources commensurate to implement vast level environmental protection strategies. However, central banks can be very influential in mitigating the environmental risk by way of dictating GB guidelines to commercial banks. Central banks of many countries, particularly where environmental protection is a serious concern, require decisive actions. Lindenberg and Volz (2016) pointed out that policy guidelines by the central bank positively influence GB adoption by commercial banks. Moreover, there is need of addressing the issue at the system level, as pointed out by the Governor of the Bank of England, Mark Carney (Bose et al., 2018). Pakistan is facing serious challenges in the face of environmental risk, but, it can avoid the pitfalls posed by environment deterioration caused by global warming and greenhouse emissions by adopting sustainable and green practices in banking industry (Khan & Szegedi, 2019). Systematic review of literature on green initiatives in Pakistan by Jafer et al. (2021) indicates that SBP has issued guidelines for commercial banks to transform country economy towards climate-resilient and low carbon economy. However, Pakistan is in early stages of adopting GB practice and much more work is needed to be done in this context (Mumtaz & Smith, 2019). A recent survey on green banking practices by Sarma and Roy (2021) stressed on the fact that more literature needs to be added on green banking as there are only 178 articles present in different research repositories. As per finding of the survey, interest in green banking was on a rise since 2011 and was the highest in 2015. Asian countries' contribution is the highest i.e. 25.44%. Furthermore, theoretical studies are more than empirical ones. Rai et al. (2019) also stressed that more research work is needed in the context of green banking. Therefore, it is need of the hour to address this hot issue raised by previous researchers. The current study aims to expand frontiers of green banking literature and is designed to evaluate banks' acceptance and implementation of GB guidelines issued by SBP. To be precise, the objective of current study is to evaluate, rank and compare commercial banks in Pakistan on the basis of green banking guidelines issued by SBP using these guidelines as criteria and TOPSIS as a research methodology. Out of considered methodologies viz. AHP, VIKOR, SWARA, GRA etc. TOPSIS sets best in problem like in hand. It is preferred due to its advantage of selecting best alternative that is nearest to ideal solution. A comparative analysis of chosen methodology with other MCDM techniques is provided in Appendix A. Rest of the paper is organized in the sequence of literature review, methodology, analysis & results, discussion and conclusion.

2. Literature Review

This section gives readers a brief overview of the subject understudy in available literature. Literature review involves collecting, sorting and reviewing latest and relevant peer-reviewed research publications available on renowned research databases such as SpringerLink, JStor, Willey-Blackwell, ScienceDirect (Elsevier), Taylor & Francis, Sage, Emerald, MDPI etc. Literature collection was performed using keywords related to the phenomenon including green banking, green banking initiatives, SBP green banking guidelines, green banking trend, banks' performance, eco-friendly banking, sustainable banking etc. As a result of search, we found more than 300 research articles and after screening, the highly relevant seventy plus papers have been reviewed thoroughly, out of which, forty directly relevant to the context of the study are reported below:

The green banks demonstrate banks' environmental accountability by considering environmentally friendly approaches to their operations (Bai, 2011). In general, the concept of GB refers to the banking system that empowers financially & environmentally sound actions and internal processes that are conducive to environmental sustainability. The alternative terms to green banking are 'environmental banking', 'community banking' and 'sustainable bank', eco-friendly banking, and are referred to as a social and environmental issue (Goyal & Joshi, 2011; Habib, 2010; Audi & Ali, 2023; Ali et al., 2023). Green Banking is a new model of banking that was introduced in year 2009 with the establishment of the first green bank in Mt. Dora, Florida, United States of America (Jayabal & Soundarya, 2016). 'The Institute for Development and Research in Banking and Technology' defines GB as an umbrella term which refers to practices and guidelines that make the banks sustainable in economic, social and environmental dimensions (Fernando, & Muralidheeran, 2019). It refers to incorporating the environmental-friendly practices in traditional banking model. It emphasizes on reducing internal and external carbon footprints to ensure banking services more socially oriented which is not a focus in traditional banking model (Rajput et al., 2013). As per SBP "responsibility of the financial sector is to support policy initiatives for transforming a country's economy towards a low carbon and climate resilient economy". Banking industry has close connections to the society. A bank has two primary functions; i.e. deposits and lending. It takes deposits from external environment (savers) and channelizes those deposits to the external environment (lenders) (Hasa et al., 2020). In lieu of its dual connection with the society, the banking industry bears obligations to contribute towards society's well-being. Green banking covers two types of aspects. The first aspect relates to the consumption of its resources such as energy, lighting, air conditioning and papers in an environmental-friendly way and reduce carbon footprints. The second aspect pertains to encourage and finance the environment-friendly investments or projects. So, the green banking is not just making sustainable use of the resources but also entails environment-friendly dispensation of the credit. At the minimum, a bank must ensure avoiding harming society during its usual course of operations (Dusuki & Abdullah, 2007). It refers to the environmentally friendly banking practices

to stop the destruction of the environment so that the planet can survive (Azam, 2012). Raw has become a major trend in the global banking industry. GB systems including eco-friendly lighting system, implementation of solar powered ATMs, and digital branching instead of branch banking for paper reduction (Khan & Szegedi, 2019; Sulehri et al., 2023). The concept of green banking has encouraged banking institutions to deliver paperless, technology-driven services while minimizing environmental impact and fulfilling their role as a corporate citizen in sustainable development. It is important for banks to understand this aspect of green systems because these types of investments contribute to the perceived customer satisfaction (Herath & Herath, 2019). Major banks around the world have played a major role in transforming the banking sector in their countries to low carbon economy, thus reducing the risk of climate change (Light & Skinner, 2021). Government officials around the world are demanding compliance with environmental standards to address climate change and to take actions that promotes sustainable economic development. Banks can play a significant role in their early lending portfolios in relation to their securities writing and asset management business (Light & Skinner, 2021). Banks design jobs to have a positive impact on the environment (Pertusa-Ortega, & Molina-Azorín, 2018). Different countries produce a series of green policies including raw taxes, green purchases and raw credit and security policies (Aizawa & Yang, 2010). Literature suggest that financial sector's stability management such as green credit policy influences banks to integrate environmental and social issues into their business processes and product & services. Sustainability of state-owned enterprises and enforcement motivates banks to improve their stable performance by engaging in green financial practices (Weber & Hurst, 2016). Proper investment can reduce operating costs for local businesses and increase profit margins. The green bank model should appeal to voters who follow certain rules who may not support government investment in clean energy. At the same time, the green bank model attracts more private investment than the government can provide on its own, which greatly expands the available funding for clean energy technologies. Green banks have the potential to serve as a rare winning solution in a time of combating politics (Leonard, 2014). The banking sector can play an important role in the green banking system by improving access to finance and meeting the needs of the 'green economy' (Sharma & Choubey, 2022). Bank employees, day-to-day operations, and GB-related policy processes have significant positive effects on green financing (Chen et al., 2022), that is a major impact on sustainability. Pakistan is currently facing high environmental risks, banks can play a key role in reducing environmental problems through green, sustainable, eco-friendly and low carbon banking approaches (Jafar et al., 2021; Khan & Szegedi, 2019). The policy of investment in green projects contributes to the promotion of green space (Rehman et al., 2021). To align banks' operations with society's well-being, the central bank of Pakistan; SBP has issued a guide namely 'SBP Green Practices Guidelines' (Ghosh et al., 2018). The objective behind issuing this guideline is to decrease susceptibility of banks from risks and threats resulting from the environment, fulfill their duties and responsibilities for the safety and protection of the environment and provide the finance for transformation of the economy into resource-efficient and climate-resistant one. The GB framework devised by SBP is first kind of an attempt leading to a sustainable and safe economic situation and environment in the banking sector and run in parallel to other, broader and applicable to all companies, guidelines such as the code of corporate governance and Corporate Social Responsibility (CSR) published by the 'Securities and Exchange Commission of Pakistan' (SECP) in the year 2013. The GB guidelines issued by SBP are divided into four sections; I) 'responsibilities, management and organization', II) 'environment risk management guidelines', III) 'green business facilitation' and, IV) 'own impact reduction'. Each section contains general as well as specific guidelines related to its particular domain. But, unfortunately, research on commercial banks' responses towards GB guidelines for economic development, particularly in Pakistan, is lacking in literature (Rehman et al., 2021). The need of the time is to evaluate whether the banks are adopting and incorporating these guidelines in their operations or not? Next section discusses the data and methodology used for analysis.

3. Methodology

This section gives the readers an overview of data collection and analysis technique. The research uses philosophy of positivism and deduction as a research approach. The study is based on cross-sectional analysis of data that is gathered at one point of time i.e. for the year 2021. Population of study consists of all the commercial banks of Pakistan i.e. forty-one banks. Out of total forty-one banks, on the basis of purposive sampling, the banks who have disclosed information about their green practices in their annual reports are shortlisted. The final sample contains fourteen commercial banks of Pakistan. Data collection involves secondary data collection through a thorough systematic content analysis using key words such as green banking, SBP guidelines, implementation, environment, low carbon, CSR, green products, paperless, digital, solar powered, sustainability, resilient, environmental risk etc. These keywords are selected on the basis the aforementioned GB framework. After collecting data, complete process of TOPSIS is applied that is explained in analysis section. Scoring of banks against criteria (i.e. four SBP guidelines) is done according to information provided in Table 1.

Table 1: Scoring Criteria

Sr.	Criteria	Scores
1	Company concern about green policies	1
2	Company is thinking about implementations	2
3	Implementation of green practices	3
4	Implemented	4
5	Positive outcome from green initiatives	5

Source: Hwang and Yoon (1981)

The scoring of banks against SBP GB guidelines is done on the basis of five groups of extent of GB practice adopted by a bank as in Table. 1. The banks that are only aware of green policies but have not taken any initiatives yet get score of '1' while the banks that are aware and are thinking to implement GB practices are given score of '2'. The banks that have implemented GB practices are scored '3' while those that are done with implementation are given score of '4' and finally those that have implemented and getting positive outcome out of their GB initiatives are scored '5'.

4. Analysis & Results and Discussion

4.1. Analysis & Results

Major goal is to rank green banks in Pakistan according to the green initiatives and practices issued by central bank of Pakistan. This study uses the secondary data obtained through content reading of the annual reports of banks that have disclosed information regarding green practices in their reports. The parameters on the basis of which green banks are ranked are taken from the aforementioned framework. The framework has defined green practices; any bank should be adopting, to consider it a green bank. SBP has set four domains of consideration for green banking used as criteria in analysis. The banks that have disclosed their green practices in their annual reports or their official website are included in this study. The list of sample banks is provided in Table.2. The data is processed and analyzed through TOPSIS. The complete procedure of applying TOPSIS is explained in upcoming section.

4.2. Stepwise Procedure of TOPSIS

TOPSIS method of multi criteria decision making was developed by Hwang and Yoon (1981). It works out the solution alternative by finding the minimum distance from positive ideal solution and the maximum distance from negative ideal solution. Comparison of TOPSIS with alternate methodologies is appended in Appendix A whereas complete stepwise procedure of TOPSIS is given following.

Step 1: Presentation of Original Data Matrix

First step involves data presentation in the form of following matrix:

$$D = \begin{array}{c} \\ A_1 \\ A_2 \\ \cdot \\ A_n \end{array} \begin{array}{c} \begin{array}{cccccc} C_1 & C_2 & \cdots & & & C_n \end{array} \\ \begin{bmatrix} X_{11} & X_{12} & \cdot & \cdot & \cdot & X_{1n} \\ X_{21} & X_{22} & \cdot & \cdot & \cdot & X_{2n} \\ \cdot & \cdot & & & & \cdot \\ \cdot & \cdot & & & & \cdot \\ X_{m1} & X_{m2} & \cdot & \cdot & \cdot & X_{mn} \end{bmatrix} \end{array}$$

Using above matrix structure, representation of original matrix consisting of banks (Alternatives) column-wise, SBP GB guidelines (Criteria) row-wise, and relevant scores on the basis of abovementioned scoring scheme in individual cells is provided as Table 2.

Table 2: Scores of Each Criterion

Sr.	Banks	Responsibilities, Management and Organization	Environmental Risk Management Guidelines	Green Business Facilitation	Own Impact Reduction
1	Allied Bank	5	5	5	3
2	Bank Alfalah	1	5	3	3
3	Bank of Khyber	1	4	1	4
4	Bank Islami	2	2	3	2
5	Bank of Punjab	2	1	5	1
6	United Bank Ltd.	3	3	3	3
7	Habib Bank Ltd.	5	5	5	5
8	JS Bank	4	4	4	3
9	National Bank of Pakistan	1	2	3	4
10	Mcb Bank Ltd.	1	1	3	2
11	Samba Bank	1	4	4	3
12	Soneri Bank	3	5	4	5
13	Summit Bank	1	1	4	1
14	Bank Al-Habib	4	3	5	4

SBP guidelines are divided into four major heads as follows: I) 'responsibilities, management and organization' is the management concern towards green practices, II) 'environment risk management guidelines' covers all the practices and guidelines towards environment risk management practices, III) 'green business facilitation' is the bank initiatives towards the practice, policies and procedure related to making products and providing services along with other organizational processes and, IV) in 'own impact reduction', banks try to reduce the adverse effect of their own policies on being green.

Step 2: Normalization of the Data

The original matrix is converted into 'normalized matrix' (Table 3). The normalized matrix is $R\left(=\left[r_{ij}\right]\right)$ where value r_{ij} is calculated according to (a).

$$r_{\mathrm{ij}} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^{n} x_{ij}^2}} \qquad \text{(a)}$$

Where $i = 1, \dots, m; j = 1, \dots, n$. For example, for 'Allied Bank', normalized value for criterion I (Responsibilities, Management and Organization),

$$r_{ij} = \frac{5}{\sqrt{5+1+1+2+2+3+5+4+1+1+1+3+1+4}}$$

$$r_{ij} = \frac{5}{\sqrt{10.67707825}}$$

=0.4683

Table 3: Normalized Matrix

Sr.	Banks	Responsibilities, Management and Organization	Environmental Risk Management Guidelines	Green Business Facilitation	Own Impact Reduction
1	Allied Bank	0.4683	0.3758	0.3450	0.2425
2	Bank Alfalah	0.0937	0.3758	0.2070	0.2425
3	Bank Of Khyber	0.0937	0.3007	0.0690	0.3234
4	Bank Islami	0.1873	0.1503	0.2070	0.1617
5	Bank Of Punjab	0.1873	0.0752	0.3450	0.0808
6	United Bank Ltd.	0.2810	0.2255	0.2070	0.2425
7	Habib Bank Ltd.	0.4683	0.3758	0.3450	0.4042
8	JS Bank	0.3746	0.3007	0.2760	0.2425
9	National Bank Of Pakistan	0.0937	0.1503	0.2070	0.3234
10	MCB Bank Ltd. Bank Ltd.	0.0937	0.0752	0.2070	0.1617
11	Samba Bank	0.0937	0.3007	0.2760	0.2425
12	Soneri Bank	0.2810	0.3758	0.2760	0.4042
13	Summit Bank	0.0937	0.0752	0.2760	0.0808
14	Bank Al-Habib	0.3746	0.2255	0.3450	0.3234

Step 3: Assigning the weight to criteria

The normalized decision matrix is converted to weighted normalized decision matrix V_{ij} using following equation (b) (Table 4).

$$v_{ij} = w_{ij} r_{ij} \qquad (b)$$

where w_j represents the weight of the jth criterion. Equal weight, in this case, is assigned to each criterion, hence, multiplying each value by 0.25.

Table 4: Weighted Normalized Matrix

Sr.	Weighted Normalized Decision Matrix	Responsibilities, Management and Organization	Environmental Risk Management Guidelines	Green Business Facilitation	Own Impact Reduction
1	Allied Bank	0.1171	0.0940	0.0863	0.0606
2	Bank Alfalah	0.0234	0.0940	0.0518	0.0606
3	Bank of Khyber	0.0234	0.0752	0.0173	0.0808
4	Bank Islami	0.0468	0.0376	0.0518	0.0404
5	Bank of Punjab	0.0468	0.0188	0.0863	0.0202
6	United Bank Ltd.	0.0702	0.0564	0.0518	0.0606
7	Habib Bank Ltd.	0.1171	0.0940	0.0863	0.1011
8	JS Bank	0.0937	0.0752	0.0690	0.0606
9	National Bank of Pakistan	0.0234	0.0376	0.0518	0.0808
10	Mcb Bank Ltd.	0.0234	0.0188	0.0518	0.0404
11	Samba Bank	0.0234	0.0752	0.0690	0.0606
12	Soneri Bank	0.0702	0.0940	0.0690	0.1011
13	Summit Bank	0.0234	0.0188	0.0690	0.0202
14	Bank Al-Habib	0.0937	0.0564	0.0863	0.0808

Step 4: Calculating the Euclidean Distance from ideal Best & Ideal Worst Solution

For every column, ideal best and ideal worst value is chosen (Table 5) using maximum and minimum functions in MS-Excel. Euclidean distance from ideal best and ideal worst are calculated using equation (c) and (d).

$$v^+ = \{v_1^+, \dots, v_n^+\} = \left\{\left(\text{Max}_{ij}\, jj \in J\right), \left(\text{Min}_{in}\, jj \in J^-\right)\right\} \qquad (c)$$

$$v^+ = \{v_1^-, \dots, v_n^-\} = \left\{\left(\text{Min}_{ij} \mid j \in J\right), \left(\text{Max}_{ij}\, j \in\in J^-\right)\right\} \qquad (d)$$

where J is associated with the positive criteria and $J^-$is associated with the negative criteria. For example, for 'Allied Bank',

Ideal best = $\sqrt{(0.1171-0.1171)^2 + (0.0940-0.094)^2 + (0.0863-0.0863)^2} + (0.0606-0.1011)^2$

= 0.0404

Ideal Worst = $\sqrt{(0.1171-0.0234)^2 + (0.0940-0.0188)^2 + (0.0863-0.0173)^2} + (0.0606-0.0202)^2$

= 0.01443

Step 5: Calculating Performance Scores C_i

At this stage, separation measures D_i^+ and D_i^- of each alternative from positive ideal solution and negative ideal solution respectively are calculated using equations (e) and (f):

$$D_i^+ = \sqrt{\sum_{j=1}^{n} \left(v_{ij-v_j^+}\right)^2},\ i = 1, \dots, m. \quad \text{(e)}$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij-v_j}\right)^2},\ i = 1, \dots, m. \quad \text{(f)}$$

The performance scores C_i are calculated for each alternative using equation (g).

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad \text{(g)}$$

It is important to mention here, that the value of C_i lies between 0-1; the larger the value, the better the performance of the alternative.

Step 6: Ranking the Alternatives

Finally, the alternatives are ranked in descending order of their performance scores. Abridged results of TOPSIS are provided in Table 5.

Table 5: Abridged results of TOPSIS

Sr.	Weighted Normalized Decision Matrix	Responsibilities Management and Organization	Environmental Risk Management Guidelines	Green Business Facilitation	Own Impact Reduction	Euclidean Distance from Ideal Best	Euclidean Distance from Ideal Worst	Performance Scores	Ranking
1	Allied Bank	0.1171	0.0940	0.0863	0.0606	0.0404	0.1443	0.781150991	2
2	Bank Alfalah	0.0234	0.0940	0.0518	0.0606	0.1077	0.0921	0.460871406	7
3	Bank of Khyber	0.0234	0.0752	0.0173	0.0808	0.1196	0.0828	0.409139884	9
4	Bank Islami	0.0468	0.0376	0.0518	0.0404	0.1139	0.0500	0.305029575	12
5	Bank of Punjab	0.0468	0.0188	0.0863	0.0202	0.1308	0.0729	0.357711685	11
6	United Bank Ltd.	0.0702	0.0564	0.0518	0.0606	0.0802	0.0802	0.5	6
7	Habib Bank Ltd.	0.1171	0.0940	0.0863	0.1011	0.0000	0.1604	1	1
8	JS Bank	0.0937	0.0752	0.0690	0.0606	0.0532	0.1115	0.676817341	5
9	National Bank of Pakistan	0.0234	0.0376	0.0518	0.0808	0.1164	0.0722	0.382984968	10
10	MCB Bank Ltd.	0.0234	0.0188	0.0518	0.0404	0.1389	0.0400	0.223553632	14
11	Samba Bank	0.0234	0.0752	0.0690	0.0606	0.1052	0.0865	0.451479098	8
12	Soneri Bank	0.0702	0.0940	0.0690	0.1011	0.0499	0.1306	0.723526988	3
13	Summit Bank	0.0234	0.0188	0.0690	0.0202	0.1458	0.0518	0.2619884	13
14	Bank Al-Habib	0.0937	0.0564	0.0863	0.0808	0.0487	0.1216	0.714131844	4
	Ideal Best	0.1171	0.0940	0.0863	0.1011				
	Ideal Worst	0.0234	0.0188	0.0173	0.0202				

Table 5 presents aggregated ranks of commercial banks of Pakistan using SBP green banking guidelines as criteria obtained through TOPSIS methodology. For the sake of distinguishing, the top three banks i.e. Habib Bank Limited (HBL), Allied Bank (AB) and Soneri Bank (SB) are highlighted grey. These bank outperformed in pursuing SBP instruction in the area of green banking.

4.3. Discussion

A green bank functions like a normal bank alongside considering the social and environmental factors for the protection and safety of the environment. This research evaluates the adoption and implementations of green banking guidelines, issued by SBP, by individual banks operating in Pakistan and ranks the banks to the extent these follow GB guidelines. This section discusses findings, implications (both theoretical as well as practical), limitations and future research directions.

Discussion about Findings: The analysis is performed through TOPSIS that finds the best solution by minimizing the distance from positive ideal solution and maximizing the distance form negative ideal solution. The findings revealed that Habib Bank Limited has attained the highest performance score of '1', hence, the most efficient bank in terms of accepting, adopting, implementing and getting positive outcomes from green banking practices requirements issued by the central bank. The Allied Bank has secured second highest score of '0.781150991', hence, at the second rank in terms of green banking practices. Soneri Bank with performance score of '0.723526988' is on third rank, Bank Al-Habib with performance score '0.714131844' is on fourth rank, JS Bank with performance score of '0.676817341' is on fifth rank. United Bank Ltd. with performance score of '0.5' is on sixth rank, Bank Alfalah with performance score of '0.460871406' is on seventh rank, Samba Bank with performance score of '0.451479098' is at eighth rank, Bank of Khyber with performance score of '0.409139884'is at ninth rank and National Bank of Pakistan with performance score of '0.382984968' is at tenth rank. Bank of Punjab with performance score of '0.357711685' is at eleventh rank, Bank Islami with performance score of '0.305029575' is at twelfth, Summit Bank with performance score of '0.2619884' is at thirteenth rank and MCB Bank Ltd. attained the lowest performance score i.e. '0.223553632' and is at fourteenth rank.

Discussion about Implications: This part of discussion gives information regarding theoretical and practical implications of results of the study.

Theoretical Implications: Theoretical contribution of the research includes unique rakings of commercial banks operating in Pakistan using TOPSIS approach. Furthermore, the analysis incorporates the SBP guidelines as criteria in decision making process expanding the frontiers on green banking in a unique way. Comparison of commercial banks of Pakistan with regard to their performance in green and sustainable model of banking and their contribution towards climate-friendly, energy-efficient and green model of banking are other unique contributions offered by the research.
Practical implications: Practically, the regulator i.e. SBP can learn from the findings of the study about performance of its member banks on the frontier of green banking and can take necessary steps to improve the operations of poor performers (the banks having low performance scores). It can be implied from the exclusion of certain banks from analysis on the basis of non-disclosure of green practices in annual reports that probably these are non-compliant of central bank's policy framework for GB. This study provides a guide to the management of individual banks to improve their consideration and better incorporate and implement GB into their operations and participate in sustainability of the environment. The management of the concerned banks can also take away important implications by way of learning their position with respect to their competitors and can take necessary steps to improve their position. The management can opt for recruiting active employees dedicated to help management transform their practices towards sustainable form of banking. The management also can devise need based training sessions to train and help current workforce adopt and implement GB practices. The current and potential employees can learn about the best employers with respect to social and environmental participation. The study also has strong implications for general public too, who are the ultimate beneficiaries of the system. The findings might help them choose 'socially participating' banks for their deposits and loans. The study has implications for society at large as it helps determine the role of banking practices in protecting the environment from the harms of climate change by way of introducing paperless, digitalized and energy-efficient model of banking. Finally, economy might benefit by way of creating awareness about green banking guidelines of SBP and commercial bank's response to it. Investment of millions supposed to be spent on post facto remedies for environmental protection can be saved through ex facto, cheaper initiatives thus benefiting the economy in dual way; environmental and financial.
Discussion about Limitations: The research has a few mention-worthy limitations. First, the research uses content analysis for data collection, hence, subject to human error inescapable in such type of data collection. Second, the method used for analysis is known culprit for rank reversal problem. Finally, the sample banks include only those banks that disclose GB practices in their annual report. There might be other banks that are practicing GB model but have not disclosed in their reports. Furthermore, the reality might be different; sometimes what the banks disclose in their report may not be practiced in real.
Discussion about Future Research Directions: To remove limitations of current research, the authors are pleased to advance some useful directions for future research. First, the potential researchers can use other methods for data collection such search engine optimization, or can use green banking proxies generated by professional research bodies such as Reuters etc. Second, the potential researchers may use other technique of analysis such as GRA or AHP to verify and compare the results of current study. Finally, the last limitation mentioned above can be removed by collecting primary data collection through interviews, observations and dialogue with the management of the sample banks.

5. Conclusion

Current study is an attempt to explore performance of commercial banks operating in Pakistan against SBP guidelines for green model of banking. The study design comprises of literature review, data collection, and analysis. Literature review includes review of the research work on global as well as local banking industry of Pakistan. It is noted that research on local banking industry is scarce, specially, with respect to green banking. Therefore, this research is taken up to fill in the gap in literature. The final sample of banks consist of fourteen banks including Allied Bank, Bank Alfalah, Bank of Khyber, Bank Islami, Bank of Punjab, United Bank Ltd., Habib Bank Ltd., JS Bank, National Bank of Pakistan, MCB Bank Ltd., Samba Bank, Soneri Bank, Summit Bank and Bank Al-Habib. Data collection involves scrutinizing annual reports of banks for the year 2021. Analysis is performed through 'Technique for Order Preference by Similarity to Ideal Solution'. TOPSIS has the advantage of creating the best alternative among the available alternatives by minimizing the distance from ideal best. The analysis revealed that Habib Bank Ltd. is at the top of bank rankings (with highest performance score of '1'), Allied Bank is at the second (performance score of '0.781150991') and Soneri Bank is at the third rank (performance score of '0.723526988') that have initiated, implemented, disclosed and obtained positive outcomes out of their green banking initiatives. The banks that are at lowest ranks such as Bank of Punjab (performance score of '0.357711685') is at eleventh rank, Bank Islami (performance score of '0.305029575') is at twelfth, Summit Bank (performance score of '0.2619884') is at thirteenth rank and MCB Bank Ltd. with the lowest score (i.e. '0.223553632') is at fourteenth rank, have an urge to go green and have devised policies but still lack in successful implementation. The findings of the research have useful implications/applications for the stakeholders. Green banking is becoming buzz word in today's banking world. Green product, solar-powered ATMs, paperless banking transactions, electronic compliance motor vehicle are used to make our environment eco-friendly and sustainable. Banks are required to improve in-housing green activities and conduct training program for employees to perform extraordinary role in the frontiers of environmental protection. It is expected from the banks to make green banking policy, implement it in true spirit, allocate budget for green finance, green projects, green marketing, adopt methods of efficient as well as effective allocation and utilization of resources to pave the way for eco-friendly and sustainable economy. The study can be instrumental for the banks to adopt green banking practices since it provides lot of new information and a framework for becoming green.

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Appendix A: Comparison of TOPSIS with Alternate Methodologies

Sr.	MCDM	Acronym	Introduction	Benefits	Drawbacks	Source
1	Technique for order performance by similarity to ideal solution	TOPSIS	It works on the basic principle of "the chosen alternative should have the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution"	It has a good computational efficiency and its algorithm remains the same regardless of number of alternatives and criteria.	It is complex, ignores correlation among attributes, difficult to maintain consistency & allocate weights and problem of rank reversal exists.	• Hwang & Yoon (1981); • Pramanik et al. (2021)
2	Vlsekriterijumska Optimizacija I KOmpromisno Resenje	VIKOR	It provides a multi-criteria ranking index through an algorithm that works under compromising situations.	It is helpful in cases of conflict and where subjective judgment is not preferred.	It is complex, and unreliable	• Opricovic (1998); Pramanik et al. (2021).
3	Step-wise Weight Assessment Ratio Analysis	SWARA	It is used to assign weights for main as well as sub-criteria in situations expert opinion is highly preferred	It is simple, effective and flexible.	Subjective judgment and lack of consistency	• Majeed & Breesam (2021).
4	Grey Relational Analysis	GRA	It is used to conduct a relational analysis in situations where complete information on a particular phenomenon is not available.	It is simple, easy, useful in situation where incomplete information is available and used in combination with others such as TOPSIS.	It requires subjective judgment, does not present situational relationship which is possible with TOPSIS	• Ju-Long (1982); Ghoushchi, et al. (2020); Niazi et al. (2021)
5	Analytic Hierarchical Process	AHP	AHP is used for ranking or for the selection of the best among a set of alternatives through pair wise comparisons using the concepts of Mathematics and Psychology.	It has a wide range of applications, free of bias, and easy.	Complex, tedious, require more time, and problem of rank reversal exists.	• Saaty (1977); Pramanik et al. (2021).