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DECIPHERING THE CAUSE-EFFECT DYNAMICS OF SUSTAINABLE BANKING ENABLERS USING THE DEMATEL APPROACH: A STUDY OF SOUTH ASIAN NATIONS

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Abstract

This study was taken up to assess the causal relationship amid the enablers of sustainable banking in South Asian nations. This was an empirical study where regional heads of private banks operating across various South Asian countries were interviewed. In this study, the DEMATEL technique was used to examine the causal relationship among the fourteen variables which were identified through exploratory study. The results of the study showed that six out of fourteen enablers, including ESG Indexing, Sustainability Code of Conduct & Reporting, and Integrating ESG in Risk Management, etc. formed the cause group and the remaining eight enablers such as Green Product & Services, Collaboration with Stakeholders and Environmental Development Measures, etc. formed part of the effect group. This study provides valuable insights for policy-makers, industry representatives, and bank leadership, enabling them to leverage the findings to strengthen the sustainable banking agenda.

JEL classification: D24, E22, M49, O34
Keywords: ESG Indexing, Sustainability, Risk Management, DEMATEL

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Introduction

The financial landscape is currently experiencing a significant shift that is driven not only by digital innovation but also by a growing awareness of environmental and social issues. The emergence of sustainable banking has become a mighty engine of change in the banking sector (Carè, 2018). Sustainable banking compels the integration of environmental, social, and governance (ESG) principles into the foundations of banking operations (Aracil et al., 2021). It underlies the development of cutting-edge solutions and the promotion of responsible investments, targeting climate problems, social justice, and ethical business conduct (Sharma & Choubey, 2022). The sustainable practices in the banking system deal with investments in environmentally friendly projects, which can help in the conservation of resources, mitigate climate change, and support social inclusion, poverty reduction, and access to basic health and education (Durrani et al., 2020). It also promotes investments in sustainable projects that promote environmental sustainability, social responsibility, and trustworthy corporate governance along with economic benefits. Thus, sustainable banking involves the strategic planning and execution of banking operations while taking into consideration these three ESG factors (Bouma et al., 2017).

Sustainable banking is entirely different from that of the profit motive; it is a holistic concept that includes interdependence on financial well-being, environmental wellbeing, and social welfare. Banks can integrate sustainable banking systems in their processes, employees, and management of financial assets. Furthermore, the sustainable business models suggest banks gain a competitive advantage through increasing brand equity and cost reduction. Thus, embracing sustainability in banks can help them in gaining competitive advantage by enhancing their reputation, attracting investors, and fostering innovation (Park & Kim, 2020). Banks that prioritize sustainability are often viewed more favorably by customers, investors, and other stakeholders, leading to improved financial performance in the long run. It also includes the promotion of those ventures that are focusing on environmentally friendly products and other struggling entrepreneurs by providing them with advances and financial aid (Hermawan & Khoirunisa, 2024).

Banks contribute to making sustainable development a reality by allocating to businesses that fight key social-environmental challenges, particularly in the developing countries and achieving global development targets like the UN Sustainable Development Goals (SDGs) through the allocation of capital. It acts as an aid to the nations in the process of producing transformation that can tackle the issues posed by climate change, which in turn preserves highly vital resources (Weber, 2019; Bukhari et al., 2023). The calls to fix the world's dilemmas through innovative banking, protecting the environment, and improving the community's well-being have necessitated the adoption of sustainable banking practices in South Asian countries (Rehman et al., 2021). South Asian countries may be inspired to adopt the use of sustainable practices, as this will contribute greatly to the economy through loans and advances, which reduce environmental risk and social disturbances. The debates around the shift of financial resources from conventional funds to investments aimed at the sustainability sector should be transferred to enterprises which ensure sustainable growth replacing environmental, social, and governance (ESG) issues with the risk in question. This shields a firm from the economic losses that can arise from anything ranging from extreme climate to resource shortage or labor disputes (Salim et al., 2023).

South Asian countries with pro-sustainability policy tools are more likely to attract investment from ethical investors, global development organizations, and other financial bodies. This implies that banks can use a sustainable development strategy within their economic development strategy to promote long-term economic growth by using, among others, the principles of responsible resource use, financial inclusion and resilience building (Julia & Kassim, 2020). This can lead to long-term economic growth. Also, a bank's sustainable finance initiatives can contribute to poverty alleviation by directing investments toward projects that benefit marginalized communities, such as renewable energy, clean water, and affordable housing (Amidjaya & Widagdo, 2020). This is essential for preserving natural resources and biodiversity, which are often crucial sources of income and livelihoods in developing countries. Banks could also contribute to social development by providing financial aid to start-ups that are addressing issues such as education, healthcare and gender equality (Kumar & Prakash, 2019). In summary, sustainability in banks is essential for fostering economic stability, protecting the environment, and advancing social development in developing countries, which depends on key enablers for the long- term adoption of such practices. Identification of the enablers of sustainable banking in South Asian countries can help in uncovering the key drivers that can accelerate the region's transition toward responsible and inclusive financial systems. Such enablers also provide actionable guidance for policymakers and banking institutions to design effective sustainability strategies. Thus, the current paper aims to identify the enablers of sustainable banking in South Asian countries and to examine the relationships among the key enablers using the DEMATEL approach.

Literature review

The banking industry is important to achieve sustainable development due to its unique intermediary role, which is essential for assembling financial resources toward sustainable goals. The literature on sustainable banking has been prolific since the beginning of the century. The global challenges like the corona virus pandemic forced the pace of business transition towards enhanced sustainability, in parallel to the increasing research efforts in this area. Many enablers of sustainable banking have been discussed in the past literature which shows the interest of banks towards adopting sustainable practices. To foster economic growth and long-term economic stability across the world, the banking system plays an important role. The banking structure has contributed significantly to sustainable development. The following section discusses the enablers of sustainability banking in developing countries which have been explored in the past literature.

Sustainable banking deals with the delivery of financial products and services, which are designed to meet the needs of people and safeguard the environment while generating profit (Yadav & Pathak, 2013). The banking system in South Asian nations are continuously taking steps towards environmental safeguards through promoting green products and services. It includes providing financial assistance for renewable energy projects, green cars and e-rickshaws and other low emission vehicles, to help reduce CO2 emissions and fossil fuel consumption (Gupta, 2015). Green savings and bonds are the green financial products that allow banks to invest in projects with a focus on environmental or social issues. The sustainability banking practices are addressing the environmental challenges, favoring investments in renewable energy and social development projects (Jeucken & Bouma, 2017). Also, the National Development Banks have realized that the protection of natural resources is essential for the economic growth (Galletta et al., 2021). Thus, the environmental development measures are necessary to be incorporated in banks for ensuring the effective utilization of natural resources and promoting the project of environment and social concern (Gangi et al., 2019).

Accountability and transparency are essential for an effective banking system to ensure the optimal and ethical utilization of resources in alignment with the goal of attaining sustainability (Myers, 2013). It has become important for banks to inform the public not only about their own practices, but also about their clients' activities for which they provide financing (Amidjaya & Widagdo, 2020). To ensure transparency and accountability in sustainable banks is to report and disclose the outcomes transparently and comprehensively (Araci et al., 2016). Banks reap benefits from the activities of their debtors and hence carry responsibility for the environmental and social outcomes that result from these activities. Although regulatory compliance has become strong after the financial crisis in the banking system of developing banks, the adherence to sustainability regulations have become more important in recent times (Kumar & Prakash, 2020). The aim of sustainability regulations is to improve the bank's risk profile through a more effective and efficient compliance function (Conley & Williams, 2011; Kumar & Prakash, 2019b). The adoption of several key regulatory measures are important to encourage sustainable practices in the banking secto and include Enhanced Disclosure Requirements, Risk Management Guidelines, Green Banking Standards, Support for Green Bonds and Sustainable Investments, etc. (Birindelli et al., 2015).

To foster sustainable banking practices, it is important to engage the stakeholders openly and regularly. South Asian countries are focusing on multi-stakeholder collaborations with the help of National Development banks and other sustainable infrastructures (Pellicano et al., 2014; Naranova-Nassauer, 2023). Collaboration with stakeholders helps in building trust, credibility, and reputation in the sustainable finance field (Stubbs & Cocklin, 2007). Moreover, environmental knowledge can serve as a catalyst for innovation within the business organization. Employees who are acquainted with sustainability trends and best practices are more likely to devise inventive results for product design, manufacturing processes, and waste reduction (Alshebami, 2021). This not only contributes to sustainability but also boosts the competitiveness of the banks (Khan et al., 2023). Also, employees who have a comprehensive understanding of environmental regulations and compliance requirements can aid banks in sidestepping legal entanglements and the associated financial penalties (Neruja & Arulrajah, 2021). When they comprehend the banks' dedication to they, are more likely to be motivated and eager to contribute to sustainable practices and play a role in promoting environmentally responsible behavior within the banks (Assyofa et al., 2020). Pro-environmental behavior of employees refers to the environmentally responsible actions and practices made by employees within the banking organization (Wu et al., 2021). It plays a significant role in enabling social development and environmental sustainability practices in banks (Saifulina et al., 2023). When employees engage in such actions, such as reducing energy and water consumption or minimizing waste, it directly contributes to improved resource efficiency within the organization (Suganthi, 2019). Green behavior, such as recycling, reducing paper usage, and adopting eco-friendly transportation options, helps banks lower their environmental footprint (Ahmad et al., 2021).

Social inclusion and equity are crucial for social development. The aim of social inclusion is to ensure that people, groups, and societies contribute abundantly in expressive ways towards the welfare of the nation (Úbeda et al., 2022). Social inclusion is the process of improving the terms on which individuals and groups take part in society - improving the ability, opportunity, and dignity of those disadvantaged based on their identity (Naranova-Nassauer, 2023; Agrawal, 2019). The World Bank supports social sustainability by fostering inclusive and resilient societies where citizens have a voice and governments respond (Schwarcz & Leonhardt, 2021). Social Sustainability and Inclusion emphases the need to prioritize the people in development processes. The ESF (Environmental and Social Framework) from the World Bank is a body of rules that guide the Group's investment projects through the lending department and highlights the need for inclusion of the poor and disadvantaged as well as sustainability for collecting the corpus of funds aiming towards the development of society (Passoni et al., 2016). Community development is considered as the foundation of societal development and ensuring sustainable practices. Sustainable community development is required in a country to ensure investments in renewable energy which support sustainable businesses (Rogers, 1983). It considers the ESG aspect towards the development of equitable and eco-friendly projects. Thus, the community development measures should be taken by the banks in the developing countries for the development of the specific societies in need (Banks et al., 2016; Úbeda et al., 2022).

ESG indexing and reporting have also become essential considerations these days in the banking sector across the globe (Ielasi et al., 2023). Financial institutions share a distinct opportunity to leverage their clout and resources to drive favorable outcomes for the planet and its inhabitants (Buallay, 2019). Including ESG in investment, banking organizations ensure that it is not only compatible with customers' and investors' motivations to advance sustainable behaviors and social activism but also secures corporate companies' viability in providing them. There are five reasons why ESG in banking and financial services should be integrated (Chiaramonte et al., 2022). The sustainable banking can be promoted by integrating the ESG in the risk management profile of banks (Dicuonzo et al., 2022). Linking ESG factors with the traditional risk managing practices of banks provides a comprehensive and risk-based approach for risk mitigation and identified opportunities (Niţescu & Cristea, 2020). Banks may develop an ESG based risk management policy to identify and assess the risk for effective risk management and ensuring long-term sustainability (Bortnikov & Lyubich, 2022). In the risk management framework of banks, after the identification of risk, it is important to find its impact as well as likelihood of occurrence to take better pro-active decisions (Antoncic, 2019).

For banks, strategically leveraging technology & innovation is another aspect of gaining sustainable advantage if used in the right direction. Through the usage of AI's ability to process and predict data, banks can pinpoint trends as well as emissions risks and shape the direction of their investments to targets driven by sustainability (Subanidja et al., 2022). Using technology such as AI and machine learning, challenger banks aim at leveraging and bettering those sections of risk management (Starnawska, 2021). Demonstrating the illustration of that, AI algorithms able to discover likely fraud or money laundering, and machine learning can help see the borrower's patterns and improve credit decision making (Dwivedi et al., 2022). The national governments' actions as that of the global response to the climate crisis are still in the lead, but there is an above involvement and shared awareness of the economic actors that their role is as well urgent to act on. Central banks globally find themselves on a journey to green their own assets and, at the same time, their roles in the climate crisis are also topics of discussion to the possible extent and proposed functions of macro prudential policies and monetary policies (Aagaard, 2021).

Furthermore, the concept of ethical banking throws light on the effect of banking actions on society and the environment (Adaga et al., 2024). The banks which follow the core set of moralities and ideals for interacting with clients and the outer environment, strive to produce earnings without sacrificing principles or causing harm (Kiruthika et al., 2024; Ramnarain & Pillay, 2016). The public and private sector banks in south Asia differ in their characteristics, ideals and values in dealing with the community, client screening and consistency of internal and external ethical principles (Carè, 2018). Banks that follow such practices provide financial assistance to the ventures which are either making environmentally friendly products or their products and services are beneficial to the environment and society (Weber, 2019; Liu, 2023). Thus, Ethical Foundation and Practices is an important enabler of sustainable banking which promotes equity and sustainable development. The Sustainability Code of Conduct & Reporting is the adherence to the highest standards of honest and ethical conduct in banks towards the disclosure and communication of ESG goals (Kumar & Prakash, 2019b; Khan et al., 2011). The sustainability reports of banks consist of the details of the progress against key metrics (ESG). Thus, it could be considered as an important enabler of sustainability in banks (Islam & Chowdhury, 2016).

Research gap

Research on sustainable banking enablers often focuses on the institutional and regulatory factors in banking (Taneja et al., 2025). Despite growing attention of sustainable banking practices, there remains a significant gap in understanding the intricate interplay of socio-economic and cultural elements, along with regulatory factors that are unique to the banking practices in the developing countries (Najam et al., 2022). While some studies touch on general trends or showcase specific cases, there's a notable absence of comprehensive analyses that encompass various dimensions like institutional frameworks, stakeholder involvement, market dynamics, and policy efficacy (Sun et al., 2020; Najam et al., 2022). While a study may identify the causal relationships between enablers of sustainable banking, it often does not measure their tangible impact. There is a need for research that quantifies how these enablers affect key outcomes like a bank's reputation, financial performance, and actual environmental or social impact. (Khan et al., 2023).

There is dearth of research on Sustainability Banking in the South Asian Countries as a whole- India, Pakistan, Bangladesh, Bhutan, Sri Lanka and Nepal (Safdar et al., 2022). Grouping "South Asian nations" together may overlook critical differences in regulations, economic development, and cultural attitudes toward sustainability among individual countries (Yanti et al., 2025). Also, methodologies like DEMATEL provide a static snapshot of relationships between factors.

The enablers for sustainable finance may vary significantly across different economic sectors, such as agriculture, manufacturing, or technology. Research is needed to identify and analyze the unique sets of enablers that are most critical for promoting sustainable investment in the key economic sectors of South Asian nations (Nguyen et al., 2024). Identifying influential factors is only the first step. There is a gap in research that translates these findings into a practical and strategic roadmap for policymakers and bank administrators to effectively implement sustainable practices (Kao et al., 2022; Nga & Tam, 2024). Closing such gaps are pivotal for guiding policymakers, investors, and practitioners toward effective strategies for nurturing sustainability in developing country financial markets, thereby fostering both economic progress and environmental responsibility.

The study seeks to address the following research questions:

RQ_1: What are the critical enablers that facilitate the implementation and advancement of sustainable banking practices in South Asian countries?

RQ_2: How do the identified sustainable banking enablers interact and relate to each other within the contextual framework of South Asian banking systems?

RQ_3: What are the causal dynamics and influence patterns among the key sustainable banking enablers, and which factors serve as primary drivers versus responsive outcomes in the South Asian banking context?

Methodology

The DEMATEL (Decision Making Trial and Evaluation Laboratory) technique is a structural modeling approach developed in the 1970s to analyze complex cause-and-effect relationships among criteria in multi-criteria decision-making problems. The method begins with expert evaluations of direct influences between factors, creating a Direct Relation Matrix that is then normalized to ensure mathematical convergence. Through matrix operations using the formula $T = X(I-X)^{-1}$, DEMATEL calculates a Total Relation Matrix that captures both direct and indirect relationships throughout the system. The technique distinguishes between "cause factors" (net influencers) and "effect factors" (net receivers) by analyzing row sums (influence given) and column sums (influence received) from the Total Relation Matrix, with results visualized in a causal diagram that plots criteria based on their prominence (overall importance) and relation (causal nature). This approach is particularly valuable for understanding interdependent systems where factors influence each other through multiple pathways, requiring only small expert panels (10-15 experts) while providing both quantitative analysis and visual insights that support strategic decision-making by revealing critical intervention points and the underlying causal architecture of complex problems.

The selection of the DEMATEL method for investigating sustainable banking enablers in South Asian nations is strategically justified due to several methodological and contextual advantages that align with the study's objectives. First, sustainable banking involves complex interdependencies among regulatory, organizational, technological, and stakeholder-related factors that influence each other through multiple direct and indirect pathways, making DEMATEL's ability to capture both immediate and cascading cause-and-effect relationships essential for understanding the holistic dynamics of sustainability transformation in banking. Second, the method's capacity to distinguish between cause factors (drivers) and effect factors (outcomes) is particularly valuable in the South Asian context, where banks are navigating evolving regulatory frameworks and need to identify which enablers serve as primary catalysts versus those that are responsive outcomes, enabling more targeted strategic interventions. Third, DEMATEL's requirement for relatively small expert panels (10-15 experts) is practically advantageous given the specialized nature of sustainable

banking expertise in South Asian markets, where identifying and accessing large numbers of qualified experts with comprehensive ESG and banking knowledge can be challenging. Fourth, the visual causal diagram output provides stakeholders - including bank executives, regulators, and policymakers - with an intuitive understanding of the sustainability enabler network, facilitating evidence-based decision-making and policy formulation across diverse South Asian banking systems. Finally, DEMATEL's structural modeling approach is particularly suited for emerging markets like South Asia, where sustainable banking practices are still evolving and understanding the foundational cause-and-effect relationships can inform the development of more effective sustainability strategies and regulatory frameworks tailored to regional contexts and banking sector maturity levels.

The steps involved in the DEMATEL process adopted in this study are represented in (Figure 1).

- List of the enablers that were to be studied using the Dematel method.
- Collection of the expert's viewpoint on a 5-point scale to provide the association in each pair of enablers. In this phase, experts are furnished with a five-point comparison scale to delineate the relationship between each pair of enablers, indicating influential levels ranging from (0) for No Influence to (4) for Very High Influence.
- Establishment of the Direct Relation Matrix (DRM) by averaging the score from each individual expert. We used Equation 1 for calculating the average scores (Table 1). The score x_{ij} k is assigned by the k^{th} expert, denoting the level of influence enabler i has on enabler j. Matrix A of size [n x n] is computed, as specified in Equation 1, by averaging the scores provided by each individual expert.

$$A = A_{ij} = \frac{1}{H}\sum_{t=1}^{H} a_{ij}^{k} \tag{1}$$

where A_{ij} is the average score, H is number of experts and $\Sigma^{H}_{t=1}a^{n}_{ij}$ is the summation of a_{ij}, where a_{ij} indicates the influential level that enabler i has on enabler j from 1, 2, 3……n number of experts and k is provided by the k^{th} expert.

Based on DRM (A), the DRM (D) was obtained (Table 2). Using the following formula:

$$X = f * A_{ij} \tag{2}$$

where, i, j = 1,2,3, …..k, D = Normalized DRM, A = Average initial-direct relation matrix, a_{ij} = values in matrix A, and:

$$f = min\, i, j\,[\frac{1}{max\sum i=1a_{ij}}, \frac{1}{max\sum j=1a_{ij}}]$$
$$1 \le i \le n \qquad 1 \le j \le n$$

$$Max\left(Column\ Total\right) = MaxCT\sum_{i=1}^{n} a_i \tag{3}$$
$$1 \le i \le n$$
$$Max\left(Row\ Total\right) = MaxRT\sum_{j=1}^{n} a_j$$
$$1 \le i \le n$$

Creation of the Identity Matrix (I), I-D Matrix and Inverse Identity Matrix (I)= I-D^1/2 to reach the Total Relation Matrix.

Based on the normalized DRM and the inverse identity matrix the Total Relation Matrix was obtained. The Total Relation Matrix (Table 3a & 3b) was calculated as follows:

$$T = (t_{ij})D(I-D)^{-1} \tag{4}$$

where, T = Total-influence matrix, t_{ij} = conforming values in matrix T, D = Normalized DRM, and I = Identity matrix.

Sum Cj, do summation of columns:

$$C_j = [\sum_{j=1}^{n} t_{ij}] \tag{5}$$

Sum R_i, do summation of rows:

$$R_i = [\sum_{i=1}^{n} t_{ij}] \tag{6}$$

$$[t_{ij}]n \times n \tag{7}$$

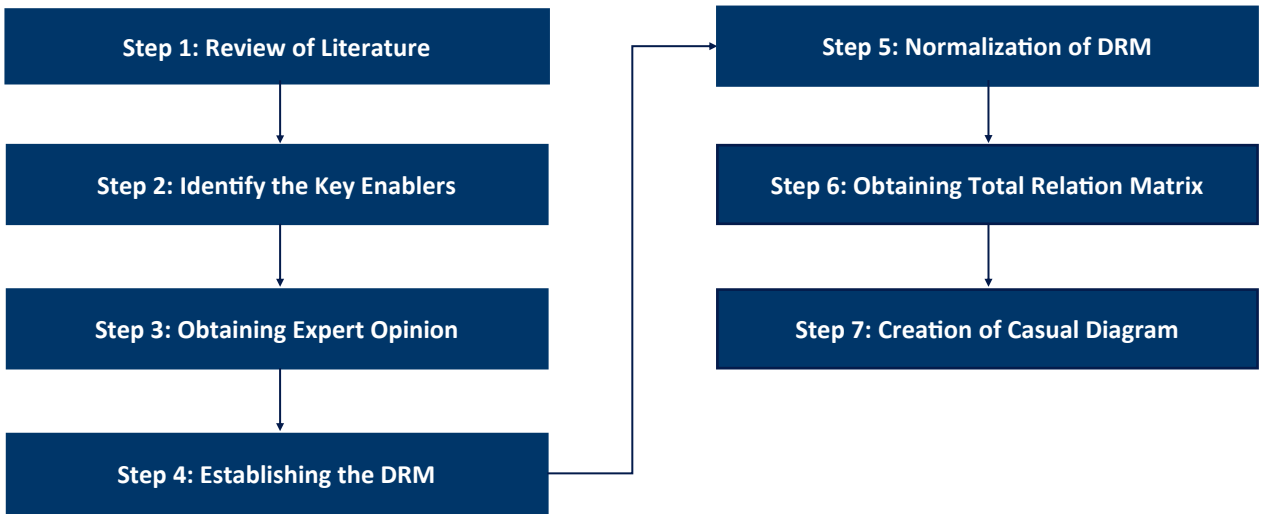
where i, j = 1,2, 3, …..n, R = Row sum of matrix T, C = Column sum of matrix T, and t_{ij} = corresponding values in matrix T.

In order to obtain T = D (I−D)-1 we first created Identity Matrix (I), then we prepared Normalized Direct Relationship Matrix I-D and Inverse Identity Matrix (I) = I-D-1.

Assigned the ranks to all the studied variables based on the relation $R_i + C_j$ (Table 3b). The variable with the highest value was assigned 1^{st} position, followed by 2^{nd} position and assigning continued until rank was assigned to all the studied variables.

Then a causal diagram was created based on the relation $R_i - C_j$, which represented the cause-and-effect relationship among the studied variables. If the value of $(R_i - Cj)$ is positive the enabler corresponds to the cause group and the negative values belong to the effect group (Table 3b, Figure 2).

Figure 1: DEMATEL Process



Source: Author's own work.

Sample selection

The adequacy of small expert panels in DEMATEL and other Multi-Criteria Decision-Making (MCDM) methods is well-established in the literature, with scholars demonstrating that meaningful insights can be captured from relatively modest sample sizes of 10-15 experts. As noted by Dytczak and Ginda (2016) and Lee et al. (2013), the collective mindset or outlook of expert groups can be effectively captured from data collected from 10-11 people, as MCDM methods prioritize the quality and expertise of participants over sheer quantity. Keeping this in mind we approached and interacted with middle level management of nationalized banks, private banks and foreign banks operating across various South Asian countries.

The selection of middle-level management professionals from diverse banking institutions across South Asia as expert respondents for this study on sustainable banking enablers is strategically justified based on their unique positioning within the banking ecosystem and their comprehensive understanding of sustainability implementation dynamics. Middle-level managers, including state heads, regional heads, senior assistant vice presidents, assistant vice presidents, and senior managers, represent the critical operational bridge between strategic executive decisions and ground-level implementation, providing them with intimate knowledge of both the strategic intent behind sustainable banking initiatives and the practical challenges encountered during execution. The inclusion of professionals from nationalized banks, private banks, and foreign banks ensures a comprehensive perspective that captures the varying approaches, regulatory compliance requirements, and organizational cultures across different banking ownership structures operating in South Asian markets, where each sector faces distinct sustainability pressures and opportunities. The diversity of functional domains represented - spanning corporate banking, retail banking, banking operations, risk management, investment banking, reporting, and compliance - is particularly crucial for understanding sustainable banking enablers, as sustainability transformation requires cross-functional integration and these professionals possess specialized insights into how ESG considerations impact their respective operational areas.

We contacted 15 middle level leadership position holders which included state heads, regional heads, senior assistant vice presidents, assistant vice presidents and senior managers working in different functional domains such as corporate banking, retail banking, banking operations, risk management, investment banking, reporting and compliance, etc. But 6 of them displayed reluctance to be part of the research, so we finally interacted with 9 middle level leaders. The total composition of the respondents was as follows: 3 from India, 2 from Bangladesh, 1 from Bhutan, 1 from Sri Lanka, 1 from Nepal and 1 from Pakistan. Their work experience ranged between 20 years to 35 years. Furthermore, the expert panel size aligns with established DEMATEL methodology requirements while ensuring manageable data collection and meaningful consensus building, as these middle-level leaders possess the practical experience necessary to evaluate cause-and-effect relationships among sustainability enablers based on their direct involvement in implementing and managing sustainable banking practices across diverse South Asian banking environments, making them ideally positioned to provide the nuanced, contextually relevant expert judgments essential for robust DEMATEL analysis. A table with demographic details is given in the annexures.

Data collection

Initial interaction was done with veterans in the banking sector to authenticate the variables that we had identified through our review of existing literature. Once we received validation from the experts, we created a matrix to map their perception. We then conducted subsequent interviews with each of our respondents and tried to record his/her perception regarding the enablers of sustainable banking and put the data in the matrix shown above. These viewpoints were collected on a 5-point scale to provide the association in each pair of enablers indicating influential levels ranging from 0 to 4: No Influence as 0; Less Influence as 1; Medium Influence as 2; High Influence as 3 and Very High Influence as 4.

Data analysis

Direct relation matrix

The Direct Relation Matrix essentially captures the immediate, first-order causal connections between system elements, providing a structured representation of the complex interdependencies that exist within the decision-making framework before considering any cascading or indirect effects.

Normalization of direct relation matrix

Based on the direct-relation matrix A, the normalized DRM (Table 2) was obtained. The normalized matrix serves as a crucial intermediate step that enables the computation of the Total Relation Matrix through matrix operations. Without proper normalization, the iterative calculations in DEMETAL could fail to converge, making it impossible to capture the complete network of direct and indirect relationships between system elements.

Total relation matrix

The Total Relation Matrix provides a holistic view of the interdependency structure, allowing decision-makers to understand not just immediate cause-and-effect relationships, but also the cumulative impact that occurs when influences propagate through multiple levels of the system. This comprehensive perspective is crucial for identifying the most influential factors and understanding the complex feedback loops that exist within the decision-making framework.

Table 1(a): Total Relation Matrix

Code i/j	Enabler	Sum R_i	Sum C_j	$R_i + C_j$	$R_i - C_j$	Ranking	Impact
E1	Ethical Foundation & Practices	1.794	1.875	3.670	-0.081	7	Effect
E2	Social Inclusion and Equality	0.511	2.105	2.616	-1.594	14	Effect
E3	Leveraging Technology & Innovation	1.361	2.122	3.483	-0.762	9	Effect
E4	Adherence to Sustainability Regulations	2.818	2.062	4.880	0.756	1	Cause
E5	Green Product & Services	1.111	2.202	3.313	-1.090	13	Effect
E6	Collaboration with Stakeholders	1.603	2.046	3.649	-0.444	8	Effect
E7	Transparency & Accountability	1.442	1.966	3.408	-0.524	11	Effect
E8	Integrating ESG in Risk Management	2.855	1.883	4.738	0.973	3	Cause
E9	Environmental Development Measures	1.454	2.012	3.466	-0.557	10	Effect
E10	Community Development Measures	1.377	2.012	3.388	-0.635	12	Effect
E11	Sustainability Code of Conduct & Reporting	2.884	1.925	4.809	0.959	2	Cause
E12	Environmental Awareness and Knowledge in Employees	2.653	1.868	4.521	0.785	4	Cause
E13	Pro-Environmental Behaviour of Employees	2.631	1.867	4.498	0.764	5	Cause
E14	ESG Indexing	2.884	1.434	4.318	1.450	6	Cause

Source: Author's own work.

Table 1(b): Total Relation Matrix

Code	Enabler	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14
E1	Ethical Foundation & Practices	0.083	0.136	0.131	0.146	0.134	0.128	0.160	0.126	0.138	0.138	0.128	0.126	0.126	0.095
E2	Social Inclusion and Equality	0.036	0.027	0.040	0.039	0.041	0.039	0.038	0.036	0.038	0.038	0.037	0.036	0.036	0.031
E3	Leveraging Technology & Innovation	0.074	0.130	0.070	0.093	0.134	0.110	0.089	0.093	0.103	0.103	0.095	0.098	0.092	0.078
E4	Adherence to Sustainability Regulations	0.203	0.213	0.209	0.145	0.226	0.215	0.198	0.203	0.212	0.212	0.206	0.202	0.202	0.172
E5	Green Product & Services	0.065	0.072	0.085	0.094	0.062	0.076	0.068	0.072	0.093	0.093	0.097	0.083	0.083	0.066
E6	Collaboration with Stakeholders	0.128	0.120	0.138	0.124	0.124	0.080	0.126	0.111	0.122	0.122	0.118	0.110	0.110	0.070
E7	Transparency & Accountability	0.116	0.106	0.107	0.122	0.109	0.128	0.071	0.098	0.103	0.103	0.100	0.098	0.098	0.082
E8	Integrating ESG in Risk Management	0.204	0.221	0.222	0.217	0.227	0.216	0.199	0.133	0.214	0.214	0.208	0.204	0.204	0.173
E9	Environmental Development Measures	0.087	0.089	0.132	0.123	0.142	0.112	0.101	0.117	0.074	0.087	0.108	0.100	0.099	0.084
E10	Community Development Measures	0.082	0.133	0.126	0.111	0.117	0.100	0.096	0.094	0.081	0.068	0.102	0.094	0.094	0.080
E11	Sustainability Code of Conduct & Reporting	0.205	0.222	0.223	0.219	0.229	0.218	0.212	0.206	0.215	0.215	0.137	0.205	0.205	0.174
E12	Environmental Awareness and Knowledge in Employees	0.193	0.209	0.210	0.206	0.215	0.205	0.199	0.194	0.202	0.202	0.191	0.121	0.193	0.114
E13	Pro-Environmental Behaviour of Employees	0.192	0.207	0.208	0.204	0.214	0.203	0.198	0.192	0.201	0.201	0.190	0.186	0.120	0.113
E14	ESG Indexing	0.205	0.222	0.223	0.219	0.229	0.218	0.212	0.206	0.215	0.215	0.209	0.205	0.205	0.102
Sum Cj		1.875	2.105	2.122	2.062	2.202	2.046	1.966	1.883	2.012	2.012	1.925	1.868	1.867	1.434

Source: Author's own work.

Table 2: Direct Relation Matrix

Code i/j	Enabler	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	Row Total (RT)
E1	Ethical Foundation & Practices	0.00	2.33	2.00	3.00	2.00	2.00	4.00	2.33	2.67	2.67	2.33	2.33	2.33	1.67	31.67
E2	Social Inclusion and Equality	0.67	0.00	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	8.67
E3	Leveraging Technology & Innovation	0.67	3.33	0.00	1.33	3.33	2.33	1.33	1.67	2.00	2.00	1.67	2.00	1.67	1.67	25.00
E4	Adherence to Sustainability Regulations	4.00	3.67	3.33	0.00	4.00	4.00	3.33	4.00	4.00	4.00	4.00	4.00	4.00	4.00	50.33
E5	Green Product & Services	0.67	0.67	1.33	2.00	0.00	1.00	0.67	1.00	2.00	2.00	2.33	1.67	1.67	1.33	18.33
E6	Collaboration with Stakeholders	3.00	2.00	3.00	2.33	2.00	0.00	2.67	2.00	2.33	2.33	2.33	2.00	2.00	0.67	28.67
E7	Transparency & Accountability	2.67	1.67	1.67	2.67	1.67	3.00	0.00	1.67	1.67	1.67	1.67	1.67	1.67	1.67	25.00
E8	Integrating ESG in Risk Management	4.00	4.00	4.00	4.00	4.00	4.00	3.33	0.00	4.00	4.00	4.00	4.00	4.00	4.00	51.33
E9	Environmental Development Measures	1.00	0.67	3.00	2.67	3.33	2.00	1.67	2.67	0.00	0.67	2.00	1.67	1.67	1.67	24.67
E10	Community Development Measures	1.00	3.33	3.00	2.33	2.33	1.67	1.67	1.67	0.67	0.00	2.00	1.67	1.67	1.67	24.67
E11	Sustainability Code of Conduct & Reporting	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	0.00	4.00	4.00	4.00	52.00
E12	Environmental Awareness and Knowledge in Employees	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.67	0.00	4.00	1.00
E13	Pro-Environmental Behaviour of Employees	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.67	3.67	0.00	1.00
E14	ESG Indexing	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	0.00
Column Total (CT)		33.67	37.67	38.00	37.00	39.33	36.67	35.33	35.33	33.67	36.00	36.00	34.33	33.33	33.33	25.00

Source: Author's own work.

Table 3: Normalization of Direct Relation Matrix (D)

Code	Enabler	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14
E1	Ethical Foundation & Practices	0.000	0.045	0.038	0.058	0.038	0.038	0.077	0.045	0.051	0.051	0.045	0.045	0.045	0.032
E2	Social Inclusion and Equality	0.013	0.000	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
E3	Leveraging Technology & Innovation	0.013	0.064	0.000	0.026	0.064	0.045	0.026	0.032	0.038	0.038	0.032	0.038	0.032	0.032
E4	Adherence to Sustainability Regulations	0.077	0.071	0.064	0.000	0.077	0.077	0.064	0.077	0.077	0.077	0.077	0.077	0.077	0.077
E5	Green Product & Services	0.013	0.013	0.026	0.038	0.000	0.019	0.013	0.019	0.038	0.038	0.045	0.032	0.032	0.026
E6	Collaboration with Stakeholders	0.058	0.038	0.058	0.045	0.038	0.000	0.051	0.038	0.045	0.045	0.045	0.038	0.038	0.013
E7	Transparency & Accountability	0.051	0.032	0.032	0.051	0.032	0.058	0.000	0.032	0.032	0.032	0.032	0.032	0.032	0.032
E8	Integrating ESG in Risk Management	0.077	0.077	0.077	0.077	0.077	0.077	0.064	0.000	0.077	0.077	0.077	0.077	0.077	0.077
E9	Environmental Development Measures	0.019	0.013	0.058	0.051	0.064	0.038	0.032	0.051	0.000	0.013	0.038	0.032	0.032	0.032
E10	Community Development Measures	0.019	0.064	0.058	0.045	0.045	0.032	0.032	0.032	0.013	0.000	0.038	0.032	0.032	0.032
E11	Sustainability Code of Conduct & Reporting	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.000	0.077	0.077	0.077
E12	Environmental Awareness and Knowledge in Employees	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.071	0.000	0.077	0.019
E13	Pro-Environmental Behaviour of Employees	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.071	0.071	0.000	0.019
E14	ESG Indexing	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.000

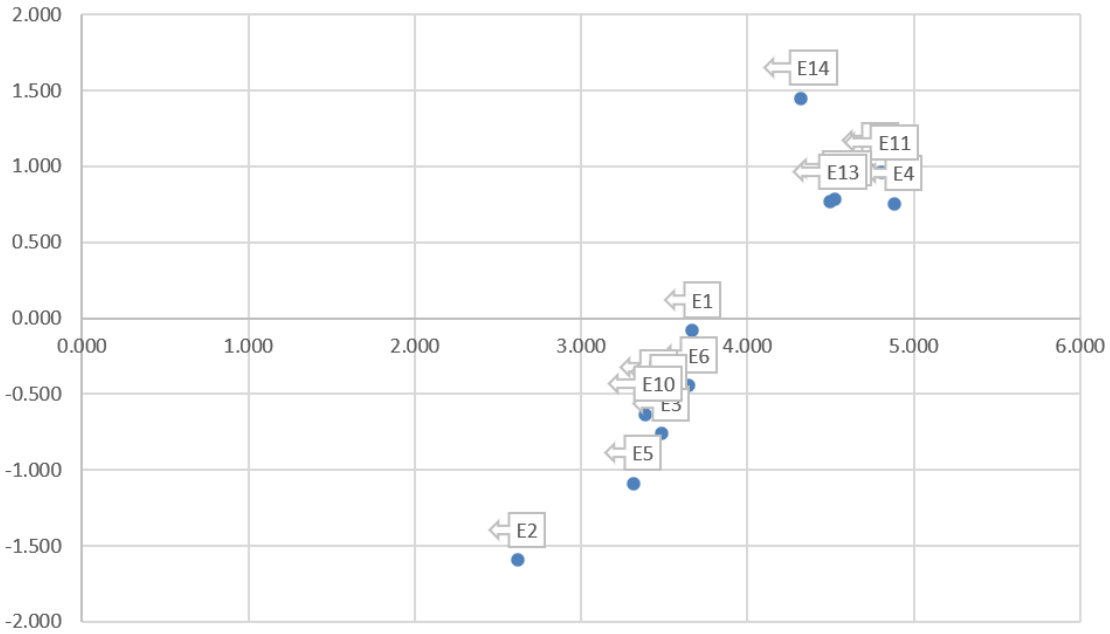
Source: Author's own work.

Casual diagram

We also calculated the difference of R_i and C_j and the values that we derived from $R_i - C_j$ helped us to divide the studied variables into two groups (a) causal group and (b) effect group. If the value of $(R_i - C_j)$ is positive, the conforming enabler can be considered to fall in the cause group, whereas the negative values fall in the effect group. Therefore, the causal diagram (Figure 2) can be attained by mapping the datasets $R_i + C_j$ and $R_i - C_j$ in Table (3b).

Criteria plotted above the horizontal axis (positive R-C values) are classified as "cause factors" or "dispatchers" that primarily influence other elements in the system, while those below the axis (negative R-C values) are "effect factors" or "receivers" that are primarily influenced by other criteria. The further a criterion is positioned to the right on the horizontal axis, the more central and important it is to the overall system.

Figure 1: Causal Diagram



Source: Author's own work.

Discussion

In the current study, the causal diagram (Figure 2) was obtained by mapping the datasets $R_i + C_j$ and $R_i - C_j$ in the Total Relation Matrix shown in Table (3b). The causal dynamics show that Adherence to Sustainability Regulations [E4], Integrating ESG in Risk Management [E8], Sustainability Code of Conduct & Reporting [E11], Environmental Awareness and Knowledge in Employees [E12], Pro-Environmental Behaviour of Employees [E13] and ESG Indexing [E14] collectively form a causal group that can influence and shape the bank's approach towards sustainability. The relative significance of these enablers are shown in terms of their rankings in Table 3b. As shown in the table, Adherence to Sustainability Regulations (E4) and Sustainability Code of Conduct & Reporting (E11) are the most significant in the banks of South Asian nations for sustainable development of banks. A strict sustainability code of conduct is required, in which banks must report all activities, events, and actions taken by the banks to protect the environment and natural resources, and social development, while keeping in mind the attainment of profits.

The next significant enabler in the causal group is Integrating ESG in Risk Management (E8), which shows that if the banking system adopts sustainability practices and adheres to sustainability regulations, it can become a driver of achieving its goals. Thus, it is important for banks to integrate the ESG profile into their risk management processes where they need to identify, prioritize, assess, and respond to different types of risk, considering the economic, social, and governance perspectives (Agrawal & Chitranshi, 2023).

Environmental Awareness and Knowledge in Employees (E12) and Pro-Environmental Behaviour of Employees (E13), shown in Table 3b, are next two significant enablers for sustainable banking practices in banks. Thus, with the help of environmental awareness programs and inculcating knowledge and benefits of adopting sustainable practices among employees, banks can engage together to achieve sustainability

goals. The findings suggest that these elements collectively form a cohesive causal group that influences a bank's CSR and environmental sustainability efforts, among the South Asian Countries such as India, Pakistan, Bangladesh, Bhutan, Sri Lanka, and Nepal.

Ethical Foundation & Practices [E1], Social Inclusion and Equality [E2], Leveraging Technology & Innovation [E3], Green Product & Services [E5], Collaboration with Stakeholders [E6], Transparency & Accountability [E7], Environmental Development Measures [E9], and Community Development Measures [E10] are identified as the eight significant effects, forming the 'Effect Group.' These enablers are the outcomes of sustainable investing which are influenced from other enablers. It shows that adhering to sustainable regulations and complying with the sustainability code of conduct and reporting can help the banks to promote ethical foundation and practices (E1) along with transparency and accountability (E7) in the banking system. Accountability in sustainability reporting promotes the banks' engagement with all stakeholders, including employees, in working towards long-term growth and profits without harming the environment, natural resources, and society's sentiments. The adoption of such sustainable practices in banks are the foundation of the genuine collaboration with the stakeholders (E6). It shows that the stakeholder relationships serve as a powerful indicator of how successfully a bank is managing the core drivers of its sustainability strategy.

With sustainability code of conduct and reporting, arranging awareness programs for employees and encouraging them to adhere to the sustainability regulations towards sustainable practices in banking operations can result in enabling them to take advantage of advanced technology and innovation (E3) and introduce green product and services (E5) in the organization. The formulation of financial instruments that target the requirements of unbanked populations can brings the possibility of homogeneous development, social justice, and environmental remedies inclusion.

Environmental Development Measures (E9), Community Development Measures (E10) in the effect group of DEMATEL analysis are proved to be the tangible outcomes influenced by the banks' actions. It shows that if banks promote and adopt sustainable practices, they create a ripple effect that directly contributes to Environmental and Community Development Measures. Sustainable practices encourage the creation of new financial products like green bonds and green deposits (E5). These products channel funds directly into certified environmental projects, creating a clear link between financial activity and positive environmental outcomes.

While this study is contextualized within South Asian nations, its findings offer broader insights, particularly for other emerging markets. The identified causal pathway - where internal capacities like risk management and employee knowledge must be built before external impacts like community development can be realized - mirrors a common developmental trajectory for sustainable finance in regions facing similar institutional and regulatory challenges.

Research implications

This study provides empirical evidence that sustainability drivers in banking are not flat but hierarchical. It confirms that internal, process-oriented factors (like risk management and employee behavior) are the foundational causes that enable the achievement of external, outcome-oriented effects (like community development and stakeholder collaboration). The DEMATEL model demonstrates a clear causal relationship, suggesting that performance in the 'Effect Group' is directly dependent on the successful implementation of factors in the 'Causal Group,' providing a more dynamic and interconnected theoretical framework for sustainable finance.

The findings of the study provide the key enablers of the 'Causal group' that should be focused on first, by the bank managers. Efforts to improve stakeholder collaboration or launch green products will be inefficient without first embedding ESG into risk management, ensuring regulatory adherence, and fostering a pro-environmental culture among employees. Following the cause group, recognizing the influence of 'Adherence to Sustainability Regulations,' 'Integrating ESG in Risk Management,' 'Sustainability Code of Conduct & Reporting,' 'Environmental Awareness and Knowledge in Employees,' 'Pro-Environmental Behavior of Employees,' and 'ESG Indexing' can help the banks in comprehensive decision-making and potentially enhance sustainable initiatives. Strengthening these underlying drivers can help the banks in building trust and demonstrate a credible commitment to sustainable goals. This analysis provides a strategic roadmap for decision-making. Managers should allocate budgets and personnel to strengthen the causal drivers, such as employee training on sustainability (E12) and robust reporting mechanisms (E11), with the understanding that this is the most effective path to achieving the desired effects like improved social inclusion (E2) and environmental measures (E9). The results underscore the importance of building internal capacity. Instead of focusing solely on external outcomes, bank leadership must cultivate employee knowledge (E12), behavior (E13), and establish a strong internal code of conduct (E11) as the primary levers for driving the entire sustainability agenda forward.

Policymakers and regulators should design interventions that target the 'Causal Group.' This means

creating strong regulations around ESG integration in risk management (E8), mandating clear sustainability reporting standards (E11), and perhaps offering incentives for employee training programs in sustainability (E12). They should create an environment that compels banks to address the root causes, knowing that the desired effects will follow as a consequence of a well-regulated foundational structure. The inclusion of "ESG Indexing" (E14) in the causal group suggests that clear, standardized market benchmarks are a powerful driver. Policymakers should support the development and adoption of consistent ESG indices to provide the market with the clarity needed to push banks toward more sustainable internal practices.

Conclusions

In the pursuit of instilling sustainability practices within South Asian banks, this study underlines the key roles played by the different enablers in the form of the causal and effect variables, towards sustainability in banks. The study reveals a clear causal hierarchy for achieving sustainability in banking, demonstrating that internal mechanisms are the primary drivers of external success. The findings provide a strategic roadmap, urging banks to prioritize resources on the six core causal factors to most effectively advance their bank's sustainability performance. Key outcomes like green product innovation and community development are identified as effects, achievable only after foundational causes like ESG risk integration and employee education are established. The key enablers of the causal group, when effectively integrated, serve as foundations for the establishment of a more responsible and sustainable business ecosystem. The formulation of strategic sustainable integration, if closely aligned with the core business objectives of banks, can empower them to seamlessly integrate sustainability practices into their daily operations. This integration reflects an organization's commitment to balancing profitability with social and environmental responsibility.

Limitations

This study relies on available data and sources, which may involve inherent limitations pertaining to their scope and reliability. Future research endeavors would benefit from a more comprehensive and varied array of data sources. Also, the dynamic nature of the businesses and the evolving regulations surrounding sustainability necessitate an acknowledgment that the study's findings may evolve over time. Hence, conducting regular updates and reviews is advisable to maintain the ongoing relevance of the study's findings and recommendations.

Future Research

To further advance our comprehension of sustainability adoption within South Asian banks, future research endeavors may explore the long-term impact of banking strategies in South Asian banks and ultimately may contribute to the establishment of a more sustainable and ethically responsible business landscape. The future research can cover the longitudinal studies to understand how these cause-and-effect relationships evolve over time in response to policy shifts, market changes, and technological advancements. Comparative studies can be conducted in future contrasting the sustainable practices of South Asian banks with those of banks in other nations, which can serve to highlight best practices and areas where improvement is needed, fostering international knowledge exchange.

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