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A Taxonomy of Sustainability Indicators in the Banking Sector

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Abstract

While the manufacturing sector is frequently scrutinized for its sustainability efforts, the banking industry is often overlooked despite its pivotal role in financing major global emission contributors. Although numerous studies have explored sustainable banking, there remains a notable gap in identifying and classifying sustainability indicators. Research specifically addressing standardized sustainability indicators for banking practices is currently limited. This study aims to systematically categorize sustainable banking indicators. A structured literature review approach was employed, utilizing the Scopus database to search for articles with keywords such as "sustainable banking," "sustainable practices," and "green banking." Following rigorous inclusion and exclusion criteria, fifty-seven relevant papers were selected for review. The comprehensive analysis enabled the classification of sustainable banking practices into seven categories: emission reduction, resource management, sustainable product innovation, product stewardship, sustainable human resource management, community engagement, and human rights compliance. Furthermore, the orientation of the sustainable practices and their corresponding impact were discussed to generate deeper insights. The resulting categorization and metrics provide a valuable framework for policymakers and academic researchers to assess and benchmark sustainability within the banking sector.

Keywords
sustainable banking, sustainable practices, banks, sustainable indicators

1. Introduction
The banking sector, although often perceived as having a minimal direct environmental footprint, exerts substantial indirect environmental and social influence through its financing and investment decisions. It is estimated that 20 of the world's largest commercial banks fund nearly 74% of global thermal power projects, underscoring their critical role in perpetuating carbon-intensive industries (Moises and Carvalho, 2025). Recognizing this, many banks have initiated green financing, sustainable lending, and environmental, social and governance (ESG) aligned investment practices (Zhixia et al., 2018). These shifts have been supported by global frameworks such as the united nations environment programme–finance initiative (UNEP-FI), the principles for responsible banking. In recent years, regulatory frameworks such as the European union taxonomy for sustainable finance and the sustainable finance disclosure regulation (SFDR) have heightened pressure on banks to integrate ESG considerations into their operations. In parallel, financial market actors including institutional investors and credit rating agencies are increasingly

incorporating ESG metrics into decision-making processes. This evolving landscape underscores the strategic necessity for banks to incorporate sustainable practices and establish credible, transparent, and standardised sustainability reporting mechanisms. Since the 1990s, banks have been viewed as key enablers of sustainable transformation due to their intermediary role in capital allocation (Jeucken & Bouma, 1999; Bouma et al., 2017). By influencing investment decisions across all sectors, banks can either support or undermine sustainability goals (Yip & Bocken, 2018). In the aftermath of the 2008 financial crisis, public scrutiny and stakeholder expectations intensified, prompting banks to align their strategic goals with broader societal and environmental outcomes (Stauropoulou et al., 2023).

Though a gamut of sustainable initiatives has been undertaken in the banking sector, which is inherently complex and service-driven, there is still no universally accepted framework of practices and indicators. Furthermore, limited research exists on the classification of these practices and the scale of their impact, raising the need for a structured approach to understanding where these practices fall and how they influence stakeholders. The indicators used across studies and institutions remain fragmented, inconsistent, and highly context specific. Regional disparities also influence how sustainability is approached. Banks in high income countries often possess the resources and regulatory support needed for sustainability integration, while those in developing economies face institutional voids, limited stakeholder pressure, and capacity constraints. These asymmetries further complicate the creation of universally applicable sustainability indicators, underscoring the need for adaptable yet comparable frameworks. For instance, HSBC, BNP Paribas, and Standard Chartered have adopted sustainability-linked loan frameworks and publish ESG scorecards annually. However, the indicators used vary significantly some emphasize carbon emissions, others prioritize gender diversity or financial inclusion. In emerging markets, such as India and Brazil, state-owned banks often report on community development but lack robust environmental metrics. Globally, several reporting standards such as the global reporting initiative (GRI), sustainability accounting standards board, and more recently the international financial reporting standards foundation's S1 and S2 standards, have attempted to bring structure to sustainability disclosure. Yet, these frameworks are often tailored to corporate reporting and lack sector specific metrics for banks. As a result, banks adopt a patchwork of indicators some mandatory, others voluntary limiting the comparability and effectiveness of sustainability disclosures. This fragmentation impedes meaningful comparison, hinders regulatory efforts, and limits the scalability of sustainability frameworks across the global banking ecosystem (Burhanudin et al., 2021). The motivation behind this study stems from the need to examine the orientation and impact of sustainable banking practices, which remain underexplored in existing literature. A deeper understanding of these aspects is essential to assess their effectiveness and relevance across different stakeholder groups.

1.1 Objectives

In this paper, we analyse the breadth of indicators used to evaluate banks' sustainable. Employing a structured literature review, we systematically categorize these indicators. This study addresses the following research questions:

I. What are the main lines of research on sustainability indicators in banking ?
II. To develop a classification of sustainable banking practices based on their orientation and to evaluate the corresponding impact of these practices.

In doing so, the study not only strengthens academic understanding of sustainability indicators in banking but also responds to the practical need for standardisation of sustainability evaluation a critical step in advancing the banks contribution to a sustainable and low-carbon economy.

2. Methods

A structured literature review was carried out to explore indicators published in peer-reviewed articles that are relevant to the sustainable practices in banks. Scopus was selected as a search database, since it provides a comprehensive coverage of peer-reviewed journal articles. Keywords such as "sustainable banking," "green practice", "green banking" and "sustainability indicators" were used to filter peer-reviewed journal articles. The base year of 2015 was selected to align with the period when banks began integrating CSR and sustainability initiatives with the united nations sustainable development goals (UN SDGs). A total of 57 studies were reviewed, with priority given to those focusing on sustainability metrics, performance evaluation frameworks, and regulatory guidelines specific to financial institutions. In addition to academic sources, the authors incorporated professional experience and industry insights to refine and supplement the indicator list. This hybrid approach ensured the inclusion of both theoretically grounded and practically relevant metrics. The identified sustainable practice indicators were classified into seven broad

categories. Sustainable practices refer to operational and strategic activities undertaken by banks to promote sustainability, including emission reduction, resource management, sustainable product innovation, product stewardship, sustainable human resource management, community engagement, and compliance with human rights standards.

3. Results

3.1 Descriptive analysis of papers

Figure 1 presents the distribution of reviewed articles by journal. Among the sources, Business Strategy and the Environment and Sustainability emerged as the most frequently represented journals, contributing the highest number of publications relevant to the objectives of this review. The analysis of journal sources suggests a growing academic focus on sustainability-related themes within strategic and interdisciplinary environmental research domains, aligning well with the scope of this study.

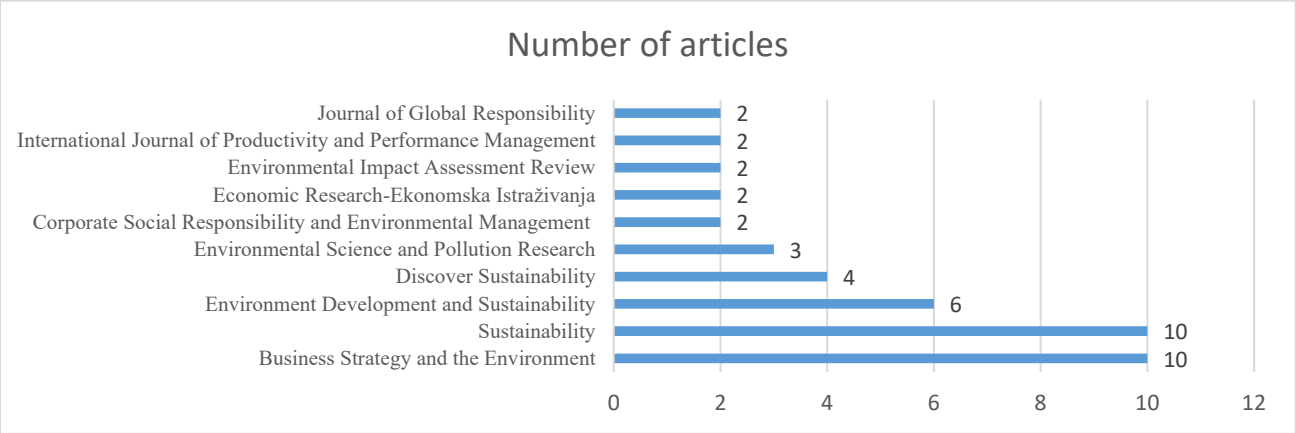

Figure 1. No. of articles by Journal (*min count =2)

To further explore the thematic focus of the literature reviewed, a word cloud was generated based on the keywords associated with the selected articles (Figure 2).

Figure 2. Word Cloud of keywords

The word cloud visually represents the most frequently occurring terms, with larger words indicating higher frequency. Dominant terms such as sustainability, banking, sustainable, performance, environmental, green, social and financial highlight the central research themes within this body of work. This visualization complements the fore coming

discussion on sustainability indicators by providing a broader perspective on how the literature conceptualizes and frames the relationship between sustainability and banking. This facilitated an accessible and engaging summary of the research focus areas, supporting both thematic categorization and the identification of dominant topics across the literature.

In addition to thematic keywords, a second word cloud was generated based on sustainability indicators reported across the reviewed studies (Figure 3). Terms such as environmental, social, governance, disclosure, score, CSR, and practices emerged frequently, suggesting a strong emphasis on ESG frameworks. The prominence of terms such as ESG, sustainability, disclosure, and score in the word cloud indicates that the majority of authors relied on secondary data-based proxies to assess and report sustainability performance. Furthermore, the frequent appearance of terms like CSR and social, which collectively rank just below ESG scores and disclosure, suggests that the banking sector's sustainability efforts are predominantly oriented toward social responsibility and community engagement, rather than environmental concerns. This visualization illustrates how sustainability is operationalized and measured within the context of banking and finance literature, reinforcing the field's multidimensional approach to sustainability assessment.

Figure 3. Word cloud for sustainability indicators

Word clouds were employed to visually summarize both the thematic focus and the sustainability indicators prevalent in the reviewed literature. The keyword cloud provides an overview of the research scope and trends, while the indicator cloud highlights the specific metrics and dimensions through which sustainability is assessed. Together, they offer a comprehensive understanding of the field's intellectual landscape and methodological priorities.

3.2 Analysis of sustainability research in Banking

Despite the extensive attention sustainability has received, only a few studies have investigated sustainability practices in the banking sector (Carnevale & Mazzuca, 2014). Most previous studies in the financial sector have concentrated on CSR behavior in a particular country or region. Regardless of the increasing interest, there remains no universally accepted framework or standardized set of metrics for assessing sustainable practices in the financial sector. The academic and practitioner communities have proposed a variety of models, but these efforts remain fragmented and fall into several distinct lines of research.

A primary line of inquiry has focused on leveraging pre-existing ESG scores as a proxy for sustainability performance. Studies have utilized access to finance and corporate social performance as proxies for social sustainability, while financial environmental impact and corporate environmental performance have been used for environmental sustainability. These variables are often sourced from large databases such as MSCI (Morgan Stanley Capital

International), Refinitiv, Bloomberg, and the World Bank (Nizam et al., 2019; Salim et al., 2023; Alam et al., 2022). While this approach offers a convenient and quantitative measure, it often lacks granular detail on the specific underlying practices of a bank and may not fully capture the complexity of sustainability. Another approach, as seen in the work of Istudor et al. (2022), combines traditional financial performance metrics (e.g., total assets, net profit, return on assets (ROA), return on equity (ROE), and non-performing loan ratio) with a limited set of environmental indicators (e.g., the volume of renewable fuel usage and CO_2 emissions). This method links sustainability to financial outcomes but the indicators are often broad and do not provide a comprehensive picture of a bank's sustainability activities. A third line of inquiry is dedicated to identifying and cataloguing a wide array of specific, practice-based indicators derived from disclosures and reports. This research, such as the work on Sub-Saharan Africa by Adu (2022) and Raut et al. (2017), provides extensive lists of granular variables covering everything from waste management and green packaging to employee diversity and community involvement. Green practices such as sustainable procurement and employee training have been shown to enhance performance across multiple dimensions and contribute meaningfully to sustainable development (Durgaprasad and Prasad, 2022). Moufty et al. (2022) identified an exhaustive list of environmental indicators (e.g., emissions, transport, energy used, waste, water used, biodiversity, compliance with laws, clients' environmental risks, and staff competency) and social sustainability indicators (e.g., labor health and safety, employee benefits, human rights policies, financial literacy, anti-corruption, and customer satisfaction). Developing technological capabilities aligned with innovation significantly accelerates firms' progress toward sustainable growth (Durgaprasad and Prasad, 2023). While highly detailed, these lists are often context-specific and lack a unifying framework, limiting their comparability across institutions. Similarly, Nicolo et al. (2024) and Cunha et al. (2021) have examined sustainability disclosure indicators focused on a bank's business model, policies, risks, and reporting frameworks. This approach highlights what banks report but often does not measure the actual implementation of those practices.

The fragmentation in academic literature is mirrored in practitioner frameworks. Foundational standards like the UNEP FI and the GRI have been instrumental in shaping sustainability reporting. The UNEP FI's principles for responsible banking, for instance, offers a strategic blueprint to align financial institutions with global objectives including the Paris agreement and the SDGs. However, while these frameworks articulate high-level principles, they often lack specific, operationalized guidance for measurement and execution. This absence of a definitive set of metrics for assessing sustainability within banks is a critical gap that complicates cross-institutional comparisons and hinders the scalability of sustainability frameworks. The development of robust, consistent, and actionable metrics for measuring sustainability in banking, therefore, remains an evolving and necessary endeavor. Cunha et al. (2021) reinforce this, positing that future research should consider a holistic approach to a bank's sustainable practices and performance to advance the field.

The existing research about variables and indicators for evaluating the sustainability implementation is still under development. This study intends to overcome this gap offering, at first, a comprehensive set of sustainability indicators to understand what indicators assesses. The reviewed indicators have been reclassified and grouped according to their possible ability to capture sustainable practices and performance. This methodology has led of the identifying of 7 broad sustainable practices.

This broad classification underscores the complexity of assessing sustainability outcomes across diverse organizational practices and sectors. Specifically, these variables reflect the operationalization of seven core sustainability practices:

1. Emission Reduction: Refers to the strategies and actions implemented by banks to minimize their direct and indirect greenhouse gas (GHG) emissions, including energy efficiency improvements, adoption of renewable energy, and carbon offset initiatives.
2. Resource Management: Involves the efficient use of natural and operational resources (e.g., paper, water, energy) within the bank's operations, aiming to reduce waste and promote circular economy principles.
3. Sustainable Product Innovation: Denotes the development of financial products and services that contribute to environmental or social sustainability, such as green bonds, ESG-linked loans, and microfinance products for underserved communities.
4. Product Stewardship: Refers to the bank's responsibility in ensuring that its financial products and services do not lead to environmental or social harm throughout their lifecycle, including responsible lending and investment screening practices.

5. Sustainable Human Resource Management (HRM): Encompasses human resource policies and practices that promote diversity, equity, employee well-being, ethical labor standards, and opportunities for continuous professional development.
6. Community Engagement: Involves partnerships, programs, and investments that support local community development, education, financial literacy, and social inclusion, often as part of CSR initiatives.
7. Human Rights Compliance: Refers to the bank's adherence to internationally recognized human rights standards in its operations, supply chain, and financing activities, ensuring that no stakeholders are exposed to human rights violations.

The rationale behind categorizing these set of practices into broader groups is to enhance analytical and conceptual clarity and practical utility. From an applied standpoint, broader categories provide simplified frameworks that are more accessible for practitioners and policymakers, thereby improving the usability of research findings in real-world contexts. Thus, categorization not only enhances conceptual coherence but also bridges the gap between research and application.

While the variables listed above define the scope of sustainable practices, their true value emerges when paired with quantifiable indicators. These indicators translate abstract concepts into actionable metrics, enabling systematic assessment and continuous improvement. These indicators provide measurable benchmarks that facilitate the monitoring and evaluation of sustainability practices. Table 1 outlines appropriate indicators for each variable, providing a practical framework for monitoring and assessment.

Table 1. Categorization of Indicators to broader practices

Sustainable practice variables	**Indicators**	**Source**
Emission Reduction	• Offering digital services • Using low carbon/environmentally friendly technologies for operations • Energy efficiency and renewable energy adoption • Use of renewable energy	Gulzar et al. (2024); Bullay (2019); Bhaskaran et al. (2023); Istudor et al. (2022); LaToree et al. (2024); Mishra and Sant (2024); lelasi et al. (2023); Adu (2022); Moufty et al. (2024); Dworczak et al. (2023); Mir and Bhat (2022)
Resource Management	• Paperless banking • Digital banking infrastructure • Waste management • Usage of recyclable materials • Water conservation	Bullay (2019); Bhaskaran et al. (2023); LaToree et al. (2024); Mishra and Sant (2024); lelasi et al. (2023); Adu (2022); Moufty et al. (2024); Dworczak et al. (2023)
Sustainable Product Innovation	• Offering green mortgages, green bonds, green loans • Environmental leasing • Environmental venture capital • Green investment funds • Climate funds	Bullay (2019); Bhaskaran et al. (2023); LaToree et al. (2024); Zaid et al. (2024); Mishra and Sant (2024); Hussain et al. (2024); Riyanti et al. (2025); Mir et al. (2025); Adu (2022); Moufty et al. (2024)
Product Stewardship	• Client & Supply Chain Environmental and Social Risk Assessment • Environmental Ownership & Performance Monitoring • Green Procurement	Bullay (2019); LaToree et al. (2024); Adu (2022); Moufty et al. (2024)

	• Products and Service Compliance with Environmental Laws and Regulation • Products and service compliance with social laws and regulation	
Sustainable HRM	• Training and skill development programs • Employee benefits and compensation • Labor health and safety • Labor-management relations • Employee hiring, turnover, and retention • Gender equity and diversity • Internal awareness and sustainability initiatives • Performance-based green rewards and motivation	Bullay (2019); Bhaskaran et al. (2023); Manta et al. (2020); LaToree et al. (2024); Mishra and Sant (2024); Drago et al. (2024); lelasi et al. (2023); Adu (2022); Moufty et al. (2024); Rajawat and Mahajan (2024); Dworczak et al. (2023)
Community Engagement	• Financial inclusion • Financial literacy • Community welfare projects and sponsorships • Support during crises • Entrepreneurship and livelihood development • Improved access to financial services for rural/remote areas • Spending on local suppliers and support to local economies • Support for community forestry and environmental livelihood projects • Social responsibility and CSR governance	Bullay (2019); Siddique et al. (2017); Bhaskaran et al. (2023); LaToree et al. (2024); Mishra and Sant (2024); Drago et al. (2024); lelasi et al. (2023); Adu (2022); Siddik et al. (2023); Moufty et al. (2024); Rajawat and Mahajan (2024); Dworczak et al. (2023)
Human Rights Compliance	• Human rights policies and assessments • Adherence to international frameworks and reporting standards • Child and forced labor prevention • Indigenous rights and culturally sensitive operations • Freedom of association and collective bargaining • Employee training on human rights and security practices • Policy and procedure concerning human rights • Compliance with operating social laws and regulations	Bullay (2019); Bhaskaran et al. (2023); LaToree et al. (2024); Mishra and Sant (2024); Drago et al. (2024); lelasi et al. (2023); Adu (2022); Moufty et al. (2024); Rajawat and Mahajan (2024); Dworczak et al. (2023)

These sustainable practices in banking can be further broadly categorized into three orientations: internal, customer-oriented, and stakeholder-oriented.

Internal practices including resource management and sustainable HRM, are implemented within the organization. These initiatives aim to enhance operational sustainability through employee-driven actions and internal process improvements. Customer-oriented practices, such as sustainable product innovation and product stewardship, are designed to offer environmentally and socially responsible products and services. These practices enhance customer engagement and promote sustainable consumption behaviours. Stakeholder-oriented practices include emission reduction, community engagement, and compliance with human rights standards. These initiatives influence a wide

range of stakeholders, employees, customers, communities, and shareholders by addressing broader environmental and social responsibilities.

The impact of these practices varies in scale: local, regional, or global depending on their scope and implementation.

- Emission reduction (e.g., adoption of digital services, renewable energy, and eco-friendly technologies) have a global impact, contributing to the reduction of carbon and greenhouse gas (GHG) emissions.
- Resource management practices (e.g., digital banking infrastructure, use of recyclable materials, water conservation, and waste management) typically have a regional impact, especially in areas where these initiatives are actively implemented.
- Sustainable product innovation and stewardship can achieve a global reach, particularly when offerings like green mortgages, bonds , green procurement, etc are scaled across markets.
- Additionally, sustainable HRM with a focus on the wellbeing and safety of employees has a local impact, as these practices are specific to the internal context of each bank and directly influence its workforce.
- Community engagement and human rights compliance through initiatives like financial inclusion, community development, fair wages, and child labour prevention tend to have a regional impact, benefiting local communities and reinforcing the bank's social responsibility.

Table 2 recapitulates the sustainable practices orientation and their impact. In summary, the orientation and implementation scale of sustainable practices determine their sphere of influence, ranging from localized internal improvements to globally significant environmental contributions.

Table 2. Classification of Sustainable Banking Practices by Orientation and Impact

Orientation	**Sustainable practice**	**Impact**
Internal	Resource Management	Regional
	Sustainable HRM	Local
Customer	Sustainable Product Innovation	Global
	Product Stewardship	Global
Stakeholder	Emission Reduction	Global
	Community Engagement	Regional
	Human Rights Compliance	Regional

Figure 4 presents a Fishbone (Cause-and-Effect) diagram that illustrates how various sustainability indicators contribute to sustainable performance in the banking sector. This visual framework helps establish a clear connection between the underlying causes and the desired outcomes. To remain competitive and relevant, banks must continuously enhance their financial performance, adopt cost-effective strategies, optimize resource usage, reduce emissions, manage waste responsibly, and promote employee and customer well-being. Meeting the expectations of diverse stakeholders is also essential. Tracking progress toward sustainability requires the use of well-defined indicators. In this context, seven key indicators have been identified to guide banks in implementing sustainable practices. These efforts not only improve operational efficiency but also align with several SDGs. Notably SDG 8 (Decent Work and Economic Growth), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), SDG 12 (Responsible Consumption and Production), and SDG 17 (Partnerships for the Goals) through sustainable product innovation and product stewardship, resource management and emission reduction. Moreover, banks contribute to broader goals such as SDG 1 (No Poverty) and SDG 11 (Sustainable Cities and Communities) by promoting financial inclusion, supporting green infrastructure, and offering loans for environmentally friendly products.

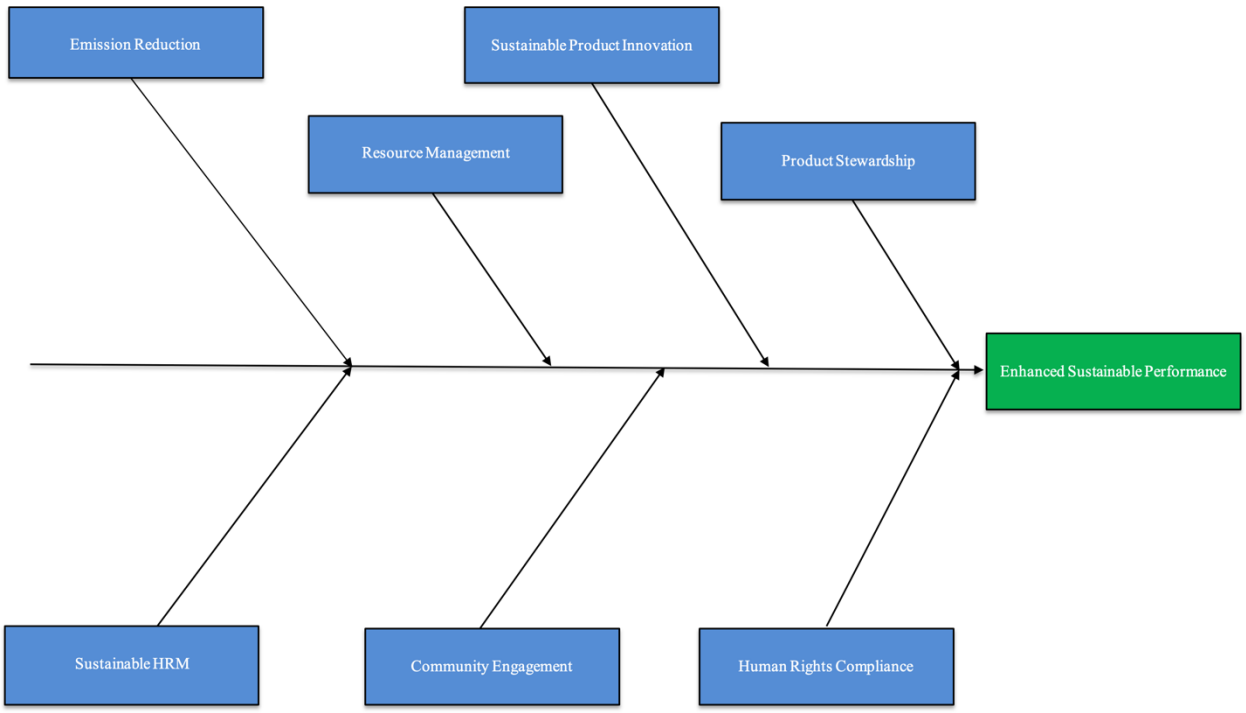

Figure 4. Fishbone diagram of sustainability indicators

4. Conclusion

This study successfully meets its objectives by mapping the main lines of research in this domain and systematically identifying and categorizing the key indicators and sustainable practices used to evaluate sustainability in the banking sector. Through a structured literature review, it offers a comprehensive taxonomy of sustainability indicators, contributing to both academic understanding and practical application. The classification of sustainable banking practices based on their orientation and corresponding impact provides a structured framework for understanding their strategic relevance. This study contributes to the development of a standardized approach to evaluating sustainability in banking, offering insights for both academic research and practical implementation. The indicators developed in this study serves as a tool for practitioners to systematically categorize and evaluate sustainability. The current absence of a harmonized taxonomy impedes objective measurement, reduces comparability across institutions, and complicates the regulatory oversight of the banking sector's transition toward sustainability. Consequently, this study underscores the need for policy intervention. We recommend that regulatory bodies and industry consortia collaborate to establish a standardized, yet flexible, set of sustainability indicators and mandate a centralized, open-access database for validated metrics. Such initiatives would support consistent, transparent, and rigorous measurement practices across the banking sector.

This study is subject to several limitations that should be acknowledged. First, while the literature survey enabled the identification and categorization of sustainability indicators, the fragmented and inconsistent nature of existing studies posed a key challenge. The lack of a universally accepted taxonomy or standard set of indicators led to interpretive variability, meaning our categorization, although based on thematic commonalities, remains partially subjective and context dependent. Second, the methodological scope of this review, which excluded grey literature and unpublished studies, may have resulted in the omission of potentially pertinent contributions, thereby limiting the comprehensiveness of our findings. Future research should explore how emerging technologies and data-driven tools such as those aligned with concepts like "Society 5.0", could be integrated to enhance the implementation, monitoring, and transparency of sustainability indicators in banking. Such advancements could foster greater stakeholder interconnectivity, improve data precision, and enable the financial sector to make a more unified contribution to a sustainable and low-carbon economy.

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Biographies

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