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From Disclosure to Impact: Evaluating ESG Double Materiality and Efficiency in the Italian Banking Sector

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Abstract

Purpose: This study aims to assess the efficiency level of Italian banks in translating the quality of double materiality disclosure into economic-financial performance, by analyzing whether and to what extent the informational commitment on ESG aspects can actually generate competitive advantages and improvements in profitability.
The research seeks to fill a gap in the literature, which has rarely examined the quality of double materiality disclosure and economic-financial performance in the banking sector jointly, especially by explicitly considering double materiality as an input in efficiency models.
Methodology: The methodology combines content analysis of Italian banks' sustainability reports and non-financial statements, assessed using a ten-criteria evaluation grid specifically designed to measure double materiality disclosure, with an output-oriented Data Envelopment Analysis (DEA). The double materiality score serves as the input, while economic–financial performance is operationalized through profitability indicators (ROA, ROE, NIM) used as outputs to assess the efficiency of transforming sustainability reporting quality into the performance.
Findings: The analysis reveals significant variability in the quality of double materiality disclosure among Italian banks. Only a minority achieve high efficiency in translating disclosure into profitability, while most operate below best practice standards, with an average DEA efficiency score of 53%. Just a few banks reach excellent efficiency and 80% show below-average results, highlighting the need to integrate sustainability with business strategy better.
Research limitations/implications: The main limitation of this research lies in the size and nature of the dataset, which consists exclusively of available sustainability reports and non-financial statements for 2023. The lack of a panel analysis limits the ability to observe changes in efficiency over time. Expanding the sample and extending the study on a spatial-temporal basis, with comparative analysis of other European banks, would allow

for the identification of differences, evolving trends, and the actual impact of regulations across different banking contexts. Therefore, future research should focus on longitudinal analyses and cross-country comparisons to better understand the integration path of double materiality.
Originality/Value: This study offers an original contribution by analyzing how Italian banks transform the quality of double materiality disclosure into economic-financial outcomes, applying Data Envelopment Analysis (DEA). The work is also distinctive in proposing Total Quality Management (TQM) as an approach to bridge the gap between formal disclosure and substantive integration into decision-making processes and organizational culture, providing new perspectives for both the literature and management and policy-making in the banking sector.
Keywords: Double Materiality, ESG disclosure, Data Envelopment Analysis (DEA), banking sector
Paper type: Research paper

1. Introduction

In recent years, the growing focus on sustainability and social responsibility has profoundly transformed the European banking landscape, driving financial institutions to adopt new forms of reporting and address unprecedented challenges in managing transparency. In particular, the introduction of the double materiality principle represents one of the most significant innovations in the field of non-financial reporting. This perspective, promoted by the Corporate Sustainability Reporting Directive (CSRD) and the new European Sustainability Reporting Standards (ESRS), requires banks not only to assess how ESG factors (environmental, social, and governance) impact the bank's financial performance ("outside-in" perspective), but also to responsibly report how the bank's activities affect the environment and society ("inside-out" perspective) (Dragomir et al., 2025; European Commission, 2022; Mezzanotte, 2023).

The Italian context, recognized in the literature for its long and sophisticated tradition in environmental, social, and ethical disclosure (Veltri et al., 2023; Manes-Rossi et al., 2018; KPMG, 2022), offers an interesting scenario for studying the strategic added value of double materiality in banks. However, despite regulatory progress and the high level of stakeholder engagement, it remains largely unexplored how the quality of double materiality disclosure translates into tangible economic-financial benefits and managerial efficiency for banking institutions.

2. Literature review

2.1. Financial disclosure in banks

Financial disclosure has long been considered a fundamental mechanism for reducing information asymmetries in the banking sector (Leland and Pyle, 1977). Due to the complexity of capital structures and risk profiles, banking operations' inherent opacity makes the disclosure quality critical to market discipline, the cost of capital, and operational efficiency (Morgan, 2002; Bushman and Landsman, 2010).

The literature confirms the centrality of high-quality disclosure, while highlighting emerging challenges and factors. For example, Flannery et al. (2004) show that greater disclosure reduces financing costs by improving investor confidence. This translates into better lending conditions (Golden and Liu, 2025).

Greater transparency disciplines banks' risk-taking, reducing the likelihood of financial distress (Nier and Baumann 2006; Bischof et al., 2021). This reinforces the general principle that transparent, comparable, and standardised financial information improves banks' relationships with market counterparties and promotes efficient capital allocation (Kiran and Chughtai, 2021; Ruiz-Acosta et al., 2019).

Similarly, international reporting standards are essential in determining the effectiveness of disclosure. Alawaqleh et al. (2022) show that adopting IFRS strengthens the link between risk management and financial reporting, ensuring the comparability and reliability of information and supporting effective risk monitoring and strategic decision-making. This aligns with more general findings that adopting IFRS improves transparency and stakeholder confidence, despite the challenges associated with implementation costs and organisational preparedness (Lev, 2018; Bischof, 2009).

In recent years, the role of corporate governance in disclosure quality has also been studied, highlighting that board independence, diversity, and audit committee effectiveness are

positively associated with compliance and disclosure quality (Bischof et al., 2021; Bechihi and Nafti, 2025). Governance structures ensure compliance and facilitate the strategic use of disclosed information as signalling mechanisms in competitive markets (Leuz and Wysocki, 2016).

Technological advances are also redefining information disclosure practices. Integrating artificial intelligence and robo-advisory platforms in the banking sector is improving the quality of reporting, increasing data processing speed, accuracy, and accessibility for stakeholders (Barile et al., 2025). AI-based systems enable more dynamic, granular, and real-time reporting, in line with stakeholders' growing demand for timely and valuable information for decision-making (Irfan et al., 2023; Tsapa, 2024).

Furthermore, the literature has increasingly explored the strategic dimension of financial reporting. Beyond regulatory compliance, disclosures signal financial health, risk management quality, and sustainability positioning to external stakeholders (Beyer et al., 2010). The effectiveness of reporting depends not only on the quantity of information but also on its readability, accessibility, and alignment with investors' decision-making needs (Golden and Liu, 2025; Lambert et al., 2007).

Finally, integrating sustainability considerations into financial reporting frameworks is gaining momentum, driven by stakeholder expectations and regulatory pressures. Non-financial information, such as environmental, social, and governance (ESG) factors, is increasingly recognised as a relevant indicator of bank performance, risk exposure, and long-term strategic positioning (Kotsantonis and Serafeim, 2019).

In parallel, an extensive body of literature has investigated the theoretical foundations that explain the role, motivations, and effects of financial disclosure in the banking sector, drawing on several major economic and management theories. Agency theory represents one of the most established frameworks in this context, viewing financial disclosure as a mechanism to mitigate agency problems arising from the separation of ownership and control. Within banking institutions, managers often possess superior risk exposure and asset quality information, which may be withheld or distorted without adequate monitoring. Mandatory and voluntary disclosure practices are thus interpreted as tools to align managerial behaviour with the interests of shareholders and creditors by reducing information asymmetries and monitoring costs (Jensen and Meckling, 2019; Healy and Palepu, 2001; Capriglione and Casalino, 2014).

Complementing this, signalling theory provides an additional lens by suggesting that financial disclosure acts as a strategic communication device through which well-performing banks voluntarily disclose superior information to differentiate themselves from their competitors. In a context marked by information opacity and credibility concerns, such as banking, disclosure serves to convey positive signals to the market regarding internal governance, risk controls, and financial soundness, thereby improving reputational capital and reducing the cost of external financing (Spence, 1978; Verrecchia, 1983). However, signalling theory critics argue that voluntary disclosure's benefits may be overstated in environments where regulatory requirements are stringent and the marginal value of additional information is limited (Hossain and Hammami, 2009).

Stakeholder theory expands the analytical perspective by recognising that banks operate within a complex web of relationships involving shareholders, regulators, clients, employees, depositors, communities, and civil society actors. From this perspective, financial disclosure is conceptualised as a form of accountability that maintains legitimacy, trust, and social licence among diverse stakeholder groups (Freeman, 2010; Gray et al., 1995). This theoretical approach is particularly relevant in the post-crisis era, where banks are expected to be more

transparent about financial metrics and social responsibility, governance structures, and long-term value creation strategies.

Legitimacy theory shares conceptual ground with stakeholder theory but emphasises the role of societal expectations and institutional norms in shaping disclosure practices. It posits that banks disclose certain types of information strategically to appear aligned with prevailing social values, especially in moments of reputational threat or regulatory scrutiny (Suchman, 1995; Deegan, 2002). Accordingly, disclosure becomes a symbolic act to preserve legitimacy rather than improving transparency or informing stakeholders. This has led to critical views questioning whether certain disclosures are informative or performative (Cormier et al., 2005).

Institutional theory further reinforces this viewpoint by arguing that disclosure practices are often influenced by coercive, mimetic, and normative pressures in the institutional environment. For example, banks may adopt extensive disclosure formats not because of intrinsic informational value, but to conform to best practices, emulate peers, or respond to expectations from international bodies such as the Basel Committee or the European Banking Authority (Scott, 2001). The convergence of disclosure standards, such as IFRS or ESG-related frameworks, is thus seen as a result of isomorphic pressures that promote homogeneity rather than differentiation.

While these theoretical lenses are complementary in many respects, they also offer divergent interpretations concerning the drivers, content, and consequences of financial disclosure in banks. Agency and signalling theories focus on efficiency-enhancing and market-based explanations, whereas stakeholder, legitimacy, and institutional theories highlight socio-political dimensions and contextual embeddedness. Understanding the interplay of these perspectives is crucial for interpreting banks' disclosure strategies in both stable and crisis periods, and for assessing the efficacy of regulatory reforms aimed at promoting transparency and accountability in the financial system (Healy and Palepu, 2001; Deegan, 2002; Cormier et al., 2005; Hossain and Hammami, 2009).

2.2. ESG Double Materiality in Banks

Double materiality has emerged as a key innovation in the ESG reporting landscape, particularly with the adopting of the Corporate Sustainability Reporting Directive (CSRD) in Europe (European Commission, 2022). Unlike traditional single materiality, which focuses solely on how sustainability issues affect firm value, double materiality incorporates financial materiality and environmental and social impacts (Dragomir et al., 2025). This dual perspective reframes corporate accountability, recognising that organisations depend on and impact society and the environment (Mezzanotte, 2023). This approach aligns with stakeholder theory, as it extends the reporting duty beyond shareholders to a broader set of actors, including communities, clients, and regulators (Kalra, 2024).

Banks play a central role in operationalizing double materiality due to their dual function as economic intermediaries and systemic enablers of sustainability transitions (Hirtle, 2020; Weber and Feltmate, 2016). Literature emphasizes that ESG disclosure in banks under a double materiality perspective entails reporting not only on sustainability risks to the bank but also on the bank's impact on society and the environment (Menicucci, 2025). This mirrors the logic of agency theory, where enhanced disclosure reduces information asymmetries between managers and stakeholders, mitigating conflicts of interest regarding sustainability risks (Del Gesso and Lodhi, 2025). Double materiality requires integrating due diligence processes

across value chains, encompassing upstream and downstream impacts and dependencies (Nielsen, 2023). Moreover, signalling theory suggests that forward-looking banks use comprehensive ESG disclosures to differentiate themselves as credible and responsible market actors, reinforcing reputational capital and trust (Huang et al., 2025).

Empirical evidence on the relationship between ESG disclosure and bank performance remains mixed. Gangi et al. (2019) find a positive association between ESG disclosure and financial performance in European banks, suggesting that enhanced transparency improves stakeholder relations and operational efficiency. Conversely, Bătae et al. (2020) argue that mere compliance with ESG disclosure regulations does not automatically translate into superior profitability, as strategic integration is required for tangible performance outcomes. Similarly, Panfilo et al. (2025) observe that while double materiality adoption has advanced, it has not yet led to significant improvements in ESG risk management, highlighting the risk of symbolic rather than substantive implementation. This risk recalls legitimacy theory, where ESG disclosure may be adopted primarily to conform to societal expectations and regulatory norms, even if not yet fully embedded in decision-making (Ellili, 2022).

Moreover, adopting double materiality frameworks poses methodological challenges in measuring ESG impacts. For instance, Liang and Renneboog (2017) note that conventional ESG ratings often fail to capture banks' external impacts, which are central to double materiality assessments. This limitation underscores the need for refined content analysis and scoring approaches tailored to financial institutions (Kotsantonis and Serafeim, 2019). Institutional theory supports this view, suggesting that banks often mimic disclosure practices of peers or conform to global norms, such as GRI or EBA guidelines, not always for strategic reasons but due to mimetic or coercive pressures (Han and Song, 2025). Recent studies also stress that translating double materiality assessments into actionable key performance indicators (KPIs) remains a critical gap, limiting their effectiveness in driving managerial decision-making and strategic alignment (Nielsen, 2023). The absence of decision-useful KPIs weakens the potential of ESG disclosure as a signalling and governance tool.

In risk management, double materiality disclosure enhances banks' ability to identify systemic environmental and social risks, thereby improving resilience (Battiston et al., 2017). However, without rigorous enforcement and clear standards, double materiality reporting risks becoming a box-ticking exercise rather than a driver of sustainability integration. This concern is reinforced by Mezzanotte (2023), who highlights potential legal risks associated with incomplete or inconsistent double materiality assessments under the CSRD framework. Such performative compliance is a central critique of legitimacy theory, which warns that disclosures may serve symbolic rather than substantive accountability functions.

Italian banks are progressively aligning with double materiality principles, driven by regulatory pressures under the CSRD and market expectations for enhanced ESG transparency (Deriu et al., 2024). Nonetheless, the heterogeneity in ESG reporting practices persists, as documented by recent analyses of sustainability reports from leading Italian banks (Schimperna and Loizzo, 2022). This heterogeneity reflects differences in strategic ESG integration, governance structures, and stakeholder engagement processes, indicating that full institutionalisation of double materiality remains a work in progress (Panfilo et al., 2025). The uneven adoption underscores the institutional theory claim that convergence often results from normative and coercive pressures rather than internalised values or performance orientation (Han and Song, 2025).

Theoretical frameworks such as stakeholder and legitimacy theories provide complementary explanations for ESG disclosure adoption under double materiality (Gray et al., 1995; Freeman, 2010). Stakeholder theory posits that banks disclose information to address the

expectations of diverse stakeholder groups, while legitimacy theory suggests that disclosure is used to maintain societal acceptance and regulatory legitimacy (Suchman, 1995). This dual rationale shows how ESG reporting acts both as a governance mechanism (agency theory) and a socio-political strategy (legitimacy theory). Recent perspectives emphasise that integrating double materiality within organisational processes and performance systems can create resource-based competitive advantages (Nielsen, 2023). Thus, strategic ESG disclosure is not merely about compliance but also about building dynamic capabilities and signalling long-term value creation (Huang et al., 2025).

Finally, ESG disclosure quality under double materiality has implications for banks' competitive advantage. Porter and Kramer (2018) argue that effective sustainability integration creates shared value, enhancing long-term competitiveness. In contrast, superficial ESG disclosures without strategic alignment can erode stakeholder trust and expose banks to reputational and legal risks (Eccles and Klimenko, 2019; Mezzanotte, 2023). This confirms that the effectiveness of double materiality disclosures depends on their alignment with internal governance, strategic goals, and the bank's broader institutional environment, core tenets of both signalling and institutional theory (Del Gesso and Lodhi, 2025).

3. Research question

The aim of this study is to assess, by means of Data Envelopment Analysis (DEA), the efficiency of Italian banks in converting the quality of double materiality disclosure into economic-financial performance. Specifically, the paper addresses the following research question:

RQ: *What is the efficiency level of Italian banks in transforming the quality of double materiality disclosure into profitability, as measured by DEA?*

4. Methodology

4.1. Content Analysis and the construction of the Double Materiality Score

The decision to focus on the Italian banking sector is motivated by the fact that the literature recognizes Italy for its long-standing tradition and high level of expertise in social, ethical, and environmental reporting. Numerous studies highlight how Italian companies, and particularly banks, have been pioneers in adopting and promoting sustainability practices and non-financial information disclosure (Veltri et al., 2023; Manes-Rossi et al., 2018; Lombardi et al., 2022; Bebbington et al., 2008; Vigano and Nicolai, 2009). Italy is often cited as a context where transparency in environmental and social reporting is well established, with companies demonstrating a proactive approach to stakeholder engagement and non-financial communication (Arena et al., 2015). Recent international surveys also confirm that Italian financial institutions are among the most active in publishing comprehensive sustainability reports, reflecting a mature and sophisticated reporting environment (KPMG, 2022). This makes the Italian banking sector a particularly relevant and significant context for studying double materiality disclosure.

For this purpose, a content analysis was applied to the 2023 sustainability reports and non-financial statements of the banks included in the sample

Although these documents refer to the reporting year 2023, when the Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU) and Legislative Decree 254/2016 were still in force, the evaluation framework draws conceptually on the Corporate Sustainability Reporting Directive (CSRD, Directive (EU) 2022/2464) and the European Sustainability Reporting Standards (ESRS).

This forward-looking approach makes it possible to assess how Italian banks operationalize the double materiality principle - as later formalized in the CSRD - and how effectively this disclosure translates into economic–financial performance.

In this regard, the CSRD has introduced the concept of double materiality, which requires companies to consider not only how sustainability issues affect financial performance but also how their activities impact the environment and society (Fedele et al., 2025; Formisano et al., 2018).

The list of banks was derived from the "Albi ed Elenchi di Vigilanza" section available on the Infostat GIAVA Inquiry portal of the Bank of Italy. Subsequently, banks for which the non-financial disclosure was retrievable at the time of the study were considered, resulting in a total of 59 banks.

To ensure a systematic and rigorous approach, the content analysis was conducted in accordance with the methodology proposed by Krippendorff (2018), which entails the coding and categorization of textual data in order to identify patterns, recurring themes, and underlying meanings. Content analysis is particularly well-suited to this study as it allows for an objective, replicable, and transparent examination of complex textual information (Krippendorff, 2018; Elo and Kyngäs, 2008; Bengtsson, 2016).

To assess the quality of disclosure on double materiality, an evaluation grid comprising 10 criteria (Table 1) was developed, based on the most recent regulatory frameworks and best practices. The criteria were also defined in accordance with the Corporate Sustainability Reporting Directive (CSRD; European Commission, 2022), European Sustainability Reporting Standards (ESRS; EFRAG, 2023), the Global Reporting Initiative (GRI Standards; GRI, 2021) and the Task Force on Climate-related Financial Disclosures (TCFD; TCFD, 2017). This approach ensures that the evaluation reflects both current European regulatory requirements and internationally recognized standards for non-financial reporting.

The score defined in this way is appropriate as it assesses the banks' ability to address the informational requirements introduced by the ESRS, which call for comprehensive disclosure on both the aspects affecting financial performance (financial materiality) and those concerning the impact of banking activities on the environment and society (impact materiality). This approach fully reflects the principle of double materiality set out in the CSRD (Fedele et al., 2025; Lombardi et al., 2022; European Commission, 2022).

Accordingly, the criteria assess several dimensions, ranging from the presence of a double materiality matrix to the description of outside-in and inside-out impacts, as well as the degree of integration of these considerations into the institution's decision-making and strategic processes.

Through the evaluation grid, the following key aspects of the quality of double materiality disclosure are assessed:

- Presence of a double materiality matrix: verifies whether the bank publishes a matrix that represents the relevance of topics from both a financial perspective (outside-in) and in terms of the bank's impact on the environment and society (inside-out).
- Implementation of double materiality: examines whether the bank has effectively integrated double materiality into its decision-making and communication processes, beyond a mere graphical representation (Mezzanotte, 2023).

- Integration of outside-in and inside-out impacts: evaluates whether both external factors (that influence the bank) and internal factors (that the bank generates externally) are considered.
- Description of ESG risks: analyses whether the bank identifies and describes risks related to environmental, social, and governance (ESG) factors.
- Link between ESG risks and risk management: assesses the connection between identified ESG risks and the bank's risk management practices (Kosztowniak, 2023).
- Alignment of material topics with strategy or business model: evaluates whether material topics are translated into strategic actions or integrated into the bank's business model (Busco, 2018).
- Use of regulatory standards (GRI, ESRS, SASB, TCFD, etc.): considers the adoption of internationally recognized sustainability reporting standards.
- Inclusion of ESG quantitative indicators or metrics: analyses the presence of KPIs or numerical metrics supporting ESG disclosure.
- Reference to the CSRD or alignment with ESRS: checks whether the bank explicitly refers to the new European CSRD directive and the corresponding European Sustainability Reporting Standards (ESRS).
- Integration of measurable ESG targets: evaluates whether the bank sets clear and measurable targets in the ESG domain.

The content analysis was performed through the NVivo software, which enabled a systematic and reproducible coding of the documents. Ten thematic nodes were created, corresponding to the defined criteria, and, through text search and auto-coding functions, the presence of explicit references to double materiality and its implementation was verified (e.g., "double materiality," "outside-in," "inside-out," "CSRD," "ESRS").

Following the content analysis, a scoring system was developed to quantitatively assess the quality of information disclosed on double materiality for each banking institution. Each piece of information was evaluated against the 10 criteria identified in the analysis grid (Table 1), assigning a binary score to each criterion: 1 if the criterion was met and 0 if it was not. The total score for each disclosure, therefore, ranges from 0 (no criteria met) to 10 (all criteria fully met). This additive approach is widely employed in sustainability and CSR research to ensure objectivity, comparability and transparency in the evaluation process (Michelon et al., 2015). It enables the transformation of qualitative content into quantitative data, facilitating benchmarking and statistical analysis across institutions and over time.

Table 1. Criteria for scoring double materiality disclosure

Criterion	Score
Presence of the double materiality matrix	0–1
Implementation of double materiality	0–1
Integration of outside-in and inside-out impacts	0–1
Description of ESG risks	0–1
Link between ESG risks and risk management	0–1
Alignment of materiality with strategy or business model	0–1
Use of regulatory standards (GRI, ESRS, SASB, TCFD, etc.)	0–1
Inclusion of ESG quantitative indicators or metrics	0–1
Reference to CSRD or alignment with ESRS	0–1
Integration of measurable ESG targets	0–1

Source: Authors'elaboration

Subsequently, a statistical analysis was conducted using the Pearson correlation coefficient to assess the existence of a linear relationship between the double materiality score, obtained through content analysis and the leading banking profitability indicators for the subsequent year, in order to identify potential effects.
The analysis did not reveal any statistically significant correlation between the quality of double materiality disclosure and banking profitability, in line with findings from recent studies that emphasize the complexity of the relationship between ESG performance and economic-financial outcomes (Carnevale & Drago, 2024; Bose et al., 2020; Gangi et al., 2018).

4.2. Applying Data Envelopment Analysis to assess the efficiency of Italian banks

For the efficiency analysis of the sample of Italian banks, a Data Envelopment Analysis (DEA) was applied using an output-oriented configuration and assuming variable returns to scale (VRS). DEA is a non-parametric method widely employed in economics and operations research to estimate the production and operational efficiency of decision-making units (DMUs) and it has been extensively used in the banking literature (Emrouznejad & Yang, 2018; Pasiouras, 2008). This feature is particularly relevant in the banking sector, where operations are complex and diversified and the provision of financial services involves numerous factors (Barros et al., 2012). Moreover, the VRS approach, introduced by Banker, Charnes, and Cooper (1984), allows for the consideration of economies or diseconomies of scale and distinguishes between pure technical efficiency and scale efficiency, thus overcoming the limitations of the constant returns to scale (CRS) assumption of the original Charnes, Cooper, and Rhodes (1978) model.
Through this analysis, it is possible to identify the most efficient banks - i.e., those located on the "efficient frontier" - and to quantify the potential for improvement for the others, thereby providing an internal benchmark within the sample under investigation.
DEA was also chosen for its flexibility in incorporating both financial and non-financial variables, such as double materiality disclosure, enabling a more comprehensive analysis aligned with recent regulatory and sustainability developments (Petria et al., 2015). An output-oriented

approach was adopted as the analysis focuses on the banks' ability to maximize outputs given the same level of inputs, which aligns with the study's objective of evaluating the quality of disclosure and efficiency.

For the implementation of DEA, the open-source software R was used, specifically employing the "benchmarking" package, which allows for the efficient estimation of technical efficiency scores and the management of complex datasets (Bogetoft & Otto, 2010).

In the proposed model, the input variable is represented by the double materiality disclosure score, reflecting the quality and completeness of each bank's reporting on both financial and non-financial (ESG) impacts. The outputs consist of the principal profitability indicators: Return on Equity (ROE), Return on Assets (ROA) and Net Interest Margin (NIM). These indicators were selected as they are widely recognized in the literature as robust measures of banking performance and profitability (Petria et al., 2015; Dietrich & Wanzenried, 2011) and were obtained from Moody's BankFocus database (Table 2).

In particular, banks for which a non-financial report was available for the year 2023 were selected and their profitability indicators for the subsequent year, 2024, were analyzed. This approach, frequently adopted in the literature, enables the assessment of the temporal effect of non-financial disclosure on banking performance by examining the lagged impact of ESG practices on the following year (Velte, 2017; Cheng et al., 2014; Lu, 2018). Indeed, several studies investigate the relationship between ESG disclosure and corporate outcomes by considering a "lag effect" to capture medium-term impacts.

The data used for the DEA model were not further normalized, as the double materiality score is already expressed on a standardized scale from 0 to 1 and the profitability indicators (ROE, ROA, NIM) are reported in decimal form.

Table 2. Output variables for the DEA model

Variable	Operationalisation	Source	Acronym
NET INTEREST MARGIN	Yearly observations	FocusBank - Moody's database	NIM
ROE	Yearly observations	FocusBank - Moody's database	ROE
ROA	Yearly observations	FocusBank - Moody's database	ROA

Source: Authors'elaboration

5. Findings and discussion

The analysis of the dataset provides critical insights into the relationship between sustainability practices and operational efficiency in the Italian banking sector.

To contextualize the sample, the banks were initially classified into three categories based on their double materiality score, which was used as the input in the DEA model, as shown in Table 3.

Table 3. Distribution of banks by double materiality score

Double Materiality Score range	Number of banks
Low (0–4)	11
Medium (5–7)	20
High (8–10)	28

Source: Authors'elaboration

A significant proportion of institutions (47%) falls within the high ESG commitment group (scores 8–10), reflecting a strong integration of environmental, social and governance (ESG) principles. Another 34% of banks are positioned in the intermediate range (scores 5–7), while a minority (19%) belongs to the low sustainability group (scores 0–4), highlighting a heterogeneous distribution of sustainability focus within the sector.
Table 4 presents the descriptive statistics for the DEA efficiency scores. As observed, there is considerable variability in performance: the average output-oriented efficiency score is 53%, with a median of 49%, suggesting that most banks operate well below the best practice frontier. The minimum score of 12% indicates the presence of institutions with significant operational inefficiencies, whereas the maximum score of 100% identifies a small number of banks that are able to optimize their profitability relative to their ESG commitment fully. These findings suggest that, on average, Italian banks could potentially improve their financial performance by approximately 47%, without increasing their investments in sustainability, if they were to adopt the best practices observed within the sample.

Table 4. Descriptive statistics of the double materiality score and DEA efficiency

Variable	Mean	Median	Min	Max	Standard Deviation
Double materiality score	6.86	7	1	10	2.42
DEA efficiency (output-oriented)	0.53	0.49	0.12	1	0.22

Source: Authors'elaboration

The classification of banks based on DEA efficiency levels, presented in Table 5, further highlights a heterogeneous performance landscape. The vast majority (80% of the sample, corresponding to 47 banks) falls within the "below average" category (score < 0.7), indicating substantial room for improvement in their ability to translate ESG commitment into economic-financial outcomes. Only 8 banks (14%) exhibit "good" efficiency (score 0.7–0.99), while a small number of institutions (4 banks, representing 7% of the sample) achieve excellent efficiency (score = 1), positioning themselves on the DEA frontier.

Table 5. Classification of banks by DEA efficiency range (output-oriented)

DEA Efficiency Range (Output-Oriented)	Number of Banks
Below average (<0.7)	47
Good (0.7–0.99)	8
Excellent (score = 1)	4

Source: Authors'elaboration

These findings suggest that, despite a growing commitment to sustainability, many Italian banks are not yet able to leverage such investments to optimize their profitability strategically.
This evidence underscores the need for targeted interventions in managerial innovation, technology and governance to strengthen the link between sustainability and economic and financial competitiveness.

6. Theoretical and Managerial Implications

This study contributes to addressing a significant gap in the literature by analyzing the quality of sustainability disclosure - with particular focus on double materiality - and the economic-financial performance of banks, using DEA as a tool for efficiency assessment. Unlike many previous studies that examine ESG practices and banking efficiency separately, this research incorporates double materiality as an explicit input, enabling a deeper exploration of the role of stakeholder theory (Freeman, 2010; Gray et al., 1996), legitimacy theory (Suchman, 1995; Deegan, 2002), and institutional theory (Scott, 2001) within the banking context. These theoretical frameworks suggest that comprehensive disclosure strengthens trust and legitimacy among stakeholders; however, the empirical findings demonstrate that, in practice, such integration is often partial or symbolic, particularly in the absence of genuine internalization within managerial and strategic processes (Mezzanotte, 2023). The heterogeneity observed among Italian banks highlights the coexistence of substantive behaviors and mere formal compliance.
From a managerial perspective, the DEA scores indicate that only a limited share of Italian banks are truly efficient in translating the quality of double materiality disclosure into superior financial performance. At the same time, the majority exhibit considerable margin for improvement. This underscores the urgency of moving beyond mere regulatory compliance, fostering instead the effective integration of double materiality into decision-making, governance and corporate strategy. The adoption of advanced organizational models such as Total Quality Management (TQM)—centered on quality leadership, employee involvement and continuous improvement through the PDCA cycle—may represent a key lever for strengthening the link between ESG disclosure and competitive advantage (Siva et al., 2016; Shuaib et al., 2023).

7. Conclusion

In conclusion, the analysis highlights that although Italian banks are showing increasing attention to the quality of double materiality disclosure and ESG issues, they are not yet able to effectively translate these practices into a real competitive advantage in terms of economic-financial performance. The significant margin for improvement in efficiency suggests that sustainability strategies must evolve beyond mere regulatory compliance, aiming for the full integration of double materiality into decision-making processes, governance and organizational culture. The adoption of advanced management models, such as Total Quality Management, may represent a crucial lever for aligning transparency in disclosure with profitability and resilience objectives,

fostering innovation and continuous improvement. In doing so, banks can not only strengthen trust and legitimacy with stakeholders but also enhance their long-term competitiveness, demonstrating that true sustainability requires substantial commitment and an integrated strategic vision.

However, this study has some limitations. The dataset is based exclusively on the sustainability reports and non-financial statements of Italian banks for a single year, limiting the generalizability and depth of the analysis. Expanding the sample by including more non-financial disclosures and adopting a panel data design would allow for the observation of efficiency dynamics over time and the identification of structural trends or changes. Future research could extend the scope both spatially and temporally, comparing Italian and European banks to assess similarities and differences in double materiality integration paths and efficiency performance. Such an approach would help to better understand the impact of regulatory, cultural and competitive differences across EU banking contexts.

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