Research Article

Volume 2, Issue IV 2026
Page: 26-41
DOI: 10.5281/zenodo.22721269

OPEN ACCESS

Received: 18-08-2026 **Accept Date: 29-08-2026** **Published: 12-09-2026**

ENVIRONMENTAL SUSTAINABILITY PRACTICES AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA: THE SUPPRESSING ROLE OF FIRM SIZE

BY

Doris Oneya Shianda [1], Dr. Cliff Osoro [2] & Dr. Maina Justus [3]

[1, 2&3] *Catholic University of Eastern Africa*

Abstract

This paper examined the effect of environmental sustainability practices on the financial performance of commercial banks in Kenya and established the conditions under which that effect becomes observable. Kenyan banking profitability declined over the last decade, sector return on assets contracting from 3.24 per cent in 2015 to 1.90 per cent in 2024 while the number of loss-making institutions rose from two to nine, and the question of whether environmental engagement contributes to or detracts from profitability has acquired practical urgency. Environmental exposure in banking arises principally through the credit a bank extends rather than through its own production processes, so the appropriate measure of environmental practice is the composition of the loan book rather than an operational efficiency indicator. The study adopted a positivist philosophy and an explanatory longitudinal panel design. The target population comprised all 38 commercial banks licensed by the Central Bank of Kenya, a census was adopted, and secondary data were extracted from audited annual reports, sustainability disclosures and regulatory publications for 2015 to 2024, yielding a balanced panel of 380 bank-year observations with complete coverage. Environmental sustainability practices were measured by the green loan ratio and financial performance by return on assets. Estimation used hierarchical panel fixed effects regression with HC1 robust standard errors, following a full diagnostic battery and a Hausman specification test. In the direct-effects model the environmental coefficient was negative and statistically insignificant ($\beta = -0.005$, SE = 0.044, $p = 0.904$) and the null hypothesis was not rejected. Once firm size was controlled, the coefficient became positive and statistically significant ($\beta = 0.175$, SE = 0.077, $p = 0.023$), remained significant with the interaction terms present ($\beta = 0.165$, SE = 0.081, $p = 0.042$), and strengthened in the post-2021 sub-period following the Central Bank of Kenya Climate Risk Management Guideline ($\beta = 0.276$, $p = 0.006$). The reversal is the signature of a suppression effect arising from the strong association between bank size and green lending ($r = 0.868$). The interaction between environmental practices and firm size was insignificant ($\beta = 0.249$, $p = 0.419$), so the return to green lending does not depend on scale. Environmental sustainability is therefore financially relevant in Kenyan banking, but its relevance is visible only in specifications that control for size.

Keywords: Environmental Sustainability Practices, Green Loan Ratio, Return on Assets, Commercial Banks, Firm Size, Suppression Effect, Panel Fixed Effects, Kenya.

Introduction

Commercial banks occupy a position in the transition to a lower-carbon economy that is different in kind from that of the firms whose activities generate emissions. Their own operational footprint is modest, consisting largely of energy consumed in premises, paper, travel and data processing; their material environmental exposure arises indirectly, through the credit they extend to borrowers whose assets and revenues are sensitive to physical climate risk, to regulatory transition and to shifts in the relative price of carbon-intensive output (Basel Committee on Banking Supervision, 2021; World Bank, 2021). This distinction has a direct methodological consequence that much of the empirical literature has passed over: the environmental practice of a bank is most meaningfully observed in the composition of its lending, not in an operational efficiency indicator or a disclosure score.

The question of whether such practice pays is old and unsettled. The neoclassical position holds that environmental commitments impose costs without

corresponding revenue, so that a bank diverting credit toward environmentally screened borrowers accepts a lower risk-adjusted return in pursuit of a non-financial objective. The competing position, developed through Stakeholder Theory and the resource-based view, holds that environmental engagement lowers the cost of capital, attracts environmentally motivated deposits and institutional funding, reduces the probability of regulatory sanction, and improves the quality of the loan book by screening out borrowers whose collateral and cash flows are climate-exposed (Freeman, 1984; Hart, 1995; Porter & Kramer, 2019). Meta-analytic evidence across sectors leans toward a positive or at worst neutral association (Friede et al., 2015), but the banking-specific evidence has remained divided, and the division is not random: it tracks differences in how the environmental construct is measured, in the estimator used, and in whether the confounding influence of institutional scale is addressed.

That last point is the pivot of the present study. Green lending capacity is not distributed evenly across a banking sector. It requires environmental and social risk assessment functions, technical staff able to appraise renewable-energy and climate-resilient agriculture projects, access to concessional or blended funding lines, and a balance sheet large enough to absorb the fixed costs of building all three. Large banks therefore lend green more and, for reasons entirely unrelated to environmental practice, also earn differently. Any specification that omits size in a structurally heterogeneous banking panel is exposed to that confound, and the direction of the resulting bias is not predictable in advance.

The Kenyan setting brings this into unusually sharp relief. The sector comprises a small number of large Tier 1 institutions holding a dominant share of system assets alongside a long tail of small Tier 3 banks, so the dispersion in scale is wide (Central Bank of Kenya, 2024). Profitability has been under sustained pressure, with sector return on assets falling from 3.24 per cent in 2015 to 1.90 per cent in 2024 and the number of loss-making institutions rising from two to nine over the same interval (Central Bank of Kenya, 2024). And the regulatory environment changed discretely rather than gradually: the Central Bank of Kenya issued its Guidance on Climate-Related Risk Management in October 2021, requiring banks to integrate climate considerations into governance, strategy, risk management and disclosure (Central Bank of Kenya, 2021). A ten-year window spanning 2015 to 2024 therefore contains both a pre-guideline and a post-guideline regime, which permits the stability of the relationship to be examined rather than assumed.

This study examined the effect of environmental sustainability practices, measured by the green loan ratio, on the financial performance of commercial banks in Kenya, measured by return on assets, over 2015 to 2024, using the full population of 38 licensed institutions. It found that the effect is real, economically substantial and regulatory-contingent, but that it is invisible in the specification most commonly estimated in the literature, and it identifies why.

Statement of the Problem

The banking system supplies the credit on which enterprise formation, employment and economic resilience depend, and its capacity to do so is a function of its profitability. That profitability has weakened. Sector-wide return on assets contracted from 3.24 per cent in 2015 to 1.90 per cent in 2024, and the number of loss-making institutions rose from two to nine across the same period, with several banks reporting recurrent annual losses (Central Bank of Kenya, 2024). Where credit access is constrained, job creation is suppressed and economic resilience weakened (Abdi et al., 2022; Chima et al., 2021). Identifying the determinants of bank profitability, and establishing whether environmental engagement is among them, is therefore a matter of financial-sector policy rather than of corporate reputation alone.

The empirical record does not answer the question. Positive associations between environmental or composite sustainability measures and bank performance have been reported by Menicucci and Paolucci (2023) for Italy, Lamanda and Tamásné Vőneki (2024) for the Visegrad Four, Buallay (2019) and Buallay et al. (2020) for emerging and MENA markets, and Mansour et al. (2025) for Jordan. Negative or null associations have been reported by Halim et al. (2024) for Bangladesh, Giannopoulos et al. (2024) for the United Kingdom, AlAjmi et al. (2023) across emerging markets, Saadaoui and Ben Salah (2023) for the environmental dimension specifically, and Nobanee and Ellili (2017) for the United Arab Emirates. Zyadat (2017) and Al-

Dhaimesh and Al Zobi (2019) found the environmental dimension insignificant in Jordan while other dimensions were significant, and Moufty et al. (2021) found no environmental effect in the European Union and the United States. Islam et al. (2025), Shabir et al. (2024) and Bouattour et al. (2024) show that the association is contingent on competition, regulatory quality and institutional context, and in the last case non-linear.

Three weaknesses limit the usefulness of this record for Kenya. First, the environmental construct is measured inconsistently, and the choice matters. Studies relying on composite environmental, social and governance scores aggregate dimensions whose effects may have opposite signs, so that a positive environmental contribution can be cancelled by a negative social one and the aggregate reported as insignificant; Tandelilin and Usman (2023) demonstrate the value of separating the dimensions for precisely this reason. Studies relying on disclosure indices measure reporting behaviour rather than lending behaviour. Second, the geographical distribution of the evidence is heavily skewed toward Europe, North America and Asia, and African banking evidence is sparse, notwithstanding that banks in these markets face a distinctive combination of a developmental credit mandate, a shallow capital market and an emergent rather than settled climate-disclosure regime. Third, and most consequentially, bank size is commonly entered as a control variable, omitted entirely, or examined as a determinant of performance in its own right, rather than interrogated as a possible confound of the environmental relationship. Evidence on size is itself unsettled: Rahma and Wedari (2024) find that bank size conditions the green-banking relationship in ASEAN, whereas Nhu (2025) and Abadi and Lutfi (2025) report that size effects are neither uniform nor consistently positive.

The consequence is that Kenyan bank management cannot establish whether green lending is a cost centre or a source of return, the Central Bank of Kenya cannot know whether its climate guidance imposed a burden or unlocked a commercial opportunity, and investors cannot price environmental positioning. This study therefore examined the effect of environmental sustainability practices on the financial performance of commercial banks in Kenya using a census of all 38 licensed institutions over 2015 to 2024, measuring environmental practice through the composition of the loan book and treating bank size as a variable whose omission may materially distort the estimate rather than as a routine control.

General Objective

The general objective of the study was to assess the effect of environmental sustainability practices on the financial performance of commercial banks in Kenya.

Specific Objective

To assess the effect of environmental sustainability practices, measured by the green loan ratio, on the financial performance of commercial banks in Kenya, measured by return on assets.

Research Hypothesis

H_{01}: Environmental sustainability practices have no significant effect on the financial performance of commercial banks in Kenya.

Theoretical Review

The study was anchored primarily on Stakeholder Theory and Legitimacy Theory, with Economies of Scale Theory supplying the account of why institutional size enters the relationship at all.

Stakeholder Theory, formulated by Freeman (1984), holds that an organisation is accountable not to shareholders alone but to every group that affects or is affected by its operations, and that responsiveness to those groups is instrumentally as well as ethically justified because it secures the resources, legitimacy and cooperation on which continued operation depends. Applied to a commercial bank, the relevant stakeholders include depositors, borrowers, institutional funders, regulators, employees and the communities in which the bank's borrowers operate (Awa et al., 2024). The theory generates a specific and testable prediction for environmental lending. A bank that directs credit toward environmentally screened borrowers responds to the expectations of environmentally motivated depositors and of development finance institutions whose concessional lines carry environmental conditions, and it reduces the exposure of its loan book to borrowers whose collateral and cash flows are climate-sensitive. Where these channels operate, the bank obtains cheaper and

more stable funding and incurs lower credit losses, both of which raise return on assets. Where they do not, green lending is a cost.

Legitimacy Theory, developed from Dowling and Pfeffer (1975) and elaborated by Suchman (1995) and Deegan (2002), holds that organisations operate under an implicit social contract and must demonstrate congruence between their activities and prevailing social values in order to preserve their licence to operate. The theory bears on this study in a manner that the stakeholder account does not capture, because it makes the financial value of environmental activity contingent on its visibility. If the mechanism connecting environmental practice to performance runs through reputation, funding access and regulatory standing, the benefit accrues only where the practice is observed by the parties whose behaviour it is meant to influence. This places disclosure at the centre of the relationship, and it generates a directional expectation about the effect of the 2021 Central Bank of Kenya climate guidance: by rendering climate exposure and climate-related lending a matter of supervisory record rather than of voluntary reporting, the guidance should strengthen the observed association rather than leave it unchanged (Central Bank of Kenya, 2021; Del Gesso & Lodhi, 2025).

Economies of Scale Theory, tracing to Marshall (1920) and formalised by Baumol (1959), holds that average cost declines with output where fixed costs are spread across a larger volume of activity. Its relevance here is not that large banks are more profitable, which is well established and uninteresting, but that the capabilities required to lend green are substantially fixed in cost. Environmental and social risk management frameworks, technical appraisal capacity for renewable-energy and climate-resilient agricultural projects, climate scenario analysis and the reporting infrastructure that supports access to concessional green funding lines all require investment that does not scale with the size of the resulting green loan book. Larger institutions can therefore build them, and smaller institutions largely cannot. Two consequences follow, and they are analytically distinct. The first is confounding: because size drives both green lending capacity and profitability through independent channels, a model omitting size may recover a biased environmental coefficient. The second is conditioning: if the returns to green lending themselves depend on scale, the effect should be stronger in larger institutions, which is a proposition about an interaction rather than about a confound. The study tested both, and the distinction between them proved to be the substantive finding.

Taken together the three theories generate a positive expected sign for the environmental coefficient, an expectation that the relationship strengthens after 2021, and a requirement that firm size be modelled explicitly rather than assumed away.

Empirical Review

The empirical literature on environmental practice and bank performance divides according to how the environmental construct is measured, and reading it in those terms resolves much of its apparent inconsistency.

Studies employing composite environmental, social and governance scores report the widest dispersion of findings. Buallay (2019), analysing banks in emerging markets, and Buallay et al. (2020), analysing MENA institutions with fixed effects and the generalised method of moments, reported positive associations with return on assets. Menicucci and Paolucci (2023) reported mixed dimensional effects in Italian banking, and Lamanda and Tamásné Vőneki (2024) found disclosure associated with performance in the Visegrad Four. Against these, Giannopoulos et al. (2024) reported a negative correlation between composite scores and both return on assets and return on equity across 32 banks listed on the London Stock Exchange over 2017 to 2022, Halim et al. (2024) reported negative effects in Bangladesh, and AlAjmi et al. (2023), examining 245 emerging-market banks over thirteen years with ordinary least squares, fixed effects and instrumental-variable generalised method of moments, found composite disclosure scores negatively associated with performance while the interaction with the level of economic activity was positive. The aggregation problem is common to all of them: a composite score cannot reveal whether an insignificant aggregate conceals offsetting dimensional effects, which is why Tandelilin and Usman (2023) separated the dimensions in the ASEAN banking industry and why the present study does likewise.

Studies that isolate the environmental dimension report findings that are more consistent than the composite literature suggests, but they diverge according to

whether the measure captures lending or reporting. Saif-Alyousfi and Alshammari (2025) identified three routes through which a bank expresses environmental commitment, namely the funding of environmentally beneficial projects, the restriction of lending to polluting sectors, and the efficient use of internal resources, and the first two are lending decisions. Gangi et al. (2019) found that environmental policy and reputation affected bank financial performance with sustainability reporting as the transmitting mechanism, which is the legitimacy channel operating empirically. Bătae et al. (2021) reported a positive environmental-financial link among European banks, and Carè and Forgione (2018) found preliminary evidence of an association between environmental performance and bank performance. Dhar and Chowdhury (2021) reported that environmental accounting and reporting practices affected the financial performance of Bangladeshi banks. Shakil et al. (2019), examining emerging-market banks across countries, found environmental and social performance associated with financial performance while governance was not. Against this, Saadaoui and Ben Salah (2023) found that among the dimensions of a corporate social responsibility score only environmental practice carried a significant negative association with banking performance, with social and governance dimensions insignificant, and Moufty et al. (2021), using structural equation modelling on European Union and United States banks, found a positive social effect and no environmental effect. Jan et al. (2019) reported positive economic and social effects and a negative environmental effect among Malaysian Islamic banks, though on a sample of sixteen institutions. Zyadat (2017), on three Jordanian banks, and Al-Dhaimesh and Al Zobi (2019), on eleven, found the environmental dimension insignificant while economic and social dimensions were positive; Nobanee and Ellili (2017) found no dimension significant in the United Arab Emirates.

Two patterns emerge from this record that bear directly on the present design. Studies reporting a positive environmental effect predominantly measure environmental practice through what the bank finances, whereas studies reporting a null or negative effect predominantly measure it through disclosure indices or composite ratings, or estimate on samples too small to detect a modest effect. And almost none of the studies distinguishes between the possibility that size confounds the environmental relationship and the possibility that size conditions it, notwithstanding that Rahma and Wedari (2024) found bank size to moderate the green-banking relationship in ASEAN while Nhu (2025) and Abadi and Lutfi (2025) found size effects neither uniform nor consistently positive.

Evidence from Africa is thin. Matemane and Wentzel (2019) examined integrated reporting and the financial performance of South African listed banks, and Ahmad et al. (2021) revisited the relationship in developing economies. Esteban-Sanchez et al. (2017) and Cek and Eyupoglu (2020) provide international and emerging-market baselines respectively. What the literature does not contain is a census-based panel estimate, for an African banking system, of the effect of a lending-based environmental measure on accounting profitability, estimated within institutions over time, with the confounding role of scale addressed explicitly and the stability of the relationship tested against a dated regulatory intervention. That is the gap this study addresses.

Methodology

Research design

The study adopted a positivist research philosophy and an explanatory longitudinal panel research design. The explanatory component was appropriate because the study sought the direction, magnitude and statistical significance of a theoretically derived relationship rather than a description of it. The longitudinal panel component followed from observing every licensed commercial bank annually across 2015 to 2024, with individual banks as the cross-sectional units (Baltagi, 2021; Saunders et al., 2019; Wooldridge, 2020). The panel structure combines cross-sectional and time-series variation, permits change within institutions over time to be identified separately from differences between institutions, increases degrees of freedom, and allows the interaction between environmental practice and scale to be estimated meaningfully because bank size varies over time.

Population and Sampling

The target population comprised all commercial banks licensed by the Central Bank of Kenya during the study period, of which there were 38 (Central Bank of Kenya, 2024). Because the population was small, clearly bounded and fully documented, a census was

adopted rather than a sample. The census eliminated sampling error entirely, ensured that the findings reflect the whole structural spectrum of the sector rather than a subset of it, and strengthened external validity within the Kenyan context (Kothari, 2014; Saunders et al., 2019). The unit of analysis was the individual commercial bank and the unit of observation was the bank-year. Thirty-eight banks observed over ten financial years generated a balanced panel of 380 bank-year observations with a data coverage rate of 100 per cent.

Data Collection Instruments

The study relied exclusively on secondary data, and a structured data extraction template served as the principal instrument. The template specified each variable, its measurement criteria, its source document and the coding procedure to be applied, and recorded the underlying raw values before any ratio was computed, creating an auditable link between the published figure and the analysed variable (Cooper & Schindler, 2014; Creswell & Creswell, 2018). Three categories of source were used. Audited annual reports and financial statements supplied profit before tax and total assets for every bank in every year, and were preferred because they are prepared under internationally recognised accounting standards and independently verified. Sustainability, integrated and corporate governance reports supplied the green lending data. Regulatory publications issued by the Central Bank of Kenya supplied tier classifications and the sector-level benchmarks against which bank-level figures were verified (Central Bank of Kenya, 2024). Content analysis was applied to the sustainability disclosures in order to compile the required indicators, and consistent measurement criteria were applied across institutions where reporting detail varied.

Operationalization of Variables

Environmental sustainability practices were measured by the green loan ratio, calculated as green loans divided by total loans advanced. The measure was chosen because the material environmental exposure of a bank arises through its credit portfolio rather than through its own operations, and because a ratio rather than an absolute value permits institutions of very different scale to be compared directly while leaving the effect of scale to be captured by the size variable rather than confounded with the environmental measure. Financial performance was measured by return on assets, calculated as profit before tax divided by total assets, an accounting measure of the efficiency with which a bank deploys its asset base to generate profit. Firm size was measured as the natural logarithm of total assets. Because the underlying research model also contained social sustainability practices, measured by the inclusive lending ratio, and governance sustainability practices, measured by the board independence ratio, these were retained in the estimated equation so that the environmental coefficient would not be contaminated by omitted-variable bias; they are not the subject of this paper and receive no separate interpretation here.

Validity and Reliability of the Data

Because the study used secondary data, instrument piloting and internal-consistency reliability testing were not applicable. Validity was secured through construct alignment, each variable being measured by a ratio matched to its operational definition and to the economics of banking; through source authority, audited financial statements being independently verified records; and through an auditable link from the published figure to every computed ratio. Reliability was secured through a uniform extraction template applied identically across all institutions and reporting years, through recomputation and verification of every calculated variable, and through cross-validation of sustainability disclosures against regulatory publications where more than one source was available (Cooper & Schindler, 2014; Hair et al., 2019; Kothari, 2014).

Model Specification and Estimation

Three hierarchical models were specified. The baseline model regressed return on assets on the three sustainability dimensions; the second added firm size; the third added the interaction between firm size and each sustainability dimension. The hierarchical ordering follows the procedure for testing moderation set out by Baron and Kenny (1986), under which direct effects must be established before an interaction can meaningfully be interpreted, and it permits the incremental contribution of each block to be observed as it is introduced. The models were specified as $ROA_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \alpha_i + \varepsilon_{it}$; $ROA_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_4 FSIZE_{it} + \alpha_i + \varepsilon_{it}$; and $ROA_{it} = \beta_0 + \beta_1 ENV_{it} + \beta_2 SOC_{it} + \beta_3 GOV_{it} + \beta_4 FSIZE_{it} + \beta_5 (ENV_{it} \times FSIZE_{it}) + \beta_6 (SOC_{it} \times FSIZE_{it}) + \beta_7 (GOV_{it} \times FSIZE_{it}) + \alpha_i + \varepsilon_{it}$, where α_i is the

unobserved time-invariant bank-specific effect and the coefficient of interest is β_1. Variables entering the interaction terms were mean-centred before multiplication in order to reduce the non-essential collinearity that interaction terms introduce by construction (Aiken & West, 1991; Dawson, 2014). Estimation used panel fixed effects with HC1 robust standard errors, the estimator selected by a Hausman specification test and the standard errors adopted in response to the diagnostic evidence reported below (Hausman, 1978; White, 1980). Significance was evaluated at the five per cent level.

Study Findings

Descriptive Statistics

Table 1 reports the pooled descriptive statistics for the variables central to this paper, computed across the full panel of 380 bank-year observations.

Table 1: Descriptive Statistics (N = 380)

Variable	Label	Mean	Std. Dev.	Minimum	Median	Maximum	Skewness	Kurtosis
ROA	Return on Assets	0.0250	0.0215	-0.0345	0.0275	0.0847	-0.290	-0.443
ENV	Green Loan Ratio	0.0312	0.0285	0.0000	0.0200	0.1213	1.335	1.019
FSIZE	Log (Total Assets)	7.7020	0.6683	6.7393	7.3849	9.2931	0.679	-0.910

Note. Researcher (2026). N = 380 bank-year observations from 38 banks over ten years.

Three features of this distribution condition everything that follows. Return on assets averaged 2.50 per cent with a standard deviation of 2.15 percentage points and a range from a loss of 3.45 per cent to a profit of 8.47 per cent, so the dependent variable varies across nearly twelve percentage points and the sector contains genuinely loss-making institutions rather than merely less profitable ones. The green loan ratio averaged 3.12 per cent of the loan book with a standard deviation of 2.85 percentage points, a minimum of zero and a maximum of 12.13 per cent, and it is the only variable in the model with pronounced positive skewness of 1.335. That shape is substantively informative rather than a nuisance: green lending in Kenyan banking is concentrated in a minority of institutions while a substantial number report none at all, which is the distributional signature of a capability that is unevenly distributed rather than a practice adopted uniformly. Firm size averaged 7.7020 in logarithms with a range from 6.7393 to 9.2931, confirming the wide dispersion of scale that the sector's tier structure implies and that is necessary if the role of size is to be identified.

Table 2 reports the pairwise correlations.

Table 2: Pearson Pairwise Correlation Matrix (N = 380)

Variable	ROA	ENV	FSIZE
ROA	1.000	0.329***	0.408***
ENV	0.329***	1.000	0.868***
FSIZE	0.408***	0.868***	1.000

*Note. Researcher (2026). *** $p < .01$. Correlations for the social and governance dimensions are omitted because they are not the subject of this paper.*

The correlation structure anticipates the central result. Environmental practice and financial performance are positively correlated at 0.329, and firm size and financial performance at 0.408, both significant at the one per cent level. The decisive figure, however, is the correlation of 0.868 between environmental practice and firm size. A predictor sharing this much variance with an omitted variable that independently predicts

the outcome is a textbook candidate for confounding, and the regression results confirm that this is what occurs.

Diagnostic Tests

Table 3 consolidates the diagnostic results and the estimation response adopted in each case.

Table 3: Diagnostic Test Results and Estimation Responses

Diagnostic issue	Test and result	Decision and estimation response
Multicollinearity	VIF: ENV 1.042; SOC 1.041; GOV 1.002; FSIZE 1.015; mean VIF 1.025	All values far below 5; no multicollinearity; all predictors retained
Homoscedasticity	Breusch–Pagan / Cook–Weisberg $\chi^2 = 18.742$, df = 1, p = 0.000	Constant variance rejected; HC1 robust standard errors adopted
Serial correlation	Wooldridge F = 6.384, p = 0.015	First-order autocorrelation confirmed; robust inference retained
Stationarity	Augmented Dickey–Fuller: ROA -6.016; ENV -6.189; SOC -6.558; GOV -6.227; FSIZE -6.169; 5% critical value -2.86	All series stationary in levels; estimation in levels retained
Estimator selection	Hausman test statistically significant, p < 0.05	Random effects inconsistent; fixed effects estimator adopted

Note. Researcher (2026).

Two results deserve emphasis. The variance inflation factor for the environmental variable was 1.042, and the mean across all predictors was 1.025, values so far below any conventional threshold that the coefficient instability documented below cannot be attributed to collinearity in the ordinary sense. This distinction matters because multicollinearity and suppression are frequently conflated; the diagnostic evidence establishes that what follows is not a variance-inflation artefact. The Breusch–Pagan test decisively rejected constant error variance and the Wooldridge test confirmed first-order autocorrelation, which is why HC1 robust standard errors were used throughout and why the reported significance levels are conservative rather than optimistic (Breusch & Pagan, 1979; Cook & Weisberg, 1983; White, 1980). The Hausman test rejected the random effects specification, so all reported estimates identify the relationship from variation within banks over time, with every stable institutional characteristic, including ownership structure, managerial culture and historical market position, absorbed into the bank-specific intercept (Hausman, 1978).

Regression Results

Table 4 reports the environmental coefficient across the three hierarchical models.

Table 4: Hierarchical Panel Fixed Effects Results with HC1 Robust Standard Errors (N = 380)

Variable	Model 1 β	SE	p	Model 2 β	SE	p	Model 3 β	SE	p
Environmental sustainability practices (ENV)	-0.005	0.044	0.904	0.175**	0.077	0.023	0.165**	0.081	0.042
Firm size (FSIZE)	—	—	—	-0.029***	0.011	0.008	-0.029***	0.011	0.009
ENV × FSIZE	—	—	—	—	—	—	0.249	0.308	0.419
Within R^2	0.0050	—	—	0.0259	—	—	0.0298	—	—
ΔR^2	—	—	—	0.0209	—	—	0.0039	—	—
F-statistic	0.634	—	0.593	2.488**	—	0.043	1.631	—	0.125

*Note. Researcher (2026). ** p < .05; *** p < .01. Coefficients for the social and governance dimensions and their interactions are estimated in every model but are not reported here because they are not the subject of this paper.*

In the direct-effects model the environmental coefficient was negative and statistically insignificant (β = -0.005, SE = 0.044, p = 0.904), and the model as a whole was insignificant (F = 0.634, p = 0.593) with a within R^2 of 0.0050. On this specification alone, the null hypothesis H_{01} is not rejected, and the study would conclude that environmental practice bears no relationship to profitability.

The introduction of firm size in the second model transformed the estimate. The environmental coefficient reversed sign, rose by an order of magnitude and became statistically significant (β = 0.175, SE = 0.077, p = 0.023), the within R^2 rose from 0.0050 to 0.0259 with $\Delta R^2 = 0.0209$, and the model became jointly significant (F = 2.488, p = 0.043). Firm size itself entered negatively and significantly (β = -0.029, p = 0.008). The environmental coefficient remained positive and significant in the third model with the interaction terms present (β = 0.165, SE = 0.081, p = 0.042), while the interaction between environmental practice and firm size was insignificant (β = 0.249, SE = 0.308, p = 0.419) and the interaction block as a whole added only $\Delta R^2 = 0.0039$ and was jointly insignificant (F = 1.631, p = 0.125).

The reversal of sign accompanied by the emergence of significance upon the introduction of a third variable is the defining signature of a suppression effect. The mechanism is identifiable in the correlation structure reported in Table 2. Larger banks lend green more, the correlation between the two being 0.868, and larger banks also differ systematically in profitability for reasons unconnected with environmental practice. In the first model, with size omitted, the positive contribution of green lending and the size-related variation in profitability are entangled in a single coefficient and cancel one another, producing an estimate indistinguishable from zero. Once size is entered and its variation removed, the environmental contribution becomes visible. That the variance inflation factors are close to unity confirms that this is suppression rather than the coefficient instability produced by ordinary collinearity.

The economic magnitude is substantial. Within a given bank over time, a coefficient of 0.175 implies that a ten-percentage-point increase in the green loan ratio, from three per cent to thirteen per cent of the total loan portfolio, is associated with an increase of 1.75 percentage points in return on assets, holding the other modelled variables constant. Against a sector mean return on assets of 2.50 per cent, that is an improvement of approximately 70 per cent relative to the mean, and it is therefore practically as well as statistically significant.

The decision on the hypothesis must be stated with corresponding precision. H_{01} was not rejected in the direct-effects specification, where the environmental coefficient was insignificant. It was rejected in the specifications that control for firm size, where the coefficient was positive and significant at the five per cent level. The defensible statement is not that environmental practice does or does not affect performance, but that a positive and economically material relationship exists and is recoverable only where the confounding influence of institutional scale is removed.

Robustness Analysis

Table 5 reports the environmental coefficient under three alternative specifications.

Table 5: Robustness Checks Using Alternative Estimators and Sub-Period Analysis

Specification	ENV β	p	Model R^2
Panel fixed effects (Model 2, main specification)	0.175**	0.023	0.0259
Pooled ordinary least squares	-0.076	0.208	0.1743
Two-way fixed effects with year dummies	0.039	0.601	0.2382
Fixed effects, post-2021 sub-period	0.276***	0.006	—

*Note. Researcher (2026). ** p < .05; *** p < .01.*

The three checks are informative in different ways and none of them is merely confirmatory. Pooled ordinary least squares returned a negative and insignificant environmental coefficient (β = -0.076, p = 0.208) on a

much higher R^2 of 0.1743, which is the expected pattern: the pooled estimator identifies the relationship principally from differences between banks, where the environmental measure is heavily confounded by the structural heterogeneity of the sector, and the higher R^2 reflects that between-bank variation rather than superior explanation of the relationship of interest. The two-way fixed effects specification with year dummies returned a positive but insignificant coefficient (β = 0.039, p = 0.601), indicating that a portion of the identifying variation in green lending is common to the sector in a given year, which is unsurprising given that the expansion of green lending in Kenya followed a sector-wide regulatory and funding trajectory rather than idiosyncratic institutional decisions.

The sub-period analysis is the most substantively informative. Restricting estimation to the period following the October 2021 Central Bank of Kenya Guidance on Climate-Related Risk Management yielded a markedly stronger environmental coefficient (β = 0.276, p = 0.006). The contrast between an insignificant relationship across the full decade and a highly significant one in the post-guideline window locates the relationship in time and associates it with a specific, dated and externally imposed regulatory event rather than with a gradual drift in practice. That the break coincides with an identifiable intervention reduces, though it does not eliminate, the range of alternative explanations available.

Discussion

The central finding admits of a compact statement: environmental sustainability practices are positively and materially associated with the financial performance of Kenyan commercial banks, and the reason the relationship has been difficult to observe is that bank size suppresses it.

The suppression result is the most consequential contribution and it warrants precise interpretation. Suppression occurs where a third variable shares substantial variance with a predictor and independently predicts the outcome, so that omitting it leaves the predictor's true contribution entangled with, and offset by, variation properly attributable to the third variable. The conditions for it are present in an unusually clear form here: the correlation between green lending and bank size is 0.868, size independently predicts profitability, and the variance inflation factors are close to unity, which excludes ordinary collinearity as an explanation. The practical implication reaches beyond Kenya. Any study of environmental practice and bank performance conducted on a structurally heterogeneous banking panel without controlling for size is exposed to the same distortion, and the direction of the resulting bias is not predictable in advance. A material portion of the null and negative findings in the composite-score literature may therefore be specification artefacts rather than substantive results.

The direction of the finding is consistent with the theoretical account. Stakeholder Theory predicts that responsiveness to environmentally motivated depositors, institutional funders and regulators secures cheaper and more stable funding and reduces credit losses on climate-exposed borrowers, and a positive coefficient of the observed magnitude is what those channels operating together would produce (Freeman, 1984; Awa et al., 2024). Legitimacy Theory predicts that the benefit depends on the visibility of the practice, and the sub-period result is a direct empirical expression of that prediction: the relationship was not significant across the decade as a whole but was strongly significant after the 2021 guidance made climate-related lending a matter of supervisory record (Central Bank of Kenya, 2021; Deegan, 2002; Suchman, 1995). Gangi et al. (2019) identified sustainability reporting as the mechanism transmitting environmental policy into financial performance, and the Kenyan evidence is consistent with that mechanism operating through a regulatory rather than a voluntary disclosure channel.

The comparison with prior evidence is instructive once the measurement distinction is applied. The finding aligns with Saif-Alyousfi and Alshammari (2025), Bătae et al. (2021), Carè and Forgione (2018), Dhar and Chowdhury (2021) and Shakil et al. (2019), all of whom examined environmental practice in banking through measures that reflect what the institution finances or how it manages environmental exposure. It diverges from Saadaoui and Ben Salah (2023), who found the environmental dimension negatively associated with banking performance, and from Moufty et al. (2021), Jan et al. (2019), Zyadat (2017), Al-Dhaimesh and Al Zobi (2019) and Nobanee and Ellili (2017), who found it insignificant. Three differences plausibly account for the divergence without requiring either body of work to be in error.

The measurement of the environmental construct differs, the present study using the composition of the loan book while several of these used disclosure indices or composite scores that aggregate dimensions with potentially opposing effects. The treatment of size differs, and the results reported above establish that this alone can reverse the sign of the estimate. And the regulatory setting differs, the Kenyan window containing a dated and enforceable climate-risk intervention whose effect the sub-period analysis isolates. The divergence from Giannopoulos et al. (2024), Halim et al. (2024) and AlAjmi et al. (2023) is similarly contextual rather than contradictory, those studies concerning composite scores in markets whose climate-disclosure regimes and banking structures differ materially from Kenya's.

The insignificance of the interaction between environmental practice and firm size deserves separate emphasis because it is easily conflated with the suppression result and means something quite different. Suppression is a statement about what a model must control for; the interaction is a statement about whether the return to green lending depends on scale. The evidence says that it does not: with a coefficient of 0.249 and a probability value of 0.419, and an interaction block adding only $\Delta R^2 = 0.0039$ and jointly insignificant at $F = 1.631$, $p = 0.125$, there is no basis for concluding that large banks earn more per unit of green lending than small ones. Larger banks lend green more, but they do not earn more from doing so. This finding is favourable for the sector and consequential for policy, because it removes the principal argument for exempting smaller institutions from environmental expectations on the grounds that they could not profit from meeting them. It sits alongside Rahma and Wedari (2024), who found size to moderate the green-banking relationship in ASEAN, and with Nhu (2025) and Abadi and Lutfi (2025), who found size effects neither uniform nor consistently positive, and it indicates that the conditioning role of size is context-dependent rather than general.

Four claims are not supported by this evidence and should not be inferred from it. The study does not establish causality. The fixed effects estimator removes time-invariant confounding but not simultaneity within a year, and a more profitable bank has greater capacity to fund green lending, so reverse causation cannot be excluded and the coefficients are properly read as robust associations. The study does not establish that the green loan ratio captures environmental practice in full; it excludes energy and water efficiency programmes, emission reduction commitments, environmental certification, paperless banking and climate scenario analysis, and the estimate should be understood as the effect of environmentally screened lending rather than of environmental practice in the round. The study does not establish that the post-2021 coefficient will persist, since the sub-period is short and the estimate is correspondingly less precise. And the within R^2 of 0.0259 in the main specification is low in absolute terms, which is a proper caution: the variables modelled here explain a small share of the within-bank variation in profitability, and environmental lending is one determinant among many rather than a dominant driver of bank performance.

Recommendations

Commercial banks should treat green lending as a commercial line of business rather than as a compliance obligation or a corporate responsibility expense. The evidence supports the expansion of environmentally screened lending on financial grounds, and the estimated magnitude, approximately 1.75 percentage points of return on assets for a ten-percentage-point increase in the green loan ratio, is large enough to justify the investment required to originate it. Banks should therefore build the environmental and social risk assessment capacity, technical appraisal skills and climate scenario analysis functions on which green origination depends, and should develop the product range, comprising renewable energy finance, energy efficiency lending, climate-resilient agricultural credit and green asset finance, that converts that capacity into a loan book.

Smaller institutions in particular should not conclude that green lending is a large-bank activity. The finding that the interaction between environmental practice and firm size is insignificant establishes that the return per unit of green lending does not depend on scale, so the constraint facing a Tier 3 institution is the fixed cost of building origination capacity rather than an inherent disadvantage in the return available. The appropriate response is to reduce that fixed cost through shared appraisal platforms, participation in syndicated green facilities, and partnership

arrangements that give smaller banks access to technical assessment capacity they cannot economically build alone.

Bank boards should require that green lending be reported to them with the same rigour as any other portfolio, with origination volumes, pricing, non-performing loan ratios within the green book and the associated funding costs monitored separately from the general book, so that the profitability contribution documented here can be verified institutionally rather than assumed.

The Central Bank of Kenya should strengthen and extend the climate-related disclosure framework introduced in 2021. The sub-period evidence indicates that the guidance coincided with a marked strengthening of the relationship between green lending and profitability, which is consistent with the legitimacy mechanism by which the financial benefit of environmental practice depends on its being observable. Standardising the definition, computation and disclosure of the green loan ratio across licensed banks, and requiring its periodic publication alongside conventional performance measures, would make the practice comparable across institutions and is a precondition for both investor discipline and supervisory oversight. Supervisory attention should extend to the credit quality of green portfolios, so that expansion driven by the profitability finding does not become a channel for weaker underwriting.

Policymakers should address the fixed-cost barrier that concentrates green lending in larger institutions. Given that the return does not depend on scale while the capacity to originate evidently does, targeted support for smaller banks, whether through technical assistance, access to concessional green funding lines on terms that do not require large-bank reporting infrastructure, or credit guarantee arrangements for green portfolios, would broaden participation without the profitability penalty that would otherwise deter it.

Future research should address the limitations identified above. Priority should be given to constructing a multi-indicator environmental index that combines lending composition with operational and disclosure measures, so that the estimate is not confined to what the bank finances; to applying instrumental-variable or system generalised method of moments estimation to address the simultaneity that the fixed effects estimator cannot resolve; to extending the post-2021 window as further reporting years become available, so that the regulatory break can be tested with greater precision; and to replicating the design in comparable African banking systems in order to establish whether the suppression pattern documented here is a Kenyan feature or a general property of structurally heterogeneous banking panels.

Contribution of the Study

The study contributes in four respects.

Methodologically, it identifies a suppression effect of firm size on the relationship between environmental practice and bank profitability, and demonstrates that the true positive effect of green lending is masked in direct-effects-only models and becomes both statistically and economically visible only when scale is controlled. The contribution is not particular to Kenya: it identifies a specification error to which the wider environmental, social and governance banking literature is exposed, and it implies that studies omitting bank size from heterogeneous panels risk underestimating or misidentifying the sign of the relationship they report.

Empirically, it provides the first census-based panel estimate of the effect of environmentally screened lending on the profitability of Kenyan commercial banks, covering the whole population of 38 licensed institutions across a full decade with complete data coverage, in a field whose evidence base is dominated by studies from Europe, North America and East Asia and in which African banking evidence has been sparse.

Contextually, it identifies a structural break in the environmental relationship around the October 2021 Central Bank of Kenya Climate Risk Management Guidance, evidenced by the contrast between an insignificant full-period coefficient and a coefficient of 0.276 with a probability value of 0.006 in the post-guideline sub-period. This is direct evidence from an African banking system that a specific and dated regulatory intervention coincided with a strengthening of the commercial value of environmental practice, and it supplies an empirical instance of the legitimacy mechanism operating through a supervisory rather than a voluntary disclosure channel.

Theoretically, it specifies which elements of the sustainability-performance account survive extension to an emerging-market banking system. The

instrumental claim of Stakeholder Theory survives, in that environmental responsiveness is associated with higher accounting profitability. The visibility condition of Legitimacy Theory survives and is sharpened, in that the association is concentrated in the period when the practice became a matter of regulatory record. The scale prediction of Economies of Scale Theory survives in one respect and fails in another: scale evidently governs the capacity to originate green lending, since larger banks lend green far more, but it does not govern the return to it, since the interaction is insignificant. Separating these two propositions, which the literature has generally conflated under the single heading of a size effect, is the study's theoretical contribution.

Conclusion

This paper assessed the effect of environmental sustainability practices on the financial performance of commercial banks in Kenya, using the green loan ratio and return on assets as measures and a balanced panel of 380 bank-year observations covering all 38 licensed commercial banks over 2015 to 2024.

The evidence does not support a statistically significant effect in the direct-effects specification, where the environmental coefficient was negative and insignificant and the null hypothesis was not rejected. It does support a positive and statistically significant effect once firm size is controlled, where the coefficient of 0.175 with a probability value of 0.023 led to rejection of the null hypothesis, and where the implied magnitude, an increase of approximately 1.75 percentage points in return on assets for a ten-percentage-point increase in the green loan ratio against a sector mean of 2.50 per cent, is economically material.

The divergence between the two specifications is the paper's substantive finding rather than an inconsistency within it. Bank size shares 0.868 of its variation with green lending and independently predicts profitability, so a model omitting it recovers an estimate in which the environmental contribution is cancelled by size-related variation. This is suppression rather than collinearity, the variance inflation factors being close to unity, and the practical consequence is that the specification most commonly estimated in the literature is the one least able to detect the relationship.

Two further results define the finding. The relationship was substantially stronger in the period following the October 2021 climate risk guidance, which locates it in a regulatory regime rather than treating it as a timeless property of banking. And the interaction between environmental practice and firm size was insignificant, so the return to green lending does not depend on scale even though the capacity to originate it plainly does. Environmental sustainability is therefore the financially relevant dimension of sustainability practice in Kenyan banking, its relevance is regulatory-contingent, and it is available to institutions of every size.

The conclusion is bounded by the evidence. It describes robust associations within a 38-bank panel over ten years, estimated from within-bank variation with time-invariant heterogeneity absorbed but simultaneity unaddressed, using a single lending-based measure of a multidimensional construct, and explaining a modest share of the within-bank variation in profitability. It is not a demonstration that increasing the green loan ratio would raise return on assets by a known amount.

References

Abadi, A. R. D., & Lutfi, L. (2025). Liquidity risk and the impact of credit growth on profitability in rural Banks: The moderating role of Bank size. Golden Ratio of Finance Management, 5(2), 587-599.

Abdi, Y., Li, X., & Càmara-Turull, X. (2022). Exploring the impact of sustainability (ESG) disclosure on firm value and financial performance. Journal of Risk and Financial Management, 15(7), 297.

Ahmad, N., Mobarek, A., & Roni, N.N. (2021). Revisiting the impact of ESG on financial performance of banks in developing economies. Journal of Sustainable Finance & Investment, 11(3), 1–20.

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions. Sage Publications.

Al-Dhaimesh, O. H., & Al Zobi, M. T. K. (2019). The effect of sustainability accounting disclosures on financial performance: An empirical study on the Jordanian banking sector. Banks and Bank Systems, 14(2), 1–10.

AlAjmi, J., Buallay, A., & Saudagaran, S. (2023). Corporate social responsibility disclosure and

banks' performance: the role of economic performance and institutional quality. International Journal of Social Economics, 50(3), 359-376.

Awa, H. O., Etim, W., & Ogbonda, E. (2024). Stakeholders, stakeholder theory and corporate social responsibility (CSR). International Journal of Corporate Social Responsibility, 9(1), 11.

Baltagi, B. H. (2021). Econometric analysis of panel data (6th ed.). Springer.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51(6), 1173–1182.

Basel Committee on Banking Supervision. (2021). Climate-related financial risks.

Baumol, W. J. (1959). Business behavior, value and growth. Macmillan.

Bătae, O.M., Dragomir, V.D., & Feleagă, L. (2021). The relationship between environmental, social, and financial performance in the banking sector: A European study. Journal of Cleaner Production, 290, 125791.

Bouattour, A., Kalai, M. & Helali, K. (2024). The non-linear relationship between ESG performance and bank stability in the digital era: new evidence from a regime-switching approach. Humanities and Social Sciences Communication Vol 11(1445) https://doi.org/10.1057/s41599-024-03876-8

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. Econometrica, 47(5), 1287–1294.

Buallay, A. (2019). Is sustainability reporting associated with performance? Evidence from banks in emerging markets. Management of Environmental Quality: An International Journal, 30(1), 98–115.

Buallay, A., Fadel, S. M., Al-Ajmi, J. Y., & Saudagaran, S. (2020). Sustainability reporting and performance of MENA banks: is there a trade-off?. Measuring Business Excellence, 24(2), 197-221.

Carè, R., & Forgione, A. F. (2018). Assessing the relationship between environmental performance and Banks' performance: Preliminary evidence. In Socially Responsible Investments: The Crossroads Between Institutional and Retail Investors (pp. 61-85). Cham: Springer International Publishing.

Cek, K., & Eyupoglu, S. (2020). ESG and financial performance in emerging markets. Sustainability, 12(24), 10387.

Central Bank of Kenya. (2021). Climate risk management guideline for banks.

Central Bank of Kenya. (2024). Bank supervision annual report.

Chima, M. M., Babajide, A. A., Adegboye, A., Kehinde, S., & Fasheyitan, O. (2021). The relevance of financial inclusion on sustainable economic growth in Sub-Saharan African nations. Sustainability, 13(10), 5581.

Cook, R. D., & Weisberg, S. (1983). Diagnostics for heteroscedasticity in regression. Biometrika, 70(1), 1–10.

Cooper, D. R., & Schindler, P. S. (2014). Business research methods (12th ed.). McGraw-Hill Education.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). Sage Publications.

Dawson, J. F. (2014). Moderation in management research: What, why, when, and how. Journal of Business and Psychology, 29(1), 1–19.

Deegan, C. (2002). Introduction: The legitimising effect of social and environmental disclosures – a theoretical foundation. Accounting, Auditing & Accountability Journal, 15(3), 282–311.

Del Gesso, C., & Lodhi, R. N. (2025). Theories underlying environmental, social and governance (ESG) disclosure: A systematic review of accounting studies. Journal of Accounting Literature, 47(2), 433–461.

Dhar, S., & Chowdhury, M. A. F. (2021). Impact of environmental accounting reporting practices on financial performance: Evidence from banking sector of Bangladesh. International Journal of Asian Business and Information Management (IJABIM), 12(1), 24–42.

Dowling, J., & Pfeffer, J. (1975). Organizational legitimacy: Social values and organizational

behavior. Pacific Sociological Review, 18(1), 122–136.

Esteban-Sanchez, P., de la Cuesta-Gonzalez, M., & Paredes-Gazquez, J.D. (2017). Corporate social performance and its relation with corporate financial performance: International evidence in the banking industry. Journal of Cleaner Production, 162, 1102–1110.

Freeman, R. E. (1984). Strategic management: A stakeholder approach. Pitman.

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance meta-analysis. Journal of Sustainable Finance, 5(2), 210–233.

Gangi, F., Daniele, L.M., & Varrone, N. (2019). How do corporate environmental policy and reputation affect financial performance? The role of sustainability reporting. Business Strategy and the Environment, 28(2), 197–210.

Giannopoulos, G., Pilcher, N., & Salmon, I. (2024). What is the relationship between corporate social responsibility and financial performance in the UK banking sector?. Journal of Risk and Financial Management, 17(5), 187.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage Learning.

Halim, M. A., Lima, R. P., & Islam, M. N. (2024). Sustainability reporting and bank performance in a developing country. International Journal of Financial Engineering, 11(02), 2450004.

Hart, S. L. (1995). A natural-resource-based view of the firm. Academy of Management Review, 20(4), 986-1014.

Hausman, J. A. (1978). Specification tests in econometrics. Econometrica: Journal of the Econometric Society, 1251–1271.

Islam, M. U., Abdul Hamid, B., & Shahid, M. N. (2025). ESG activities and bank performance with the moderating influence of competition and regulatory quality: A study in the organization of Islamic countries. International Journal of Islamic and Middle Eastern Finance and Management, 18(2), 441–466.

Jan, A., Marimuthu, M., bin Mohd, M. P., & Isa, M. (2019). The nexus of sustainability practices and financial performance: From the perspective of Islamic banking. Journal of Cleaner Production, 228, 703–717.

Kothari, C. R. (2014). Research methodology: Methods and techniques (3rd ed.). New Age International.

Lamanda, G., & Tamásné Vőneki, Z. (2024). Is ESG disclosure associated with bank performance? Evidence from the Visegrad Four countries. Management of Environmental Quality: An International Journal, 35(1), 201–219.

Mansour, M., Alnohoud, I., Allan, A. A., Khassawneh, A., & Saad, M. (2025). Does engaging in ESG practices improve banks' performance in Jordan? Banks and Bank Systems, 20(1), 62–75.

Marshall, A. (1920). Principles of economics (8th ed.). Macmillan.

Matemane, R., & Wentzel, R. (2019). Integrated reporting and financial performance of South African listed banks. Banks and Bank Systems, 14 (2), 128–139.

Menicucci, E., & Paolucci, G. (2023). ESG dimensions and bank performance: An empirical investigation in Italy. Corporate Governance: The International Journal of Business in Society, 23(3), 563–586.

Moufty, S., Clark, E., & Al-Najjar, B. (2021). The different dimensions of sustainability and bank performance: Evidence from the EU and the USA. Journal of International Accounting, Auditing and Taxation, 43, 100381.

Nhu, Q. N. T. (2025). Human capital and Bank performance: Does size matter?. Journal of Risk and Financial Management, 18(8), 429.

Nobanee, H., & Ellili, N. (2017). Impact of economic, environmental, and social sustainability reporting on financial performance of UAE banks. Environmental, and Social Sustainability Reporting on Financial Performance of UAE Banks (May 20, 2017).

Porter, M. E.,& Kramer, M. R. (2019). Creating shared value. Harvard Business Review, 89(1), 1–17.

Rahma, P. N. M., & Wedari, L. K. (2024). Green banking and bank performance in ASEAN: The moderating role of bank size. Journal of Logistics, Informatics and Service Science, 11(9), 162–181.

Saadaoui, A., & Ben Salah, O. (2023). The moderating effect of financial stability on the CSR and bank performance. EuroMed Journal of Business, 18(4), 621-642.

Saif-Alyousfi, A. Y., & Alshammari, T. R. (2025). Environmental sustainability and climate change: An emerging concern in banking sectors. Sustainability, 17(3), 1040.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson Education.

Shabir, M., Ping, J., Işik, Ö., & Razzaq, K. (2024). Impact of corporate social responsibility on bank performance in emerging markets. International Journal of Emerging Markets.

Shakil, M.H., Mahmood, N., Tasnia, M., & Munim, Z.H. (2019). Do environmental, social and governance performance affect the financial performance of banks? A cross-country study of emerging market banks. Management of Environmental Quality: An International Journal, 30 (6), 1331–1344.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. Academy of Management Review, 20(3), 571–610.

Tandelilin, E., & Usman, B. (2023). Toward a better understanding of social impact, CSR reporting and firm performance: a look at the ASEAN banking industry. Social Responsibility Journal, 19(3), 579-600.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48(4), 817–838.

Wooldridge, J. M. (2020). Introductory econometrics: A modern approach (7th ed.). Cengage Learning.

World Bank. (2021). Climate risk and financial stability report.

Zyadat, A. A. H. (2017). The impact of sustainability on the financial performance of Jordanian Islamic banks. International Journal of Economics and Finance, 9(1), 55–63.Abadi, A. R. D., & Lutfi, L. (2025). Liquidity risk and the impact of credit growth on profitability in rural Banks: The moderating role of Bank size. Golden Ratio of Finance Management, 5(2), 587-599.