



CSR Maturity and ESG-Linked Finance Readiness in Indonesian Construction Contractors

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Abstract. Indonesia's sustainable-finance push is reshaping credit allocation, yet evidence on how contractors can translate corporate social responsibility (CSR) maturity into financing advantages remains limited. This study investigates whether CSR governance & KPI discipline, a green project pipeline aligned with recognised taxonomies, and disclosure alignment with reporting standards jointly enhance ESG-linked finance readiness. Using primary data from $n = 90$ contractors via a two-informant matched-pair survey (Finance and CSR/ESG managers), we estimate a PLS-SEM model wherein finance readiness is specified as a second-order composite (Access, Terms, Execution). The model shows good fit (SRMR = 0.058), substantial explanatory power ($R^2 = 0.62$) and predictive relevance ($Q^2 = 0.41$). All hypotheses are supported: governance & KPI ($\beta = 0.33$), green pipeline ($\beta = 0.28$), and disclosure alignment ($\beta = 0.25$) exhibit positive, significant effects. Robustness checks (full-collinearity VIF, blindfolding, permutation) and multi-group analysis suggest stronger governance/disclosure effects for listed firms and relatively larger pipeline effects for non-listed/private firms. The findings integrate signalling and pecking-order perspectives, offering an actionable sequence governance first, pipeline curation second, disclosure assurance third to convert CSR maturity into cheaper, longer-tenor, and more reliable ESG-linked debt.

Keywords: CSR maturity, ESG-linked finance readiness, construction contractors, green project pipeline, disclosure alignment.

1 Introduction

The acceleration of sustainable finance has reshaped capital allocation logic across emerging markets, with lenders increasingly conditioning access to credit on credible environmental, social and governance (ESG) performance [1]. Construction capital-intensive, project-based, and risk-laden sits at the centre of this shift. Indonesian policymakers have signalled clear intent through national sustainable-finance roadmaps and a green-taxonomy framework, while banks expand sustainability-linked instruments that adjust pricing and tenor against ESG targets. For contractors, these developments transform corporate social responsibility (CSR) from a discretionary peripheral activity into a strategic lever for de-risking projects, signalling managerial

quality, and ultimately improving bankability [2]. Yet, despite strong policy momentum, evidence on whether and how CSR maturity translates into concrete financing advantages for contractors remains thin.

This study addresses a practical and theoretical problem. Practically, many Indonesian contractors report difficulties converting ESG rhetoric into improved access to sustainability-linked facilities, favourable covenants, or lower all-in funding costs. Lenders, for their part, require hard signals that reduce information asymmetry: robust governance, measurable targets, project pipelines consistent with recognised taxonomies, and disclosures that are decision-useful rather than symbolic [3]. Theoretically, CSR can function as a market signal and, within a pecking-order perspective, as an enabler to secure debt financing on better terms before turning to costlier sources. The core problem, therefore, is to determine whether higher CSR maturity operationalised as governance and KPI discipline, the depth of a green project pipeline, and disclosure alignment with recognised standards enhances firms' readiness to obtain ESG-linked finance [4].

The extant literature leaves several gaps. First, most empirical studies on ESG and financing advantages concentrate on listed firms or manufacturing sectors; the construction sector, with its unique project financing risks, subcontracting structures, and safety obligations, is under-represented [3],[4]. Secondly, Indonesian studies frequently proxy CSR by compliance or disclosure scores alone, overlooking the strategic content of CSR governance (e.g., board oversight and pay-for-ESG performance) and the "real economy" evidence of a pipeline of taxonomy-eligible projects [5]. Thirdly, research rarely integrates these three CSR pillars into a single explanatory model of finance readiness a construct that reflects not only the presence of facilities but also perceived improvements in tenor, pricing, and approval hit rates. Finally, few primary-data studies capture views from both financial decision-makers (CFOs/treasury) and CSR/ESG leads, or compare listed versus non-listed contractors where investor scrutiny and disclosure regimes differ materially [6].

Accordingly, this paper pursues four objectives. (i) To test whether CSR governance and KPI discipline (X1), green project pipeline (X2), and disclosure alignment with recognised standards and taxonomies (X3) each exert a positive effect on ESG-linked finance readiness (Y) among Indonesian contractors. (ii) To compare these effects between listed and non-listed firms, examining whether capital-market exposure strengthens the signalling value of CSR maturity. (iii) To develop and validate a parsimonious measurement of finance readiness that captures availability of facilities alongside perceived improvements in pricing and tenor. (iv) To derive actionable implications for managers and lenders by identifying which CSR levers most effectively enhance readiness under Indonesia's sustainable-finance architecture. Grounded in signalling and pecking-order theories, the study offers an integrated, evidence-based account of how strategic CSR can be mobilised to unlock greener, cheaper, and more reliable financing pathways in the construction industry.

2 Literature Review

2.1 Signalling Theory and the Pecking-Order Perspective

At its core, signalling theory explains how firms convey credible information to outside claim-holders when quality is difficult to observe *ex ante* [7]. In markets characterised by information asymmetry, such as corporate lending to project-based construction firms, lenders cannot immediately verify managerial quality, risk governance, or the environmental integrity of projects.

Signals are therefore valuable when they are observable, costly to imitate, and reliably correlated with the unobservable attributes they purport to represent [8]. In this study, the attributes of interest are a contractor's capability to manage ESG risks and deliver taxonomy-eligible projects. The signal set comprises CSR governance and incentive structures, the depth of a green project pipeline, and disclosure practices aligned with recognised standards and taxonomies [9].

Each element potentially reduces due-diligence frictions by converting internally held information into externally legible evidence that credit officers can assess and price.

The credibility of a signal rests on its costliness and commitment value. Governance arrangements, including board-level oversight of ESG, KPI-linked remuneration, and risk-appetite statements, are costly to design, monitor, and sustain. These arrangements also expose executives to performance discipline [10].

Likewise, developing a pipeline of projects that meet national green-taxonomy criteria requires irreversible investments in capability building, supplier qualification, and design choices that constrain opportunism.

Disclosure alignment with recognised frameworks (e.g., GRI-OJK) and explicit mapping to a green taxonomy add verification costs (for instance, external assurance) and legal/reputational exposure if misstatements occur. Because low-quality firms find these costs prohibitive, such signals are separating rather than pooling: they allow lenders to update beliefs about expected cash flows and downside risks, which in turn affects pricing, tenor, and covenant intensity of ESG-linked facilities [11].

The pecking-order perspective complements this logic by describing how firms sequence financing choices under asymmetric information. Managers prefer internally generated funds, then debt, and lastly equity; within debt, instruments with lower information sensitivity and favourable pricing are prioritised. ESG-linked loans create a route to cheaper or more flexible debt conditional on the strength of signals that reduce perceived risk and measurement error in sustainability performance. When CSR maturity generates credible signals, it lowers the "information premium" that lenders would otherwise charge, allowing contractors to climb the pecking order towards ESG-linked debt before tapping costlier alternatives. Conversely, weak or symbolic CSR provides little relief from adverse-selection discounts, pushing firms down the hierarchy towards more expensive, restrictive, or short-tenor financing [12].

A further implication of combining signalling with the pecking-order view is dynamic and relational: repeated issuance and performance against ESG-linked KPIs create a feedback loop between signals and realised outcomes. Meeting sustainability

targets embedded in loan contracts (e.g., margin ratchets tied to intensity metrics) strengthens reputation capital, reducing monitoring intensity and easing access to subsequent facilities. This mechanism is particularly salient in construction, where lenders assess not only firm-level credit but also project execution risk and subcontractor governance. The risk of “greenwashing” clarifies boundary conditions: only signals that are auditable (e.g., assured disclosures), hard to mimic (e.g., KPI-linked pay actually affecting compensation), and embedded in project selection (taxonomy-aligned pipeline) are likely to translate into financing advantages. Taken together, the theories predict that CSR maturity operationalised through governance discipline, pipeline quality, and disclosure alignment acts as a credible signal that shifts contractors upward in the financing hierarchy, thereby increasing readiness for and access to ESG-linked debt on better terms [13].

2.2 CSR Governance

CSR governance refers to the formal structures and routines through which a firm’s environmental and social priorities are set, monitored, and enforced. In a strategic (rather than philanthropic) conception, it comprises board-level oversight (e.g., a sustainability committee with clear remit), explicit risk-appetite statements for ESG issues, integration of ESG into enterprise risk management and project screening, and the codification of measurable targets that cascade into managerial scorecards [14]. Crucially, governance also involves credible performance discipline linking executive remuneration to ESG KPIs that are material to the business model of a contractor (for example, safety incidence rates, resource-efficiency metrics, and the proportion of taxonomy-eligible projects). These design choices shift CSR from a compliance posture to a capability that coordinates functions (finance, procurement, HSE, and operations) and aligns them with external expectations from lenders and rating agencies [15].

The financing mechanism is straightforward. Robust CSR governance reduces information asymmetry by generating auditable, decision-useful evidence that a firm can select, execute, and report projects in line with sustainability benchmarks. Board oversight and KPI-linked pay act as costly commitments that are difficult for low-quality firms to mimic; they signal managerial quality and discipline in achieving sustainability performance targets (SPTs) typically embedded in sustainability-linked loans. When ESG objectives are embedded into budgeting, capital allocation, and risk controls, lenders can underwrite lower execution risk and lower measurement error in future KPI realisation, which in turn supports better terms (pricing, tenor, covenants) and higher approval hit rates [16]. Within a pecking-order perspective, such governance strength elevates contractors towards cheaper, less information-sensitive debt specifically ESG-linked facilities before resorting to costlier financing alternatives.

- **H1:** Stronger CSR governance and KPI discipline are positively associated with finance readiness for ESG-linked debt among Indonesian contractors.

2.3 Green Project Pipeline

A green project pipeline denotes the depth and credibility of near-term projects that conform to recognised sustainable-finance taxonomies and certification regimes. For contractors, it is not merely a list of aspirations; it embodies design specifications, permitting trajectories, procurement choices, and counterparties that together render a project eligible for sustainable or sustainability-linked financing [17]. Because eligibility hinges on technical thresholds (for example, energy efficiency, low-carbon materials, water stewardship, or waste minimisation) and verifiable performance indicators, building such a pipeline demands irreversible capability investments engineering expertise, supplier qualification, and project screening routines that extend well beyond rhetorical commitments to responsibility. In this sense, pipeline quality represents “real-economy” evidence of strategic CSR: it reveals how sustainability principles are embedded in project selection and value engineering rather than confined to corporate communications [18].

The financing mechanism is direct. Lenders underwriting ESG-linked facilities assess both firm-level governance and the probability that forthcoming projects will meet taxonomy criteria and deliver measurable sustainability targets over the life of the loan. A credible pipeline reduces due-diligence friction by clarifying the use of proceeds, anchoring KPI selection, and lowering the risk that targets will be missed risks that otherwise attract pricing premiums, tighter covenants, or shorter tenors. It also mitigates execution risk: taxonomy-aligned designs, pre-qualified green suppliers, and documented measurement plans improve schedule reliability and cost control, strengthening lenders’ confidence in forecast cash flows [19]. Within a pecking-order logic, contractors with deeper green pipelines can access cheaper, less information-sensitive debt earlier, while firms lacking such pipelines are pushed towards costlier or more restrictive financing.

- **H2:** A stronger green project pipeline defined by the proportion and maturity of taxonomy-eligible projects in the near-term backlog is positively associated with finance readiness for ESG-linked debt among Indonesian contractors.

2.4 Disclosure Alignment

Disclosure alignment denotes the extent to which a firm’s sustainability reporting is coherent with recognised standards and taxonomies, decision-useful for lenders, and credibly assured [4],[12]. In practice, alignment has three pillars. First, content: disclosures map material topics to recognised frameworks (e.g., GRI-based sustainability reporting) and translate them into clearly defined metrics and targets relevant to construction (safety incidence, resource-efficiency, embodied carbon, waste intensity). Secondly, classification: activities and projects are explicitly screened against an applicable green taxonomy, with scoping rules, eligibility criteria, and thresholds documented so that stakeholders can distinguish taxonomy-eligible, aligned, and non-aligned components. Thirdly, credibility: disclosures are governed by internal controls, supported by data lineage and audit trails, and where feasible subject to external or limited assurance. Together, these features transform CSR narratives into a

consistent, comparable, and verifiable evidence base that credit officers can underwrite [15].

The financing channel operates through reductions in information and verification costs. Lenders pricing sustainability-linked facilities need to judge whether chosen key performance indicators (KPIs) are material, measurable over the loan's life, and calibrated to ambitious yet achievable sustainability performance targets (SPTs). High-quality, taxonomy-referenced, and assured disclosures lower model risk in KPI selection, facilitate the formulation of transparent margin-ratchet mechanics, and reduce the perceived risk of misstatement or under-performance risks that would otherwise attract higher spreads, tighter covenants, shorter tenors, or prolonged due diligence. Conversely, boilerplate or selectively positive reporting heightens greenwashing concerns, increases monitoring intensity, and weakens the signalling value of CSR maturity [20]. In short, disclosure alignment enhances the credibility and decision-usefulness of the firm's ESG information set, sharpening the link between reported capability and expected performance in loan covenants.

- **H3:** Stronger disclosure alignment operationalised by taxonomy-referenced, standard-consistent, and externally assured sustainability reporting is positively associated with finance readiness for ESG-linked debt among Indonesian contractors.

2.5 Finance Readiness

Finance readiness is defined here as a firm's capability and likelihood to secure ESG-linked debt on advantageous terms within a realistic decision window [21]. It is intrinsically multi-dimensional: beyond mere eligibility, readiness encompasses (i) access the availability of sustainability-linked or green facilities and the firm's approval hit rate; (ii) terms perceived improvements in pricing (spread/margin), tenor and covenant flexibility, including the transparency and enforceability of margin-ratchet mechanics; and (iii) execution the organisational capacity to co-design material KPIs and sustainability performance targets (SPTs), deliver auditable data over the loan's life, and close due diligence without prolonged iterations. In project-based construction, where lenders scrutinise both corporate credit and delivery risk, this triad reflects how convincingly a contractor can convert ESG intent into bankable, monitorable commitments [22].

Operationally, finance readiness is modelled as a second-order composite formed by three first-order latent dimensions Access, Terms, and Execution each measured reflectively via Likert-type items and, where feasible, anchored by light document checks (e.g., evidence of facility offers/limits, indicative pricing changes, KPI/SPT term sheets, assurance statements). A composite specification is appropriate because the dimensions are non-interchangeable contributors to the overarching construct: stronger terms do not substitute for an absence of facilities, and a facility offer without execution capacity does not constitute readiness. This specification aligns with the paper's explanatory aim: to detect whether variations in CSR maturity map onto

tangible movement along lenders' decision criteria, rather than onto disclosure quality alone [2],[4].

Conceptually, finance readiness is the proximate outcome through which the study's signalling-and-pecking-order logic materialises. Credible signals generated by CSR governance (board oversight and KPI discipline), by a taxonomy-aligned green project pipeline, and by disclosure alignment (standard-consistent, taxonomy-referenced, and, where feasible, assured) should reduce lenders' information and verification costs, thereby raising the probability of access, improving expected terms, and accelerating execution [9]. The dependent variable thus anchors the contribution of this research: it translates strategic CSR from a normative aspiration into a financing advantage that can be measured, compared across listed and non-listed firms, and ultimately managed. In the empirical model that follows, we therefore expect CSR governance & KPI discipline (H1), green project pipeline strength (H2), and disclosure alignment quality (H3) to exert positive effects on finance readiness, with subgroup analysis exploring whether capital-market exposure amplifies these effects.

3 Methodology

This study adopts an explanatory, cross-sectional, quantitative design using a structured survey administered to $n = 90$ Indonesian construction contractors (main and specialist contractors with active or recent project portfolios). A two-informant, matched-pair approach is employed at firm level to reduce single-source bias and improve construct validity: the Finance Manager (or equivalent treasury lead) provides information on access, pricing and tenor of facilities, while the CSR/ESG Manager reports on governance, targets and disclosure practices, as well as the composition of the green project pipeline. Firms are selected purposively to ensure variation in ownership (state-owned/private held), listing status, and project types (building/infrastructure), with minimum inclusion criteria of (i) ≥ 3 years of operating history and (ii) at least one tender or facility application involving sustainability criteria in the prior 24 months.

Measures operationalise the three independent constructs as reflective latent variables CSR governance & KPI (board oversight, ESG target-setting, and pay-for-ESG performance), green project pipeline (proportion and maturity of taxonomy-eligible projects in the near-term backlog), and disclosure alignment (consistency with recognised reporting standards and green-taxonomy referencing, including assurance where feasible). The dependent construct, finance readiness, is specified as a second-order composite formed by three reflective first-order dimensions: Access (availability of ESG/SL-loan facilities and approval hit rate), Terms (perceived improvements in spread/margin, tenor and covenant flexibility), and Execution (capacity to co-design material KPIs/SPTs and deliver auditable data during the loan life). Items are rated on five-point Likert scales; wording is derived from prevailing policy frameworks and market practice (e.g., governance of ESG targets, taxonomy eligibility screening, KPI/SPT design, assurance and margin-ratchet mechanics). Content validity is established through expert review with senior practitioners (finance and ESG), followed by a small-scale pilot to refine clarity and relevance.

Data quality is safeguarded through procedural and statistical remedies. The dual-respondent design separates sources for predictors (CSR/ESG) and outcomes (finance readiness), supplemented where permitted by light document checks (e.g., excerpts of sustainability reports, facility offers/term sheets, assurance statements) to anchor self-reports. Participation is voluntary with informed consent; company and individual identities are anonymised and results reported in aggregate. Responses are screened for completeness and consistency; sporadic missing values (<5%) are imputed using within-construct medians. Distributional assumptions are monitored, although the chosen estimator is robust to non-normality. Outliers are inspected at the indicator and construct levels to ensure they reflect genuine heterogeneity rather than data entry error.

Given the study's prediction orientation, small-to-moderate sample size, and inclusion of a composite higher-order construct, hypotheses are tested using PLS-SEM (SmartPLS) [23]. The measurement model is assessed via internal consistency (α , CR ≥ 0.70), convergent validity (AVE ≥ 0.50), and discriminant validity (HTMT < 0.85), with indicator pruning only when theoretically defensible. The structural model reports path coefficients (β), explained variance (R^2), effect sizes (f^2), predictive relevance (Q^2), and model fit (SRMR), using 5,000 bootstrap resamples for inference. Multi-group analysis (listed vs non-listed; state-owned vs private) is conducted where cell sizes allow; otherwise, permutation-based procedures provide robustness [24]. Potential common-method and endogeneity concerns are examined through full-collinearity VIF (< 3.3) and, if indicated, Gaussian copula tests. Size, leverage, certification (ISO 14001/45001) and project type are included as observed controls.

4 Result and Discussion

4.1 Descriptive Statistics

This section presents the sample profile, descriptive statistics, and psychometric evidence for the latent constructs prior to structural testing. The analytic dataset comprises $n = 90$ construction contractors, each represented by two matched respondents (one Finance Manager/treasury lead and one CSR/ESG Manager), thereby reducing single-source bias and improving construct validity. The sample is heterogeneous across ownership, listing status and segment specialisation, providing the variance required to test the hypothesised relationships. Table 1 summarises firm characteristics and confirms full adherence to the two-informant design (90 finance + 90 CSR/ESG responses).

Table 1. Sample & Respondents

Attribute	Category	n	%	Notes
Ownership	State-owned (BUMN)	28	31.1	Diverse subsidiaries included Family-owned and corporate groups
	Private	62	68.9	
Listing status	Listed	24	26.7	For MGA in §4.3
	Non-listed	66	73.3	

Segment	Building	31	34.4	Commercial & residential
	Infrastructure	38	42.2	Roads, bridges, utilities
	Mixed	21	23.3	Multi-segment contractors
Respondent roles	Finance Manager	90	100	One matched pair per firm
	CSR/ESG Manager	90	100	

Source: Primary Data (2025)

Table 2 reports descriptive statistics (means on five-point Likert scales; standard deviations) and inter-construct correlations among CSR governance & KPI (X1), Green project pipeline (X2), Disclosure alignment (X3), and the three first-order dimensions of Finance readiness (Y) Access, Terms, and Execution. Means cluster around the moderate-to-high range (3.2–3.6) with acceptable dispersion (SD ≈ 0.65–0.80), suggesting neither ceiling nor floor effects. Inter-construct correlations lie well below the conventional 0.85 threshold, indicating no bivariate evidence of discriminant validity breaches ahead of the formal measurement tests. As expected, X1 and X3 correlate meaningfully with Execution, reflecting the role of governance and reporting discipline in delivering auditable KPI/SPT performance over the loan life.

Table 2. Descriptive Statistics

Construct	Mean	SD	1	2	3	4	5	6
X1 CSR governance	3.62	0.68	—	0.48	0.56	0.44	0.38	0.52
X2 Green project pipeline	3.41	0.72	0.48	—	0.47	0.41	0.36	0.45
X3 Disclosure alignment	3.55	0.65	0.56	0.47	—	0.46	0.40	0.58
Y-Access (facility availability & hit rate)	3.27	0.78	0.44	0.41	0.46	—	0.63	0.49
Y-Terms (pricing, tenor, covenants)	3.18	0.74	0.38	0.36	0.40	0.63	—	0.45
Y-Execution (KPI/SPT design & reporting)	3.46	0.70	0.52	0.45	0.58	0.49	0.45	—

Source: Primary Data (2025)

Table 3 provides evidence for reliability and validity. For reflective first-order constructs, outer loadings exceed 0.70 (with one or two marginal items retained on theoretical grounds), Cronbach’s α and Composite Reliability (CR) comfortably surpass 0.70, and Average Variance Extracted (AVE) meets or exceeds 0.50, supporting convergent validity. HTMT ratios remain below 0.85, indicating discriminant validity across constructs. Finance readiness is modelled as a second-order composite formed by three reflective dimensions (Access, Terms, Execution); its internal consistency is assessed at the first-order level, while second-order diagnostics (collinearity, Q^2) are reported with the structural results in §4.2. Where applicable, item retention reflects both statistical performance and conceptual salience to preserve content validity.

Table 3. Measurement Model

Construct	Item	Loading	α	CR	AVE	HTMT (max)
X1 CSR governance	X1_1	0.82	0.86	0.90	0.61	0.79
	X1_2	0.84				
	X1_3	0.78				
	X1_4	0.80				
	X1_5	0.72				
X2 Green project pipeline	X2_1	0.81	0.83	0.88	0.59	0.74
	X2_2	0.76				
	X2_3	0.79				
	X2_4	0.74				
X3 Disclosure alignment	X3_1	0.81	0.85	0.89	0.58	0.78
	X3_2	0.79				
	X3_3	0.77				
	X3_4	0.83				
	X3_5	0.71				
Y-Access (first-order)	YA_1	0.88	0.81	0.88	0.71	0.65
	YA_2	0.84				
	YA_3	0.76				
Y-Terms (first-order)	YT_1	0.86	0.78	0.86	0.67	0.62
	YT_2	0.79				
	YT_3	0.73				
Y-Execution (first-order)	YE_1	0.80	0.82	0.88	0.60	0.69
	YE_2	0.84				
	YE_3	0.77				
	YE_4	0.70				

Source: Primary Data (2025)

Procedural and statistical remedies were employed to mitigate common-method variance. The dual-respondent design separates sources for predictors (CSR/ESG) and outcomes (finance) and is supplemented, where permissible, by light document checks (e.g., sustainability-report excerpts, facility offers, assurance statements). Diagnostics include inspection of cross-loadings and the full-collinearity VIF criterion (<3.3), with results reported in §4.2. Overall, the measurement model satisfies stringent reliability and validity benchmarks, enabling a credible assessment of the hypothesised effects in the subsequent structural analysis.

4.2 Structural Model and Hypothesis Testing

Estimated the structural model using PLS-SEM (two-stage approach) to accommodate the second-order composite of Finance Readiness (Y) formed by three reflective first-

order dimensions (Access, Terms, Execution). Collinearity diagnostics indicated no critical issues (max full-collinearity VIF = 2.21), and model fit met recommended heuristics (SRMR = 0.058). The endogenous construct exhibited substantial explanatory power ($R^2(Y) = 0.62$) and predictive relevance ($Q^2(Y) = 0.41$ based on blindfolding), supporting the model’s adequacy for hypothesis testing. Bootstrap resampling with 5,000 draws, two-tailed provided standard errors for inference.

At the path level Table 4, CSR governance & KPI (X1) displayed the strongest standardised effect on Finance Readiness ($\beta = 0.33, t = 3.01, p = 0.003, f^2 = 0.15$), followed by Green project pipeline (X2) ($\beta = 0.28, t = 2.72, p = 0.007, f^2 = 0.12$) and Disclosure alignment (X3) ($\beta = 0.25, t = 2.49, p = 0.014, f^2 = 0.10$). All three effects were positive and statistically significant, lending support to H1–H3. In aggregate, the results are consistent with the study’s theoretical frame: governance discipline and KPI-linked incentives (signalling) appear to reduce information asymmetry most effectively, while a taxonomy-eligible pipeline and decision-useful disclosures jointly improve lenders’ confidence in KPI/SPT achievability and data verifiability, thus strengthening readiness for ESG-linked debt.

From a practical standpoint, these findings imply an ordering of strategic levers. First, institutionalising ESG oversight and KPI discipline (board remit, pay-for-ESG, risk-appetite statements) yields the largest marginal gain in Finance Readiness, aligning with lenders’ preference for difficult-to-mimic, commitment-heavy signals. Secondly, curating a credible green project pipeline with documented taxonomy screening, pre-qualified green suppliers, and measurement plans meaningfully anchors use-of-proceeds and KPI selection, lowering due-diligence frictions. Thirdly, aligning disclosures to recognised standards and explicitly referencing the national taxonomy (with assurance where feasible) sharpens the link between reported capability and expected performance embedded in margin-ratchet mechanics. Together these levers move contractors up the financing hierarchy (pecking order) toward cheaper, longer-tenor ESG-linked loans.

Table 4. Structural Path and Model fit (PLS-SEM)

Hyp.	Path	β	t	p	f^2	Supported
H1	X1 (CSR governance & KPI) → Y (Finance readiness)	0.33	3.01	0.003	0.15	Yes
H2	X2 (Green project pipeline) → Y (Finance readiness)	0.28	2.72	0.007	0.12	Yes
H3	X3 (Disclosure alignment) → Y (Finance readiness)	0.25	2.49	0.014	0.10	Yes
	Model fit	SRMR = 0.058				
	Collinearity	VIF (max) = 2.21				

Explained variance	$R^2(Y) = 0.62$
Predictive relevance	$Q^2(Y) = 0.41$

Source: Primary Data (2025)

Notes: Two-stage estimation for second-order composite Y; significance based on two-tailed tests. Heuristics: SRMR < 0.08 (acceptable); full-collinearity VIF < 3.3; $f^2 \approx 0.02$ small, 0.15 medium, 0.35 large (rule-of-thumb).

The explanatory power ($R^2 = 0.62$) and out-of-sample oriented $Q^2 = 0.41$ indicate that the model not only fits but also predicts aspects of Finance Readiness. Among exogenous drivers, governance & KPI discipline carries the largest effect size, reinforcing the centrality of hard commitments (e.g., board oversight, remuneration links) as separating signals. The pipeline coefficient underscores lenders' emphasis on real-economy evidence taxonomy-eligible projects with embedded measurement plans while the disclosure coefficient shows that assured, taxonomy-referenced reporting enhances the pricing of sustainability performance into loan terms. All three levers jointly reduce lenders' information and verification costs, consistent with signalling and pecking-order predictions that better signals permit access to less information-sensitive, cheaper debt earlier in the financing sequence.

4.3 Robustness and Multi-Group Analysis

This section strengthens the credibility and practical value of the findings by (i) stress-testing the model against alternative explanations, (ii) examining whether effects differ across salient firm types, and (iii) translating coefficients into prioritised action levers using Importance–Performance Map Analysis (IPMA). Unless stated otherwise, all tests use the two-stage PLS-SEM specification reported in §4.2 with 5,000 bootstrap resamples and permutation-based p-values for group comparisons.

Robustness. First, full-collinearity VIFs for all constructs were below 3.3 (max = 2.24), mitigating common-method concerns under the dual-respondent design. Second, adding controls (size, leverage, ISO 14001/45001 certification, project type) did not materially alter the substantive coefficients; the largest absolute change in β was 0.03. Third, Gaussian copula checks for potential endogeneity of X1–X3 (relative to Y) were non-significant ($|t| \leq 1.31$), suggesting that omitted risk preferences or lender relationships are unlikely to drive the observed effects. Fourth, blindfolding confirmed predictive relevance ($Q^2(Y) = 0.41$); exploratory PLSpredict on hold-out folds showed lower RMSE than a naïve linear benchmark for all three first-order Y dimensions, indicating useful out-of-sample prediction.

Multi-Group Analysis (MGA). We contrasted listed vs non-listed and state-owned vs private contractors. Patterns align with theory: market-exposed or governance-intensive contexts tend to amplify the value of hard-to-mimic signals (X1, X3), while firms outside capital markets benefit relatively more from “real-economy” evidence embedded in the pipeline (X2). Group-specific $R^2(Y)$ remained substantial (0.60–0.66), indicating stable explanatory power.

Table 5. Multi-Group & Robustness Checks

Comparison	Path	$\beta(\text{Group A})$	$\beta(\text{Group B})$	$\Delta\beta$ (A-B)	p_per m	Decision	Notes
Listed (n=24) vs Non-listed (n=66)	X1 → Y	0.41	0.29	+0.1 2	0.091	Marginal	Governance more valued by public lenders/investors
	X2 → Y	0.22	0.31	- 0.09	0.118	n.s.	Pipeline carries greater weight for non-listed firms
	X3 → Y	0.33	0.21	+0.1 2	0.078	Marginal	Disclosure scrutiny higher for listed firms
State-owned (n=28) vs Private (n=62)	X1 → Y	0.36	0.31	+0.0 5	0.312	n.s.	Board-level oversight prevalent in SOEs
	X2 → Y	0.21	0.32	- 0.11	0.095	Marginal	Private firms signal readiness via taxonomy-ready pipeline
	X3 → Y	0.27	0.24	+0.0 3	0.411	n.s.	Similar disclosure effects across ownership types
Robustness (pooled)	Max full-collinearity VIF	—	—	2.24	—	OK	< 3.3 threshold
	Gaussian copula (X1-X3)	—	—	—	n.s.	No endogeneity indication	
	R ² (Y) by group	0.66	0.60	—	—	—	

Source: Primary Data (2025)

Importance-Performance Map Analysis (IPMA). We mapped each strategic lever’s importance (total effect on Y) against its performance (rescaled mean 0–100). The aim is to highlight where improving performance yields the largest readiness gain. In the

pooled sample, X1 exhibits the highest importance but moderate performance; X2 shows high importance with the lowest performance, indicating the largest improvement potential; X3 shows moderate-high importance with moderate performance. Group-wise IPMA suggests tailoring: non-listed and private firms particularly benefit from upgrading X2; listed firms gain more from strengthening X1 and X3 (to satisfy market scrutiny and assurance expectations).

Table 6. IPMA Summary

Construct	Importance (total effect on Y)	Performance (rescaled mean)	Priority for Improvement
X1 CSR governance & KPI	0.33	64	High (institutionalise pay-for-ESG; board remit)
X2 Green project pipeline	0.29	58	Very High (taxonomy screening; supplier pre-qualification; measurement plans)
X3 Disclosure alignment	0.26	61	Medium-High (taxonomy-referenced SR; limited assurance)

Source: Primary Data (2025)

5 Conclusion

This study set out to examine whether and how CSR maturity functions as a strategic lever for improving contractors' readiness to obtain ESG-linked debt within Indonesia's evolving sustainable-finance architecture. Grounded in signalling theory and the pecking-order perspective, we operationalised CSR maturity through three firm-level levers CSR governance and KPI discipline (X1), a taxonomy-eligible green project pipeline (X2), and disclosure alignment with recognised standards and taxonomies (X3) and modelled finance readiness (Y) as a second-order composite capturing access, terms, and execution capability. Using primary data from $n = 90$ construction contractors and a two-informant design (Finance and CSR/ESG managers), we employed PLS-SEM to evaluate the proposed relationships.

The results are unambiguous. The structural model exhibits good fit and predictive relevance (SRMR = 0.058; $R^2(Y) = 0.62$; $Q^2(Y) = 0.41$). All three hypotheses are supported: CSR governance & KPI exerts the largest positive effect on finance readiness ($\beta = 0.33$), followed by green project pipeline ($\beta = 0.28$) and disclosure alignment ($\beta = 0.25$). Multi-group analyses indicate that listed firms benefit relatively more from hard-to-mimic signals embedded in governance and disclosure, whereas non-listed and private firms gain proportionally more from "real-economy" evidence manifested in a credible pipeline. Robustness checks: full-collinearity VIF, Gaussian copula, blindfolding, and PLSpredict reinforce these findings. Collectively, the evidence suggests that lenders do price credible CSR-related signals, and that these

signals raise the probability of access, improve expected terms, and accelerate execution for ESG-linked facilities.

The study advances theory in three ways. First, it demonstrates that strategic CSR not merely compliance or narrative disclosure can operate as a separating signal in credit markets, lowering information and verification costs for lenders. Secondly, it conceptualises finance readiness as a second-order outcome that integrates access, terms, and execution, thereby linking corporate-level governance and reporting discipline to project-level bankability. Thirdly, it foregrounds the green project pipeline as an under-examined conduit that translates sustainability intent into bankable design choices and measurement plans, complementing governance and disclosure in a coherent signalling bundle.

Managerially, an importance–performance perspective prioritises three sequenced actions. First, institutionalise ESG oversight and KPI discipline clarify board remit, embed risk-appetite statements, and link remuneration to material ESG outcomes to generate commitment-intensive signals. Second, curate a taxonomy-ready pipeline early in project conception: screen eligibility, lock in low-carbon specifications, pre-qualify green suppliers, and co-design KPI/SPT measurement plans that can be lifted into loan covenants. Third, enhance disclosure alignment by referencing the national taxonomy explicitly, elevating data lineage and controls, and seeking proportionate external assurance to counter greenwashing concerns and support transparent margin-ratchet mechanics. For policymakers and lenders, the results argue for continued harmonisation of taxonomy use in reporting, clearer guidance on KPI/SPT materiality, and scalable assurance pathways that keep verification costs proportionate for mid-sized contractors.

Limitations provide a constructive agenda for future work. The cross-sectional design constrains causal claims; longitudinal or quasi-experimental designs (e.g., policy shocks or loan-issuance events) would sharpen identification. The reliance on perceived financing terms should be complemented with lender-side data on actual spreads, covenants, and tenor, and with measured cost-of-capital outcomes. Expanding beyond contractors and comparing value-chain actors (developers, consultants, specialist subcontractors) would test generalisability, while deeper inquiry into assurance depth and greenwashing safeguards could refine the boundary conditions under which signals remain credible. Notwithstanding these limits, the present evidence indicates that contractors can convert CSR maturity into a tangible financing advantage, provided that governance discipline, bankable pipelines, and assured, taxonomy-anchored disclosures are advanced in concert.

Reference

1. Adeneye, Y.B., Kammoun, I., Ab Wahab, S.N.A.: Capital structure and speed of adjustment: The impact of environmental, social and governance (ESG) performance. *Sustain. Account. Manag. Policy J.* 14(5), 945–977 (2023). <https://doi.org/10.1108/SAMPJ-01-2022-0060>
2. Agarwala, N., Pareek, R., Sahu, T.N.: Does board independence influence CSR performance? A GMM-based dynamic panel data approach. *Soc. Responsib. J.* 19(6), 1003–1022 (2023). <https://doi.org/10.1108/SRJ-10-2020-0433>

3. Agbakwuru, V., Onyenahazi, O.B., Antwi, B.O., Oyewale, K.: The impact of environmental, social, and governance (ESG) reporting on corporate financial performance. *Int. J. Res. Publ. Rev.* 5(9), 3629–3644 (2024). <https://doi.org/10.55248/gengpi.5.0924.2710>
4. Alsayegh, M.F., Rahman, R.A., Homayoun, S.: Corporate economic, environmental, and social sustainability performance transformation through ESG disclosure. *Sustainability* 12(9), 3910 (2020). <https://doi.org/10.3390/su12093910>
5. Eccles, R.G., Ioannou, I., Serafeim, G.: The impact of corporate sustainability on organizational processes and performance. *Manag. Sci.* 60, 2835–2857 (2014). <https://doi.org/10.1287/mnsc.2014.1984>
6. Padilla-Rivera, A., Hannouf, M., Assefa, G., Gates, I.: Enhancing environmental, social, and governance performance and reporting through integration of life cycle sustainability assessment framework. *Sustain. Dev.* 33, 2975–2995 (2025). <https://doi.org/10.1002/sd.3265>
7. Yulianto, A., Witiastuti, R.S.: Signalling or pecking order theory: Evidence from mining and energy sector. *Int. J. Prof. Bus. Rev.* 8(8), 74 (2023)
8. Akorsu, P.K.: Testing the pecking order and signalling theories for financial institutions in Ghana. *Res. J. Finance Account.* 5(16), 77–83 (2014)
9. Wang, Z., Sarkis, J.: Corporate social responsibility governance, outcomes, and financial performance. *J. Clean. Prod.* 162, 1607–1616 (2017)
10. Albareda, L., Waddock, S.: Networked CSR governance: A whole network approach to meta-governance. *Bus. Soc.* 57(4), 636–675 (2018)
11. Chan, M.C., Watson, J., Woodliff, D.: Corporate governance quality and CSR disclosures. *J. Bus. Ethics* 125(1), 59–73 (2014)
12. Akpinar, A., Jiang, Y., Gomez-Mejia, L., Berrone, P., Walls, J.: Strategic use of CSR as a signal for good management. SSRN (2008). <https://doi.org/10.2139/ssrn.1134505>
13. Bennett, W.L.: An introduction to journalism norms and representations of politics. *Polit. Commun.* 13(4), 373–384 (1996). <https://doi.org/10.1080/10584609.1996.9963126>
14. Brammer, S., Jackson, G., Matten, D.: Corporate social responsibility and institutional theory: New perspectives on private governance. *Socio-Econ. Rev.* 10(1), 3–28 (2012). <https://doi.org/10.1093/ser/mwr030>
15. O'Donovan, G.: Environmental disclosures in the annual report: Extending the applicability and predictive power of legitimacy theory. *Account. Audit. Account. J.* 15(3), 344–371 (2002). <https://doi.org/10.1108/09513570210435870>
16. Parum, E.: Does disclosure on corporate governance lead to openness and transparency in how companies are managed? *Corp. Gov. Int. Rev.* 13(5), 702–709 (2005). <https://doi.org/10.1111/j.1467-8683.2005.00461.x>
17. Chung, R., Bayne, L., Birt, J.: The impact of environmental, social and governance (ESG) disclosure on firm financial performance: Evidence from Hong Kong. *Asian Rev. Account.* 32(1), 136–165 (2024). <https://doi.org/10.1108/ARA-07-2022-0165>
18. Chytis, E., Eriotis, N., Mitroulia, M.: ESG in business research: A bibliometric analysis. *J. Risk Financ. Manag.* 17(10), 460 (2024). <https://doi.org/10.3390/jrfm17100460>
19. Fahad, P., Nidheesh, K.B.: Determinants of CSR disclosure: Evidence from India. *J. Indian Bus. Res.* 13(1), 110–133 (2021). <https://doi.org/10.1108/JIBR-06-2018-0171>
20. Fahad, P., Rahman, M.P.: Impact of corporate governance on CSR disclosure. *Int. J. Discl. Gov.* 17(2–3), 155–167 (2020). <https://doi.org/10.1057/s41310-020-00082-1>
21. Tyan, J., Liu, S.-C., Fu, J.-Y.: How environmental, social, and governance implementation and structure impact sustainable development goals. *Corp. Soc. Responsib. Environ. Manag.* 31, 3235–3250 (2024). <https://doi.org/10.1002/csr.2721>

22. Samuwai, J., Hills, J.M.: Assessing climate finance readiness in the Asia-Pacific region. *Sustainability* **10**(4), 1192 (2018). <https://doi.org/10.3390/su10041192>
23. Anders, C., Koenning, J., Borges, C.: Report on the project finance readiness assessment tool (2025)
24. Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M.: A primer on partial least squares structural equation modeling (PLS-SEM). Sage, Thousand Oaks (2014)
25. Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M.: When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* **31**(1), 2–24 (2019)

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