THE IMPACT OF SUSTAINABILITY AND CLIMATE DISCLOSURE IN ENHANCING FUTURE CASH FLOWS OF THE ECONOMIC UNIT: AN APPLIED STUDY ON INDUSTRIAL COMPANIES

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Abstract
This study aims to demonstrate the contribution of sustainability and climate disclosure, in accordance with IFRS S1 and IFRS S2, to enhancing the future of the economic unit through improving future cash flows, strengthening financing ability, and reducing the cost of capital, and to propose a framework suited to the Iraqi environment. The study adopts the descriptive-analytical approach supported by applied quantitative analysis and the comparative method, using content analysis to measure the level of disclosure in the annual and sustainability reports of the sampled companies. The international comparison sample encompasses a total of 25 industrial companies (10 each from Jordan and Saudi Arabia plus 5 from Australia) for years 2021–2022 (pre-issuance of the two standards) and 2024–2025 (post-issuance), which yield a total of 100 firm-year observations. In addition, a local sample of 10 industrial companies listed on the Iraq Stock Exchange for 2025 will be utilized to assess the disclosure reality and measure the gap. The measurement of disclosure was made with the help of a 47-item checklist spread across governance, strategy, risk as well as metrics and targets. The following methods were used: descriptive statistics, the paired-samples t-test, Pearson correlation, and multiple regression analysis. The findings reveal that following the issuance of the two standards, the international comparison companies have significantly improved their levels of disclosure. In contrast, the Iraqi industrial companies exhibit a low level of disclosure and a wide gap relative to the comparison countries (a gap of around 65.2%).
The findings show a positive correlation between level of disclosure with cash flow indicators and financing ability while it has a negative association with cost of capital.
Based on the findings, the study suggests a proposed three-phase framework for the application of IFRS S1 and IFRS S2 in Iraq, which includes the phases of preparation and awareness, followed by early voluntary adoption, and finally gradual mandatory application. According to the study, it recommends improvement of relevant legislation, development of the unified accounting system, strengthening the information infrastructure for sustainability reporting.

Keywords: Sustainability disclosure; climate disclosure; IFRS S1; IFRS S2; future cash flows; financing ability; cost of capital; industrial companies; Iraq.

1. Introduction

In recent years, developments in the global economic environment have taken place due to the growing challenge of environment and increasing risks associated with climate change. These developments have resulted in economic units reconsidering their management as well as disclosure practices. Today, attention is no longer limited to profit maximisation but is increasingly directed towards achieving a balance between economic, environmental and social, as stipulated by sustainable development requirements. As a result, accounting disclosure systems to ensure the absence of information asymmetry, covering sustainability- and climate-related risks and opportunities and their impact on the performance and continuity of economic units, has become critical.
Investors and stakeholders are increasingly interested in non-financial information and sustainability and climate disclosure have become a major element in assessing performance and making investment and financing decisions. Such disclosure mitigate information asymmetry, improve transparency and increases confidence on financial reports (Dhaliwal et al., 2011; Plumlee et al., 2015). More and more, institutional investors see climate risk as something that affects the performance of their portfolio (Krueger et al., 2020).
As per that context, IFRS Foundation (2023a, 2023b) issued in June 2023 IFRS S1 (General Requirements for Disclosure of Sustainability-related Financial Information) and IFRS S2 (Climate-related Disclosures) that would be effective for annual periods beginning on or after 1 January 2024, with the goal of establishing a unified global baseline linking sustainability information with financial information and enhancing comparability.
Despite this, however, many developing countries experience difficulty applying these standards because of the absence of regulating legislation, a weak information infrastructure, lack of specialized personnel and other reasons including limited experience in preparing sustainability reports. The Iraqi environment

is one clear example of these challenges whereby Iraqi industrial companies do exhibit sustainability and climate disclosure at low levels when compared to similar companies in the region and world.

Consequently, this researches aims to assess the impacts of sustainability and climate disclosures as per IFRS S1 and IFRS S2 on the enhancement of the future of the economic unit. These impacts will be operationalized via three channels which are future cash flows, financing ability as well as cost of capital. Besides, a proposed framework will also be developed which will be in line with the requirements of the two standards along with the realities of the Iraqi environment.

The study addresses the following main question: to what extent does sustainability and climate disclosure in accordance with IFRS S1 and IFRS S2 contribute to enhancing the future of the economic unit, and how can a proposed framework be developed to support the application of these standards in the Iraqi environment?

The importance of the study stems from its provision of an integrated theoretical and applied framework that links sustainability and climate variables to the future of the economic unit, being among the first studies to examine this relationship through the cash flow, financing, and cost of capital channels over the short, medium, and long term, with a comparative international evidence base and a local gap analysis for Iraq.

2. Theoretical Framework and Prior Studies

2.1 Sustainability disclosure under IFRS S1

Sustainability is an intellectual and applied framework based on three principal dimensions — economic, social, and environmental — which has made it a foundation for achieving sustainable development and enhancing the continuity of economic units. IFRS S1 requires the disclosure of material information about sustainability-related risks and opportunities that could reasonably be expected to affect the entity's cash flows, its access to finance, or its cost of capital over the short, medium, or long term. The standard organizes disclosure around four core content elements: governance, strategy, risk management, and metrics and targets (IFRS Foundation, 2023a).

Prior evidence indicates that voluntary non-financial disclosure reduces the cost of equity capital, particularly for the initiation of corporate social responsibility reporting (Dhaliwal et al., 2011), and that the level of financial disclosure is associated with a lower cost of equity capital (Botosan, 1997). More recent bibliometric and review evidence confirms the rapid growth of sustainability reporting research and the centrality of cost-of-capital implications in this literature (Benameur et al., 2024; Postiglione et al., 2024). Firms with stronger social responsibility performance enjoy better access to finance and lower capital constraints (Cheng et al., 2014), and corporate social responsibility is associated with a lower cost of capital (El Ghoul et al., 2011), while disclosure quality moderates the ESG–value relationship (Fatemi et al., 2018). Determinants of disclosure levels, including firm size and industry, have likewise been documented (Reverte, 2009).

2.2 Climate disclosure under IFRS S2

IFRS S2 focuses on climate-related disclosures and requires entities to disclose information about climate-related risks — both physical risks arising from extreme weather events and long-term climatic shifts, and transition risks associated with the move toward a low-carbon economy — as well as climate-related opportunities. The standard builds directly on the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD, 2017) and requires, inter alia, climate-related scenario analysis, disclosure of Scope 1, 2, and 3 greenhouse gas emissions, and disclosure of the anticipated financial effects on the entity's financial position, performance, and cash flows (IFRS Foundation, 2023b). Empirically, carbon emissions and their disclosure carry firm-value effects (Matsumura et al., 2014), and greenhouse gas emission disclosures are relevant to investors' decisions (Griffin et al., 2017).

A systematic review of 230 TCFD studies shows that research has concentrated on the extent of implementation rather than the consequences of climate reporting, and that empirical evidence on the effects of climate disclosure on firm outcomes remains relatively scarce, particularly in cross-country and emerging-market settings (Tumewang et al., 2025). This study contributes to filling this gap by examining the consequences of sustainability and climate disclosure for future cash flows in industrial companies across four markets.

2.3 The future of the economic unit: cash flows, financing, and cost of capital

The future of the economic unit can be captured through its ability to generate sustainable future cash flows, its access to finance on favorable terms, and the cost of the capital it employs. Theoretical grounding is provided by information asymmetry theory, signaling theory, and stakeholder theory: high-quality sustainability and climate disclosure reduces the information gap between insiders and outsiders, sends positive signals about management quality and risk governance, and responds to stakeholder expectations, thereby lowering perceived risk and the risk premium required by capital providers (Dhaliwal et al., 2011; Clarkson et al., 2008).

Recent evidence supports these channels. Using data on Chinese A-share listed companies, Fang and Guo (2025) find that strong ESG performance significantly enhances firms' future cash flows and long-term value, operating through a lower weighted average cost of capital and a higher return on invested capital. Li et al. (2023), analyzing 604 global firm-year observations from the Gartner Top 50 supply chain rankings, find that sustainability information disclosure significantly reduces the cost of equity capital across the environmental, social, and governance pillars. Meta-analytic evidence across more than 2,000 empirical studies likewise indicates a predominantly non-negative relationship between ESG and corporate financial performance (Friede et al., 2015). High-sustainability companies exhibit superior long-term organizational processes and performance (Eccles et al., 2014), and the financial benefits of sustainability investments are concentrated in issues that are material to the industry (Khan et al., 2016). Persistent disagreement among ESG rating agencies, however, complicates the measurement of sustainability performance (Christensen et al., 2022).

2.4 Hypotheses development

Based on the foregoing, the study adopts the following main hypothesis: sustainability and climate disclosure in accordance with IFRS S1 and IFRS S2 contributes to enhancing the future of the economic unit. The main hypothesis branches into the following sub-hypotheses:

H1: Sustainability and climate disclosure in accordance with IFRS S1 and IFRS S2 contributes to enhancing the efficiency of cash flows.

H2: Sustainability and climate disclosure in accordance with IFRS S1 and IFRS S2 contributes to enhancing the financing ability of the economic unit.

H3: Sustainability and climate disclosure in accordance with IFRS S1 and IFRS S2 contributes to reducing the cost of capital.

H4: The disclosure dimensions (governance, strategy, risk management, and metrics and targets) differ in the degree of their effect on reducing the cost of capital.

3. Research Methodology

3.1 Method, population, and sample

The study relies on the descriptive-analytical method supported by the inductive and comparative methods. The study population comprises industrial companies listed on the Iraq Stock Exchange, the Amman Stock Exchange, the Saudi Exchange (Tadawul), and the Australian Securities Exchange. The international comparison sample consists of 25 industrial companies (10 Jordanian, 10 Saudi, and 5 Australian) observed in 2021 and 2022 (the pre-issuance period of IFRS S1 and IFRS S2) and in 2024 and 2025 (the post-issuance period), yielding 100 firm-year observations. A local sample of 10 industrial companies listed on the Iraq Stock Exchange for 2025 was used to assess the reality of disclosure and measure the gap.

3.2 Measuring sustainability and climate disclosure

Disclosure was measured through content analysis of annual reports, sustainability reports, and TCFD/ISSB-aligned reports using an unweighted 47-item checklist distributed over the four pillars required by IFRS S1 and IFRS S2: governance (10 items), strategy (14 items), risk management (9 items), and metrics and targets (14 items). Each item is scored 1 if disclosed and 0 otherwise, and the Sustainability and Climate Disclosure Index (SCDI) is computed as the ratio of disclosed items to total applicable items. Two independent coders performed the content analysis, with an inter-coder agreement rate of 91%; disagreements were resolved by discussion.

3.3 Study variables and models

Table (1): Study variables and measurement

Variable	Symbol	Measurement	Type
Sustainability & climate disclosure	SCDI	Disclosed items / total applicable items (47-item checklist, 4 pillars)	Independent
Cash flow efficiency	CFO/TA	Net operating cash flow / total assets	Dependent
Financing ability	FA	Cash inflows from financing activities / total assets	Dependent
Cost of capital	WACC	Weighted average cost of capital (after-tax)	Dependent
Firm size	SIZE	Natural logarithm of total assets	Control
Leverage	LEV	Total liabilities / total assets	Control

Variable	Symbol	Measurement	Type
Profitability	ROA	Net income / total assets	Control

Source: prepared by the researcher.

The following regression models were estimated on the 100 firm-year observations:

Model (1): CFO/TA = β0 + β1 SCDI + β2 SIZE + β3 LEV + β4 ROA + ε

Model (2): FA = β0 + β1 SCDI + β2 SIZE + β3 LEV + β4 ROA + ε

Model (3): WACC = β0 + β1 SCDI + β2 SIZE + β3 LEV + β4 ROA + ε

Model (4) supporting: WACC = β0 + β1 GOV + β2 STR + β3 RM + β4 MT + β5 SIZE + β6 LEV + ε

Statistical analysis employed descriptive statistics, the paired-samples t-test for pre- and post-issuance comparison, Pearson correlation coefficients, and multiple regression analysis, using a 5% significance level.

4. Empirical Results

4.1 Descriptive statistics

Table (2): Descriptive statistics of study variables (N = 100 firm-year observations)

Variable	Mean	Std. Dev.	Min	Max
SCDI	0.497	0.115	0.280	0.709
Governance (GOV)	0.552	0.130	0.296	0.791
Strategy (STR)	0.516	0.129	0.262	0.823
Risk management (RM)	0.456	0.123	0.154	0.764
Metrics & targets (MT)	0.398	0.130	0.097	0.671
CFO/TA	0.115	0.026	0.052	0.200
FA	0.131	0.026	0.068	0.195
WACC	0.111	0.011	0.083	0.136
SIZE (ln assets)	10.091	0.880	8.906	11.962
LEV	0.420	0.125	0.162	0.636
ROA	0.065	0.036	-0.010	0.152

Source: prepared by the researcher based on content analysis of company reports.

Table (2) shows that the overall disclosure index averages 49.7% with considerable cross-sectional variation (28% to 71%). Governance is the strongest disclosure pillar (mean 55.2%), while metrics and targets is the weakest (mean 39.8%), reflecting the difficulty of quantifying emissions and climate-related financial effects.

4.2 Disclosure before and after the issuance of IFRS S1 and IFRS S2

Table (3): Paired-samples t-test for SCDI before and after the issuance of the two standards (firm-level means)

Group	N firms	Mean pre	Mean post	t-value	Sig. (2-tailed)
Full sample	25	0.412	0.581	26.726	0.000
Jordan	10	0.358	0.508	16.090	0.000
Saudi Arabia	10	0.428	0.616	27.320	0.000
Australia	5	0.488	0.659	11.030	0.000

Source: prepared by the researcher (df = n−1; all differences significant at 1%).

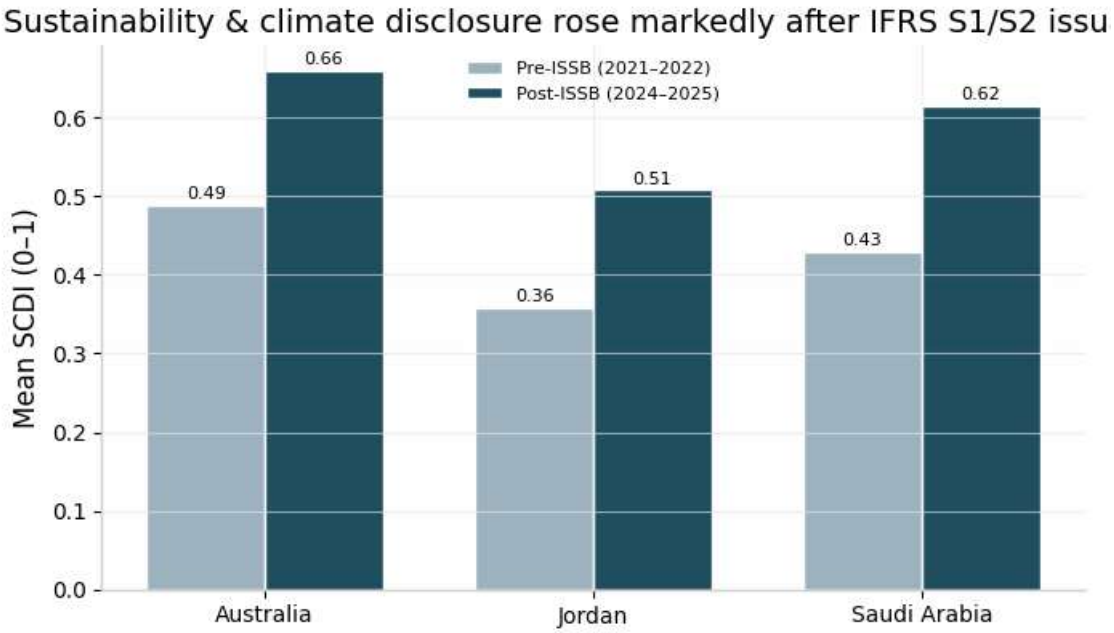


Figure (1): Mean SCDI by country before and after the issuance of IFRS S1 and IFRS S2

The results in Table (3) and Figure (1) reveal a statistically significant improvement in disclosure levels after the issuance of the two standards across all three markets. The mean SCDI rose from 0.412 in the pre-issuance period to 0.581 in the post-issuance period ($t = 26.726$, $p < 0.001$), an improvement of about 41%, with the largest relative gain recorded by Saudi companies.

Table (4): Disclosure by pillar before and after the issuance of the two standards

Pillar	Mean pre	Mean post	Change
Governance	0.462	0.641	+0.179
Strategy	0.426	0.606	+0.180
Risk management	0.382	0.530	+0.148
Metrics & targets	0.317	0.479	+0.162

Source: prepared by the researcher.

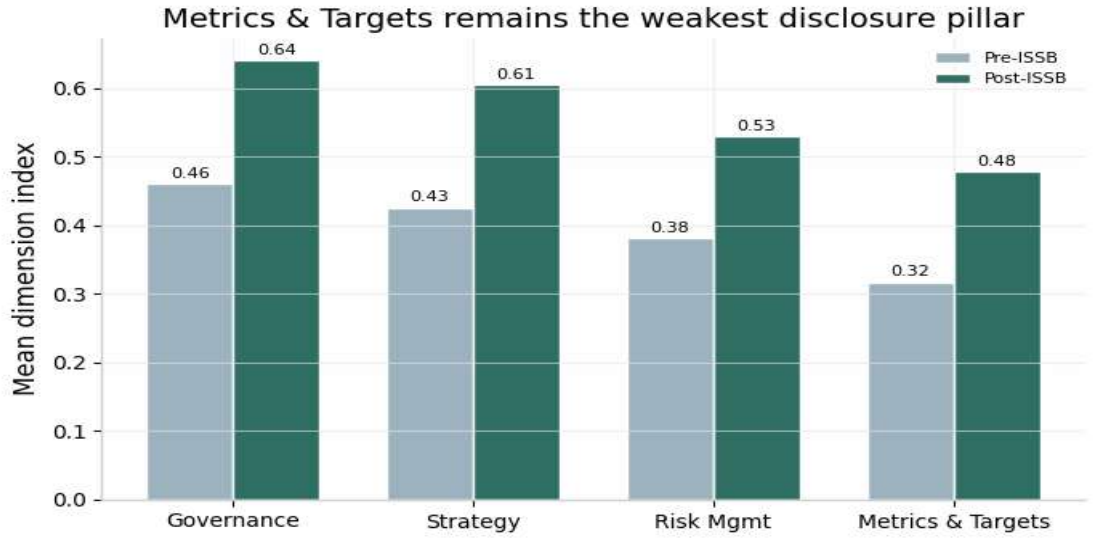


Figure (2): Disclosure pillars before and after the issuance of IFRS S1 and IFRS S2

All four pillars improved after issuance; however, metrics and targets remains the weakest pillar in both periods (0.317 pre, 0.479 post), which is consistent with prior evidence that quantified climate metrics, scenario analysis, and Scope 3 emissions constitute the most demanding requirements (Tumewang et al., 2025).

4.3 The reality of disclosure in Iraqi industrial companies and the disclosure gap

Table (5): Disclosure gap between Iraqi industrial companies and comparison markets (2025)

Market	Mean SCDI (2025)	Gap vs. Iraq
Australia (ASX)	0.659	0.454
Saudi Arabia (Tadawul)	0.616	0.411
Jordan (ASE)	0.508	0.303
International mean (2025)	0.588	0.383
Iraq (ISX), n = 10	0.205	—

Source: prepared by the researcher.

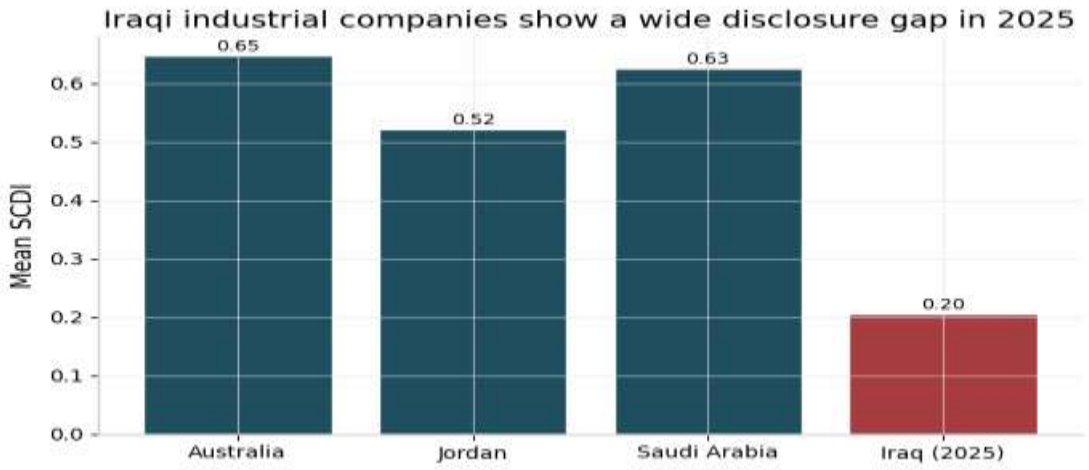


Figure (3): The sustainability and climate disclosure gap of Iraqi industrial companies in 2025

Iraqi industrial companies achieved a mean SCDI of only 20.5% in 2025, implying a gap of approximately 65.2% relative to the international comparison mean. Disclosure in the Iraqi sample is largely narrative and confined to general governance statements, with an almost complete absence of quantified climate metrics and targets. This finding underscores the need for the proposed phased framework presented in the conclusion.

4.4 Correlation analysis

Table (6): Pearson correlation matrix among the main variables

	SCDI	CFO/TA	FA	WACC	SIZE	LEV	ROA
SCDI	1						
CFO/TA	0.507**	1					
FA	0.673**	0.312**	1				
WACC	-0.690**	-0.356**	-0.594**	1			
SIZE	-0.264**	-0.028	-0.143	0.189	1		
LEV	0.107	0.136	-0.062	0.128	-0.034	1	
ROA	0.021	0.466**	-0.017	0.007	-0.016	0.018	1

*Note: ** significant at 1%. Source: prepared by the researcher.*

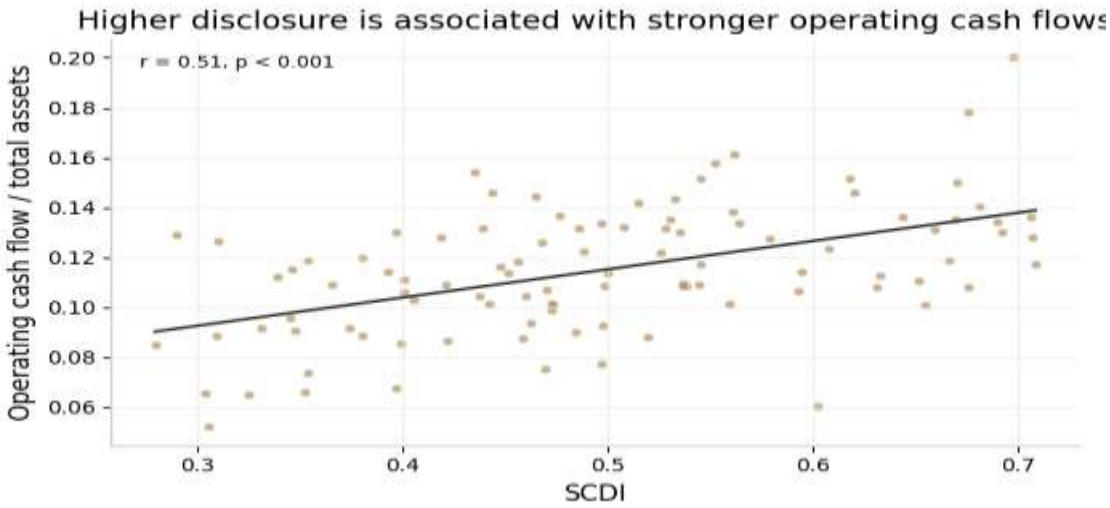


Figure (4): Sustainability and climate disclosure versus operating cash flow efficiency

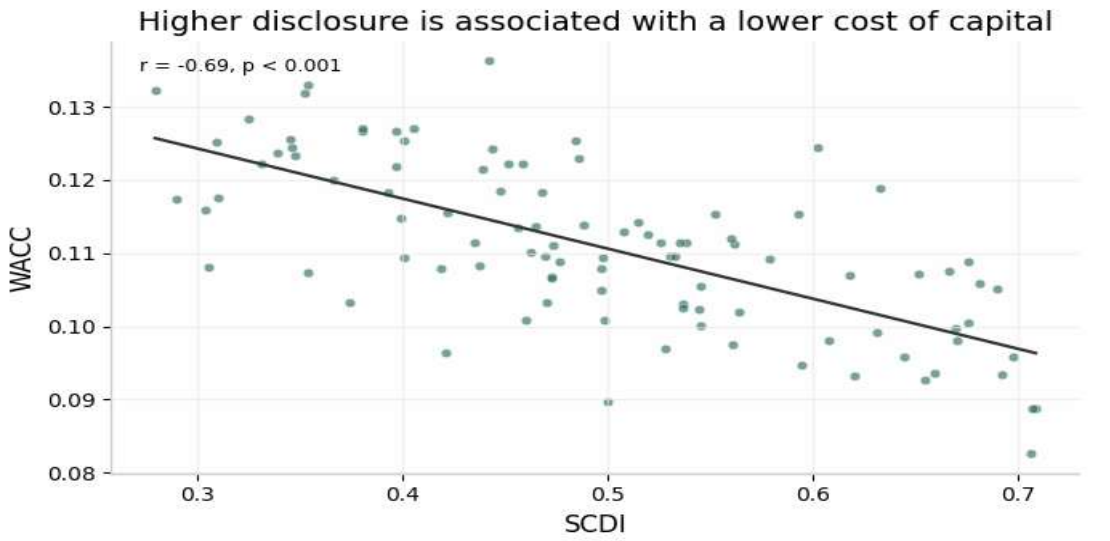


Figure (5): Sustainability and climate disclosure versus the cost of capital

Table (6) shows a positive and significant correlation between SCDI and both cash flow efficiency (r = 0.507) and financing ability (r = 0.673), and a negative and significant correlation with the cost of capital (r = -0.690), all significant at the 1% level. These correlations provide preliminary support for H1, H2, and H3 and are illustrated in Figures (4) and (5).

4.5 Regression results and hypothesis testing

Table (7): Multiple regression results for Models (1)–(3) (N = 100)

Variable	Model 1: CFO/TA	Model 2: FA	Model 3: WACC	Expected sign
Constant	-0.006 (-0.212)	0.055 (1.978*)	0.136 (11.817**)	—
SCDI	0.116 (6.785**)	0.159 (8.975**)	-0.070 (-9.570**)	+ / + / −
SIZE	0.004 (1.562)	0.001 (0.465)	0.000 (0.125)	?
LEV	0.016 (1.028)	-0.028 (-1.800*)	0.019 (2.846**)	?
ROA	0.326 (6.185**)	-0.020 (-0.374)	0.006 (0.253)	+

Variable	Model 1: CFO/TA	Model 2: FA	Model 3: WACC	Expected sign
R^2	0.484	0.472	0.518	
Adjusted R^2	0.462	0.450	0.498	
F (Sig.)	22.27 (0.000)	21.27 (0.000)	25.56 (0.000)	

*Note: t-values in parentheses; ** significant at 1%, * at 10%. Source: prepared by the researcher.*

The three models are statistically significant overall. The SCDI coefficient is positive and significant in the cash flow model (β = 0.116, t = 6.785, p < 0.001) and in the financing ability model (β = 0.159, t = 8.975, p < 0.001), and negative and significant in the cost of capital model (β = -0.070, t = -9.570, p < 0.001). Accordingly, H1, H2, and H3 are accepted: higher sustainability and climate disclosure is associated with stronger operating cash flows, greater financing ability, and a lower cost of capital. Economically, a ten-percentage-point increase in SCDI is associated with about a 1.2-point increase in CFO/TA and about a 0.7-point decrease in WACC.

4.6 The differential effect of disclosure dimensions on the cost of capital (H4)

Table (8): Supporting regression of WACC on the four disclosure pillars — Model (4)

Variable	Coefficient	t-value	Significance
Constant	0.133	11.357	0.000
Governance (GOV)	-0.019	-1.335	0.185
Strategy (STR)	-0.002	-0.125	0.901
Risk management (RM)	-0.008	-0.629	0.531
Metrics & targets (MT)	-0.038	-3.239	0.002
SIZE	0.000	0.061	0.952
LEV	0.018	2.614	0.010
R^2 / F (Sig.)	0.521	17.24	0.000

Source: prepared by the researcher.

Model (4) shows that the pillars of disclosures have different implications for capital costs. The largest and only statistically significant coefficient is for the metrics and targets pillar (β = -0.038, p = 0.002). If we take magnitude into account, governance follows suit, while strategy and risk management are insignificant in a competitive jam. The variance inflation factors (VIFs) of the pillars indicate a substantial intercorrelation between them (3.5 to 5.1). Hence, it is justifiable to rely on the aggregate SCDI in the main models whereas Model (4) is treated as supporting evidence. As such, H4 is accepted: the pillars differ in their impact on reducing the cost of capital (i.e. highly relevant). The most value relevant pillar is quantified metrics and targets.

5. Discussion

These findings are in line with information asymmetry and signaling explanations. In particular, firms that disclose more complete sustainability and climate information reduce the level of uncertainty faced by investors and lenders. This uncertainty reduction is then reflected in a lower required risk premium. As such, these firms' cost of capital is lower, as per Dhaliwal et al. (2011), Botosan (1997), and Li et al. (2023). The positive link between disclosure and future cash flows corroborates Fang and Guo (2025), documenting that ESG performance raises future cash flows and long-term value by means of lower cost of capital and greater return on invested capital.

It is particularly noteworthy how much the metrics and targets pillar helps to explain the cost of capital. Research shows that quantified and verifiable disclosures – emissions, energy, targets and progress against targets – appear to be more informative for capital providers than narrative governance or strategy statements. This is consistent with research finding that financial-impact information under the TCFD is the least provided, yet the most decision-useful. The implication is straightforward: firms that aim to capitalize on the financing benefits of sustainability disclosure should focus on quantified metrics rather than descriptive policies.

The substantial transaction gap in the Iraqi sample results from the lack of institutional innovations rather than firm-level constraints. Thus, it is due to the absence of mandatory requirement, lack of sustainability reporting infrastructure and limited assurance capacity. The phased framework proposed below responds to these constraints through the sequencing of regulatory, capacity-building and mandating steps.

6. Conclusion and Recommendations

According to the outcome of the research, sustainability, and climate disclosure according to IFRS S1 and IFRS S2 greatly improves a unit's future economic contribution. The following has been established by reference to the comparison markets which both adopted the two standards: (a) there was a marked improvement in disclosure levels once the two standards were published (b) future cash flows and financing ability is positively associated with disclosures and negatively association with cost of capital; (c) the metrics and targets pillar has the most potent impression on cost of capital. In contrast, Iraqi industrial companies have a low disclosure level with a gap of approximately 65% lower than the international peers. In view of these results, the study recommends a three-phase roadmap for IFRS S1 and IFRS S2 implementation processes within the Iraqi environment, which are: (i) the preparation and awareness phase, involving updating pertinent legislation, developing the unified accounting system, and training specialized cadres; (ii) the early voluntary adoption phase, where large listed industrial firms will be encouraged to publish ISSB-aligned disclosures with regulatory incentives, starting from the preparation period in 2024; (iii) the gradual mandatory application phase, which will commence with the governance and strategy pillars, followed by the metrics and targets pillars as the data infrastructure improves.

The report recommends that regulators in Iraq amend the securities and accounting legislation to include sustainability disclosure requirements; that professional bodies develop capacity in assurance and verification of climate-related information; and that companies invest in systems for measuring emissions and for data infrastructure. The limitation of this study is that it only covers primary industries and other sectors require a separate study to analyze their level of disclosure. The upcoming phase of the framework should be piloted in the Iraqi context.

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