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BEYOND COMPLIANCE: THE FINANCIAL PAYOFF OF SUSTAINABILITY DISCLOSURE AND GREEN MARKETING IN UNIVERSITIES

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Abstract. This study investigates when and how sustainability disclosure in higher education translates into superior financial performance, and whether green marketing initiatives strengthen that relationship. Drawing on a multi-country panel of Middle Eastern universities covering the period (2014–2024), the analysis develops a disclosure index aligned with the Global Reporting Initiative (GRI). Green marketing intensity is coded from verifiable institutional communications, while financial performance is assessed through operating outcomes and revenue-related indicators. Using panel regression models and complementary dynamic specifications, supported by thorough diagnostic and robustness checks, the results indicate a clear positive association between disclosure quality and financial performance, a separate positive association for green marketing, and, most importantly, a reinforcing interaction whereby credible, consistent green communication amplifies the financial payoff of disclosure. The study recommends that universities move beyond compliance reporting toward communicative integration for value: align disclosure with recognized standards, anchor messages in verifiable evidence, coordinate disclosure and marketing functions, and monitor communication outcomes related to enrolment, partnerships, and funding. The findings offer actionable guidance for leaders and policymakers seeking to couple sustainability commitments with sound financial stewardship in an increasingly competitive academic landscape.

Keywords: sustainability disclosure, green marketing initiatives, financial performance, higher education institutions, stakeholder theory, signaling theory, institutional theory.

JEL Classification: M14, M31, M41, Q56, C23.

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1. Introduction

Higher education institutions in the Middle East are facing increasing financial pressures (Atoum et al., 2024). Increasing competition for prospective students and funding constraints limit the expansion of financial resources for many higher education institutions (Jaafar et al., 2023). Simultaneously, government funding is diminishing, as are the associated costs of transitioning to a green economy and integrating technologies into the higher education system, thereby narrowing financial margins (Yaakub & Mohamed, 2020; Muneer et al., 2025). In the context of stakeholder analysis, financial performance remains an essential indicator of an institution's credibility and effectiveness in maintaining its role in society as an edu-

cational institution (Santos et al., 2020). Given the challenges higher education faces in advancing socio-economic development in community settings, the socio-cultural acceptability of the activities undertaken by institutions of higher education remains an essential factor influencing contemporary success factors in the current socio-economic context (Purevsuren et al., 2025). Generally, in this current analysis of higher education in today's socio-economic conditions, there is overwhelming evidence from previous scientific investigations to propose that reputation and trust remain a crucial fundamental aspect for influencing the financial performance of many institutions of higher education in today's socio-economic conditions (Gündüz & Gündüz, 2025).

Good sustainability reporting by universities should go beyond click compliance activity (Alshaketheep et al., 2024; Nicolò et al., 2023). When data is provided through the four categories, proper performance comparison, analysis, and monitoring are achievable (Moggi, 2023). Economically, providing adequate information on resource efficiency and sustainable value can justify funding, but poor data provision can attract increasing scrutiny and funding woes (Sassen & Azizi, 2018). Socially, by providing information on equity, inclusion, working conditions, and community engagement, an institution communicates its approach to distribution-related issues. Excluding these sections can affect legitimacy and attract students (Son-Turan & Lambrechts, 2019). When providing data on emissions, waste, and resource use, universities demonstrate current perceptions of future potential costs of climate change, rather than a green reputation (Moggi, 2023).

Governance reporting on transparency, integrity, and accountability helps mitigate the risks posed by distrustful management practices and greenwashing, thereby enhancing the credibility of leadership in high-value funding partnerships and commitments (Alrawashedh et al., 2025). Purposefully planned integrated reporting can therefore shift sustainability reporting from a merely "tick-box exercise" to one that yields reputation-building, thereby strengthening the entire higher education system's competitive position (Nicolò et al., 2023). However, one needs to keep in mind that the message conveyed through reporting must accompany effective green marketing campaigns that repackage the results in a stakeholder-centric and straightforward form (Yoon et al., 2025). Campaigns aimed at promoting the best practices associated with programs, campus, and green research are effective in helping the students and employees understand the good practices related to the programs they are looking for in the best possible manner, thus setting the criteria that they are looking for within the context of college selection (Sahibzada et al., 2025). Now comes the whole concept of integrating disclosure reporting on the topic of sustainability along with green marketing, aimed explicitly at communicating the accomplishments associated with the former market position in the market-stakeholder space.

The extent of sustainability disclosure has an impact on financial performance in relation to stakeholder and institutional behavior and signaling activities (Hussien et al., 2025a; Ramírez et al., 2025). Disclosures that are reflective and trustworthy address knowledge gaps and reassure funders that their funds are well spent (Nicolò et al., 2023; Nguyen & Duong, 2025). Social and environmental disclosure sends a signal for social responsibility and shapes individual and organizational behavior in response to students, partners, and other people in the community (Yoon et al., 2025; Hussien et al., 2025b). Disclosures regarding governance, commitment, accounting, and integrity help mitigate opportunistic behavior and enhance stability (Xie et al., 2019). Green marketing further improves this signal by issuing clear and simple messages about success (del Mar Alonso-Almeida et al., 2015). The existence of firm theoretical foundations is justified by a few empirical works in Middle Eastern universities (Atoum et al., 2024).

Empirical research that tackles the set of economic, social, environmental, and governance aspects in universities, especially regarding their financial performance, has actually remained somewhat scarce to date (Ramírez et al., 2025; Trireksani et al., 2021), especially in developing countries, where the institutional structure, the set of stakeholders involved, and the form of information released differ from those in more successful economies (Ali et al., 2025). Moreover, the extent to which integrated sustainability disclosure and financial performance are related to each other, and the role of green marketing activities in the Middle East, remains unknown to a large extent (Ali et al., 2025; Ramírez et al., 2025). Green marketing activities have actually remained barely conceptualized, if at all, in extant literature as specific independent and moderating variables, especially regarding the integrated model described above (Kotula & Małagocka, 2025; Sahibzada et al., 2025). Sometimes, green marketing activities are conceptualized independently of the relationship between integrated sustainability disclosure and financial performance, particularly regarding the role of these efforts in acquiring additional infrastructure to enhance universities' reputations (Kotula & Małagocka, 2025; Sahibzada et al., 2025). A significant research gap, therefore, exists concerning the impact of the integrated role of sustainability disclosure and green marketing in building the financial performance of universities.

This study is novel in at least three respects. First, it develops an integrated composite index of sustainability disclosure quality for universities, aligned with GRI-based economic, social, environmental, and governance dimensions (Ramírez et al., 2025; Trireksani et al., 2021). Second, it models green marketing initiatives both as an independent driver of financial performance and as a moderator of the relationship between sustainability disclosure performance and financial performance in Middle Eastern higher education, including Jordan. Third, the study uses multi-country panel data on universities between 2014 and 2024 and applies panel data techniques and the generalized method of moments (GMM) estimators to address endogeneity in the model of financial performance. Grounded in an integrative theoretical model drawing on the stakeholder, signaling, and institutional approaches, the method is developed in the following section. In this context, the paper examines the relationship between the quality of sustainability disclosure and financial performance in universities in Jordan, and the role of green marketing in strengthening this relationship.

The rest of the paper is structured as follows. The following section will discuss the theoretical background and the hypotheses developed in this research study. The subsequent section will discuss the research methodology employed in this research study, while the results will be presented and discussed in the following sections in relation to the theoretical underpinnings of this research study and the relevant theoretical and research literature. The final section concludes the paper by highlighting the main implications, limitations, and avenues for future research.

2. Theoretical background

Stakeholder theory is the prevailing paradigm within which we interpret the context of higher education (Trireksani et al., 2021). The simultaneous meeting of the various social, economic, and cultural missions generates a complexity of demands emerging from students, employees, funders, authorities, and local communities toward universities (Ali et al., 2025). Under this, the importance of transparency in the disclosure of sustainability is critical in that it also relates to our treatment of stakeholder relationships in that it conveys our responsiveness to their demands and our readiness to be accountable to their demands (Alodat & Hao, 2025).

Those universities that provide disclosure on their sustainability matters indicate their handling of scarce resources in their attempt to pursue legitimacy and keep a good reputation with various powerful groups (del Mar Alonso-Almeida et al., 2015). We extend this reasoning to green marketing in that the efforts on sustainability are communicated in a way that is interpretable and appreciable to various groups of stakeholders (Deek et al., 2025). With this in view, the three hypotheses that follow are formulated to depend largely on the perspective of stakeholders on the importance of disclosure about their various sustainability matters leading to the aspect of green marketing that creates value to universities and their supporters.

Signaling theory details the central view by elaborating on how and why it is that what universities disclose and how they talk about it results in real market signals being generated (Alodat et al., 2025; Connelly et al., 2011). When a university issues high-quality sustainability reports, it sends out truly positive signals of its commitment to managing environmental and social risks and optimizing resources, therefore allowing the external audience to bridge information gaps in their understanding (Nicolò et al., 2023). In green marketing, advancements in sustainability are woven into narratives that are meaningful to students, parents, policymakers, and the international community. Institutional theory sheds further light on the rationale for the disclosure of information by universities. Factors like regulatory frameworks, accreditation, rankings, and funding play a critical role in the focus of the information disclosed, especially in developing markets and in the Middle East (Sharma & McLean, 2025; Trireksani et al., 2021). At the same time, the combination of the lens of signaling theory and the lens of institutional theory adds depth to the stakeholder-centric approach by shedding further light on the significance of sustainability reporting and green marketing in the way that daily practices are made into noticeable signals and the power of the signals in influencing universities.

3. Hypothesis development

3.1. Sustainability disclosure and financial performance

Sustainability disclosures play a vital role in the way universities interact with stakeholders (Ramírez et al., 2025). From the stakeholders' perspective, the main stakeholders are concerned with the level of transparency in the sustainability performance data and the way in which the universities are able to efficiently utilize the available resources (Alodat et al., 2024). Sustainability disclosures are a way of showing the stakeholders that the university is responsive to their concerns and is committed to accountability (Muneer et al., 2025). From the agency perspective, the level of transparency in the sustainability metrics is a way of minimizing the agency costs between the managers and the stakeholders (Ali et al., 2025). In this way, the universities are able to efficiently allocate the resources, and this will eventually lead to positive financial outcomes in the future (Hussain et al., 2018; Saeed et al., 2025).

Each aspect of sustainability disclosure also provides a new avenue through which financial performance can be positively affected. Economic disclosures provide stakeholders with a very clear image of how prudent the implementation of finance and sound choices of investment decisions have been made by a fund-seeker, instilling confidence that there will be further continued support (Ahmad et al., 2025). In turn, social disclosures look upon working conditions, student welfare provisions, and community engagement, signifying genuine concern for both internal and external communities and raising the social legitimacy and moral support of the institution (Ramírez et al., 2025; Alodat et al., 2022; Muneer et al., 2025).

Environmental disclosures now encompass emissions, energy use, waste management, and conservation activities, with an emphasis on how such efforts are crucial for effective long-term risk and cost management, and the attraction of partners and funders with a priority on sustainability (Hussain et al., 2018; Saeed et al., 2025; Gündüz & Gündüz, 2025). Governance disclosures outline governance structures, control systems, and monitoring mechanisms, reinforcing perceptions of accountability and integrity and facilitating easier access to external financing and collaboration opportunities with greater ease (Ahmad et al., 2025; Rahi et al., 2022).

Empirical studies often note that stakeholders drive value. At the company level, many findings indicate that sharing sustainability or ESG information is positively related to financial performance, particularly where there is good governance and effective board oversight (Hussain et al., 2018; Saeed et al., 2025). In higher education, more recent evidence points to clearer reporting on economic and environmental progress, which is associated with improved financial outcomes and credibility with funders and regulators (Sharma & McLean, 2025). Emerging market research suggests that sustainability disclosure facilitates linkages between governance quality and firm performance through this channel of value creation (Rahi et al., 2022). Institutional theory further suggests that integrated disclosure is already becoming the norm as normative and regulatory imperatives encourage universities to converge toward internationally accepted reporting practices to sustain legitimacy and competitiveness (Saeed et al., 2025).

In our region, universities rely heavily on tuition revenue when meager public funding and the struggle to achieve international rankings and attract external grants make the going tough. All that combination makes financial credibility and legitimacy a strategic imperative (Ali et al., 2025). Stakeholder and signaling perspectives alike would, therefore, suggest that enhancing sustainability disclosure is associated with improved financial performance, as clearer evidence of performance generally tends to attract confidence, support, and funds flows (Muneer et al., 2025). Accordingly, we hypothesize:

H1: The quality of sustainability disclosure is positively associated with universities' financial performance.

3.2. Green marketing initiatives and financial performance

Green marketing seeks to articulate and highlight the sustainability efforts of the university for outsiders. Green marketing, from a stakeholder perspective, ensures that the image of the university aligns with environmental and social values, which are currently being used by students, parents, and benefactors to make decisions regarding their support of the university (Kotula & Małagocka, 2025; Ham & Lee, 2011; Al-Ahmed et al., 2025). When the marketing efforts focus on specific actions on campus, rather than slogans, it is easier to evaluate whether sustainability is really integrated into the mission of the university (Kotula & Małagocka, 2025; Flórez-Parra et al., 2021). Green marketing programs make the message of sustainability more transparent, removing any confusion regarding greenwashing, making it more trustworthy, and more financially relevant (Connelly et al., 2011; Sahibzada et al., 2025).

The empirical research in services and education suggests that green positioning is associated with improved reputation, as well as higher satisfaction and loyalty of stakeholders, all of which are important factors for improved financial performance (Ham & Lee, 2011; Flórez-Parra et al., 2021; Sahibzada et al., 2025). More recent research suggests that higher

education institutions using green positioning and supporting it with concrete and visible actions are more likely to attract sustainability-oriented stakeholders (Kotula & Małagocka, 2025; Al-Ahmed et al., 2025). Considering the higher education context in the Middle East, where higher education programs are often similar, and the competition for both regional and international students is extremely high, differentiation is likely to result in higher enrollment rates, external funding, and more advantageous partnerships (Ali et al., 2025; Ramírez et al., 2025). Therefore, we believe that green marketing efforts are positively associated with universities' financial performance. Accordingly, we hypothesize:

H2: Green marketing initiatives are positively associated with universities' financial performance.

3.3. The moderating role of green marketing initiatives in the relationship between sustainability disclosure and financial performance

Good sustainability reporting helps to identify the manner in which the university considers environmental, social, and governance issues. This bridges the information gap and creates value when the relevant stakeholders identify and understand the information (Pham et al., 2021; Flórez-Parra et al., 2021). The value, however, will depend on whether the students, parents, funders, and partners identify the disclosure, consider the credibility of the information credible, and act accordingly (Flórez-Parra et al., 2021). This is the area in which the role of green marketing is seen, as it serves to amplify the information provided through the frequent communication of the university's sustainability success stories (Chen, 2010; Kotula & Małagocka, 2025). In accordance with the signaling theory, the signal is deemed to function properly when it is transparent, frequent, inexpensive to convey, and credible. Deliberate green campaigns improve the signal for sustainability, diminish information asymmetry, and enhance the possibility of securing finance (Saeed et al., 2025). In the case of stakeholders, value is created when the disclosed information is processed by significant stakeholders with communications that highlight the benefits and commitments, as opposed to remaining hidden in technical reports (del Mar Alonso-Almeida et al., 2015). In cases where there is considerable pressure to outperform in terms of sustainability performance metrics, such as in the Middle Eastern higher education sector, the green marketing activities of the university could assume a significant position. This is to translate signals into discernible commitments that attract demand, partnership, and finance, thus directing flows to the university (Ramírez et al., 2025).

Evidence supporting the interaction idea above with data from green marketing research also presents a view wherein environmental messages, if well-integrated and consistent, boost a company's image, foster positive behavioral intentions, and ultimately improve financial performance (Kotula & Małagocka, 2025; Polonsky, 2011). However, although current studies link green marketing with reputation and performance across various industry types, few explicitly test its moderating role on how sustainability disclosure relates to financial performance, particularly in universities and more so in emerging markets and the Middle East. Accordingly, we hypothesize:

H3: Green marketing initiatives strengthen the positive relationship between the quality of sustainability disclosure and universities' financial performance.

The following is Figure 1, which illustrates the conceptual model.

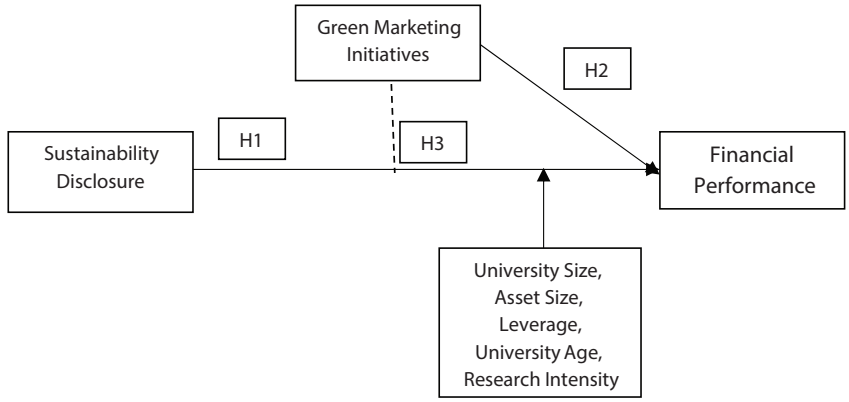

Figure 1. The conceptual model

4. Method

4.1. Sample and data sources

This study adopted a quantitative approach using secondary data from official annual and sustainability reports, as well as financial data and promotional activities published on the universities' official websites and verified social media accounts. The study covered the period (2014–2024), providing panel data that allowed for the analysis of relationships between variables. The study population included all universities in eight Middle Eastern countries (Jordan, Saudi Arabia, the UAE, Bahrain, the Sultanate of Oman, Egypt, Kuwait, and Iraq), totaling 422 universities (241 private and 181 public). Based on the following criteria (availability of annual/sustainability reports, availability of published financial data, presence of documented green marketing activities during the period 2014–2024), the intentional enumeration method was adopted to select the study sample, ensuring that it included all universities that met the previous criteria. According to the statistical sample size calculations at a 95% confidence level and a margin of error (5%), the standard size reached 273 universities distributed as follows (149 private, 124 governmental), which covers the minimum required in terms of statistical power. Accordingly, the number of observations reached (11*273 = 3003 observations).

4.2. Variable definitions

To operationalize the concept of sustainability disclosure, we developed a composite quality index based on the GRI 2021 standards. Using a systematic content analysis method, each item was scored as 0 (absence of disclosure) or 1 (presence of disclosure). The disclosure rate was calculated as the proportion of items disclosed relative to the total known items. To assess the index's reliability, internal consistency was assessed using Cronbach's alpha. The results indicated an alpha coefficient of 0.81, which exceeds the required minimum standard threshold of 0.70, thereby satisfying the internal consistency requirement for the disclosure process. To validate the results based on the index items' relevance and generality to the concept the index represents, the items were reviewed by academic professionals involved in disclosure and sustainability processes. Construct validity was again confirmed by comparing the required disclosure dimension factors with the GRI framework factors, which comprise the four aspects identified in the aforementioned studies.

The moderator's emphasis on green marketing initiatives (GMI) was measured using a six-item scale adapted from Peattie and Crane (2005) and Leonidou et al. (2013). The items include environmental media campaigns, green research promotion, student ecological initiatives, and sustainable infrastructure marketing. Every university was given 1 point for every implemented item, giving a score of 0-6 points corresponding to the actual items implemented. The approach used in this study is consistent with recent studies on green marketing initiatives that improve institutional reputation and unlock resources (Kotula & Małagocka, 2025; Sahibzada et al., 2025). Worth noting is the fact that this approach has been relatively objective, with ease of conversion to an index score of 0–1.

The dependent variable, Financial Performance (FP), is constructed as a combined z-score that integrates three commonly used metrics: return on assets, operating profit margin, and revenue growth. Each of these metrics is converted to a z-score to normalize across units. In turn, the average of the z-score metrics is used to calculate the value of the combined variable. This method of measuring the dependent variable aligns with the proposals of other researchers (Nguyen & Duong, 2025) and with the existing literature (Hussain et al., 2018).

Additionally, as proposed in the existing literature (Ali et al., 2025; Trireksani et al., 2021), a series of additional observables could influence the relationship under study. These are university size (LOGSTUD; natural logarithm of the number of students enrolled), asset size (LNTA; natural logarithm of fixed assets), leverage (LEV; ratio of total liabilities to total assets), university age (AGE; number of years since founding up to the study year), and research intensity (SFR; ratio of R&D expense to total expense).

4.3. Econometrics model and methodology

We estimate a moderation regression to test whether green marketing initiatives strengthen the link between sustainability disclosure quality and universities' financial performance, modeling the interaction between disclosure and green marketing alongside standard controls and fixed effects:

Model 1:

$$FP_{i,\,t} = \beta_0 + \beta_1 SDI_{i,t} + \varepsilon_{i,t}; \tag{1}$$

Model 2:

$$FP_{i,\,t} = \beta_0 + \beta_1 SDI_{i,t} + \beta_2\, AGE_{i,t} + \beta_3\, SIZE_{i,t} + \beta_4\, LNTA_{i,t} + \beta_5\, LEV_{i,t} + \beta_6\, SFR_{i,t} + \varepsilon_{i,t}; \tag{2}$$

Model 3:

$$\begin{aligned} FP_{i,\,t} = {} & \beta_0 + \beta_1 SDI_{i,t} + \beta_2\, GMI_{i,t} + \beta_3\, SDI\_GMI_{i,t} + \beta_4\, AGE_{i,t} + \\ & \beta_5\, SIZE_{i,t} + \beta_6\, LNTA_{i,t} + \beta_6\, LEV_{i,t} + \beta_6\, SFR_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

where: $SDI\_GMI_{i,\,t}$; the interaction between green marketing initiatives and quality of sustainability disclosure for the university i in the year t; β_0; constant coefficient in regression models; $\beta_1 - \beta_8$; Regression Model Coefficients; $\varepsilon_{i,t}$; random Error for the university i in the year t.

A panel dataset of universities by year was created, and analysis was performed in EViews. Regressions with fixed effects, random effects, and cluster-robust standard errors were estimated, and the model choice was based on the results of the Hausman and Breusch-Pagan LM tests to determine which model best fit the data. Given the possibility of reverse causality

between disclosure/marketing and financial outcomes, and because the model required the addition of the dependent variable from the previous period, the GMM method for dynamic panels was used. The model addresses remaining heterogeneity and dynamics, reduces endogeneity through internal instrumenting using lagged variables, and assesses the validity of the instruments using the Hansen/Sargan J-test. Tests involved the use of the model to check for the stability and stationarity of the variables, the use of the test by Pesaran to test for the cross-section dependence among the variables, the test using the Sargan statistic to check the validity of the instrument due to the GMM model, and the VIF test for multicollinearity among the variables.

5. Results and discussion

5.1. Summary statistics and correlation matrix

Table 1: Descriptive statistics

The descriptive statistics in Table 1 indicate significant variability across the variables, with 3,003 observations, further supporting the validity of the results. The Social Disclosure Index (SDI) had a mean of approximately 1.00, a median of 1.008, and a standard deviation of 0.572, indicating variability in information disclosure across universities. A further observation indicates that Green Marketing Intensity (GMI) had a mean of 3.019 and a standard deviation of 1.748, suggesting variability in the greening of marketing activities across institutions. Financial Performance (FP), with a mean of 2.325 and a standard deviation of 1.886, was used to test the significance of the variables. Based on the results of the tests for normality, it is evident that the majority of the variables do not support normality, as their p-values are approximately 0.000, except for variable SIZE, where normality cannot be rejected, and AGE, where significance is detected at a less stringent level than 0.05, i.e., 0.014. Methodologically, and concerning their implications, it is worth noting that the application of robust estimation methods is appropriate, whereas regarding heteroskedasticity, it is worth noting that it is not an issue, as long as post-estimation tests are performed, satisfying the conditions for stationarity.

Table 1. Descriptive statistics

	FP	GMI	SDI	LEV	SFR	SIZE	AGE	LNTA
Mean	2.325	3.019	1.000	–0.020	20.211	9.880	3.557	16.807
Median	2.102	3.041	1.008	–0.037	20.307	9.880	3.560	17.035
Maximum	8.836	5.999	1.999	0.998	39.984	12.840	4.800	17.727
Minimum	–3.080	0.001	0.001	–1.000	0.037	6.920	2.340	13.826
Std. Dev.	1.886	1.748	0.572	0.578	11.637	0.867	0.521	0.819
Skewness	0.450	–0.025	–0.031	0.038	–0.013	0.000	0.005	–1.313
Kurtosis	2.894	1.799	1.802	1.796	1.787	2.954	2.738	4.410
Jarque-Bera	102.675	180.709	180.096	182.138	184.090	0.263	8.581	1111.727
Probability	0.000	0.000	0.000	0.000	0.000	0.877	0.014	0.000
Observations	3003	3003	3003	3003	3003	3003	3003	3003

Correlation Matrix

The correlation matrix in Table 2 shows that there are low levels of interrelation between the main variables. For example, the correlation between SDI and GMI is low and not statistically significant, given that p ≈ 0.768. In the same way, the correlation between the independent variable, SDI, and the majority of the control variables is low, with high p-values, thereby reducing the possibilities of significant collinearity, which could affect the regression coefficients. This general picture, low bivariate correlations, and consistent high probability correlations pave the way for accepting the results of the subsequent Variance Inflation Rate (VIF) test and support the validity of including all variables in the models without serious concerns about multicollinearity. Methodologically, this enhances the interpretability of each variable's marginal contribution in the models, particularly when testing the moderating effect of green marketing.

Table 2. Correlation matrix

Correlation / Probability	GMI	SDI	LEV	SFR	SIZE	AGE	LNTA
GMI	1.000						
	–						
SDI	–0.005	1.000					
	0.768	–					
LEV	–0.013	0.001	1.000				
	0.469	0.944	–				
SFR	–0.003	–0.001	–0.015	1.000			
	0.851	0.940	0.424	–			
SIZE	0.005	0.001	–0.022	0.009	1.000		
	0.793	0.975	0.218	0.624	–		
AGE	0.012	–0.012	0.032	0.022	0.012	1.000	
	0.525	0.506	0.081	0.235	0.526	–	
LNTA	–0.013	–0.017	0.015	0.026	–0.004	–0.002	1.000
	0.475	0.359	0.407	0.160	0.841	0.925	–

Table 3: VIF (Multicollinearity) Results

Non-centered VIF values close to unity for all variables (≈1.000–1.002) confirm the practical absence of multicollinearity among the independent variables. This means that endogenous correlations will not inflate the variance of the regression coefficients, and that the statistical signals (significance/non-significance) attributed to the SDI, GMI, and SDI_GMI interaction term can be relied upon given the variables' structural independence. Methodologically, this improves inference quality and reduces the need for corrective measures to address multicollinearity.

To verify the properties of time series in the panel data, the ADF – Fisher Chi-square; Im, Pesaran and Shin W-stat; and Levin, Lin & Chu t was applied to all research variables, as shown in Table 4. The results showed that the probability values for all variables were less than (5%), indicating that the null hypothesis of the presence of a unit root was rejected, and

the alternative hypothesis of stationarity at the level was accepted. These results support the use of static panel regression models.

Table 3. VIF results

Variable	Coefficient Variance	Uncentered VIF
GMI	0.00013	1.00099
SDI	0.00123	1.00048
AGE	0.00150	1.00218
SFR	0.00000	1.00201
SIZE	0.00053	1.00180
LEV	0.00121	1.00194
LNTA	0.00061	1.00207

Table 4. Panel unit root test: summary

Variables	ADF – Fisher Chi-square		Im, Pesaran and Shin W-stat		Levin, Lin & Chu t		Decision
	Statistic	Prob.**	Statistic	Prob.**	Statistic	Prob.**	
LNTA	1041.195	0.000	–11.953	0.000	–19.278	0.000	Level stationary I(0)
AGE	1117.217	0.000	–13.661	0.000	–20.810	0.000	Level stationary I(0)
SIZE	1062.979	0.000	–12.902	0.000	–22.183	0.000	Level stationary I(0)
SFR	1160.277	0.000	–14.442	0.000	–21.812	0.000	Level stationary I(0)
LEV	1022.076	0.000	–12.071	0.000	–18.822	0.000	Level stationary I(0)
SDI	1099.835	0.000	–13.444	0.000	–20.775	0.000	Level stationary I(0)
GMI	1031.658	0.000	–12.086	0.000	–19.918	0.000	Level stationary I(0)
FP	1050.861	0.000	–12.297	0.000	–20.162	0.000	Level stationary I(0)

5.1.1. Cross-section dependence test

To verify whether the data segments (universities in our case) are correlated in terms of errors, the (Pesaran CD) test was applied to the estimated panel models. The null hypothesis for this test states "there is no cross-sectional dependence between the units (segments)," while the alternative hypothesis states "there is cross-sectional dependence between the units."

Table 5. Cross-section dependence test

Model	Test	Statistic	Prob.
1	Pesaran CD	–1.335	0.182
2		–1.399	0.162
3		–0.228	0.820

The results in Table 5 show that the p-value for all models is greater than 5%, indicating that the null hypothesis is accepted. Therefore, there is no evidence of cross-sectional dependence between the units. Therefore, the estimates are not affected by biases resulting from the correlation between the segments (universities), which strengthens the validity of the results during estimation.

5.1.2. Determine the appropriate model

The results in Table 6 show that the LM results indicate that the random effects model (REM) is superior to the pooled model (LM probabilities = 0.000 for all models), while the Hausman tests show that the null hypothesis is not rejected (probabilities as large as 0.921, 0.343, and 0.743), favoring the random effects model (REM) over the fixed effects model (FEM) in all three models. This indicates that unobserved differences between universities can be treated as random, and that RE estimates will be efficient and consistent given the uncorrelation of unobserved characteristics with the explanatory variables.

Table 6. Determine the appropriate model results

Model	Lagrange Multiplier		Hausman		Decision
	Chi-Sq. Statistic	Prob.	Chi-Sq. Statistic	Prob.	
1	40 735.924	0.000	0.010	0.921	REM
2	40 747.772	0.000	6.771	0.343	REM
3	40 851.576	0.000	5.132	0.743	REM

5.2. Baseline regression estimation

Table 7 indicates a clear pattern. In Model 1, sustainability disclosure (SDI) exerts a strong, positive, and statistically significant effect on universities' financial performance (FP). In other words, without the addition of control variables, the net effect indicates that disclosure quality is responsible for a significant proportion of variance in financial performance (FP) since universities that transparently report their economic, social, environmental, and governance practices enjoy higher levels of stakeholder trust, which in turn boosts funding, enrolment, and partnerships. This is consistent with stakeholder theory, which is based on satisfying stakeholder expectations (Ali et al., 2025). Similarly, it is consistent with signaling theory, which presents disclosure as a credible signal for efficiency and good governance (Connelly et al., 2011). In Model 2, control variables are included: firm size, organizational age, asset level, and research and development (R&D) intensity. The SDI coefficient is positive and statistically significant, suggesting that the effect is robust across institutional differences. Although some control variables lack statistical significance, none reduce the effect of disclosure. In Model 3, green marketing activities (GMI) and their interaction with SDI are included. The SDI constant remains positive, though reduced, and is statistically significant. The GMI constant is positive and statistically significant. Most important, however, is that the interaction effect is positive and substantial, suggesting a robust interaction effect when green marketing activities are genuine and disclosure impacts the stock market. In conclusion, it is recommended that disclosure efforts be reinforced by strategic green marketing to make the message detectable and meaningful (Flórez-Parra et al., 2021; del Mar Alonso-Almeida et al., 2015).

The overall results support the combined logic of stakeholder and signaling theories, in that transparency is valuable, and its payoffs are enhanced when communication makes the signal salient and credible.

Residuals checks

Model fit is strong in the interaction model ($R^2 \approx 0.7224$) compared to models without interaction (~0.26), and the Jarque–Bera test and Durbin–Watson statistic ≈ 1.96 support the hypothesis of adequate residuals (nearly normality and lack of significant autocorrelation). Overall, the results show that disclosure alone is important, but its operationalization through green marketing maximizes its financial returns.

Table 7. Baseline regression estimation (random effects)

Variables	MODEL1	MODEL2	MODEL3
SDI	**1.6739*****	**1.6741*****	**0.1941*****
GMI			**0.1863*****
SDI_GMI			**0.4993*****
LNTA		–0.0198	0.0058
AGE		0.0572	0.0264
SIZE		0.0282	0.0224
SFR		–0.0011	0.0001
LEV		–0.0741	–0.0369
C	**0.6500*****	**0.5215*****	**–0.3535*****
R-squared	0.2577	0.2587	0.7224
F-statistic	1041.7460	174.2868	973.9260
Prob(F-statistic)	0.0000	0.0000	0.0000
Jarque-Bera	2.5120	2.8500	0.9950
Prob (Jarque-Bera)	0.2850	0.2410	0.6081
Durbin-Watson stat	1.9680	1.9665	1.9635

Note: The dependent variable is financial performance with the symbol (FP), and *, **, *** indicate the level of statistical significance at 10%, 5%, 1%.

Residuals stationarity

Table 8 shows that the stationarity tests of the residuals in the three models (Resid1–Resid3) show stationarity at the level (probabilities of 0.000 in all tests), which means that the estimated panel models do not leave problems of non-stationarity in the errors, and indicates the validity of the probabilistic inference (t/F values and their probabilities) and that they are not confounded by inappropriate time characteristics. This diagnostic step is essential before moving on to the robustness test.

Table 8. Residuals stationarity test

Model	ADF – Fisher Chi-square		Im, Pesaran and Shin W-stat		Levin, Lin & Chu t		Decision
	Statistic	Prob.**	Statistic	Prob.**	Statistic	Prob.**	
Resid1	1034.608	0.000	–12.093	0.000	–18.236	0.000	stationary
Resid2	1037.156	0.000	–12.134	0.000	–18.259	0.000	stationary
Resid3	1009.802	0.000	–11.541	0.000	–17.274	0.000	stationary

Robustness check

Table 9 presents the estimates of the three models (Model 1, Model 2, and Model 3) with the introduction of the dynamic property (FP (–1) as a lagged variable) and using endogenous instruments to control for reverse causality issues between green disclosure/marketing and financial performance. The results showed the following:

- The coefficient on FP is negative, weak, and not statistically significant (approximately –0.0026 to –0.0204) in FP itself. This indicates that past financial performance is not a strong predictor of current performance. Universities thus appear not to rely heavily on their past financial performance to project future performance, but rather on more current disclosure variables and strategies. However, this aligns with the characteristics of higher education institutions, which are known to be regulated by a reputation/delivery-disclosure legitimacy construct rather than by past financial performance. The coefficients on the SDI are all positive and strongly statistically significant (approximately 0.399* in Model 3, and approximately 1.76*** in the remaining models). These results support the argument that open, comprehensive disclosure is a strong signal that enhances confidence among funders, students, and partners. However, in Model 3, which includes an interaction term for green marketing, the effect of disclosure is smaller than in the remaining models; that is, a component of disclosure is included in the green marketing treatment. Specifically, Table 9 considers the effect of green marketing campaigns (GMI); here, the result is positive and strongly statistically significant at approximately 0.193***. The implication is that green marketing is not only advertising but also a means of achieving strategic goals, one of which is enhancing financial performance through improved reputation and the attraction of more students, funders, and partners. However, the interaction term SDI × GMI is strongly positive, with an estimated coefficient of approximately 0.455***. The result is the most critical in this analysis; it suggests that, to maximize financial benefits from an open, comprehensive disclosure embrace, a highly effective green marketing strategy is also necessary.

Table 9. Robustness check (panel generalized method of moments)

Variables	MODEL1	MODEL2	MODEL3
FP (–1)	–0.0191	–0.0204	–0.0026
SDI	**1.7599*****	**1.7559*****	**0.3987***
GMI			**0.1930*****
SDI_GMI			**0.4546*****
LNTA		–0.0030	–0.0249
AGE		–0.0183	0.0015
SIZE		0.0677	0.0379
SFR		–0.0002	0.0011
LEV		–0.1032	**–0.0678***
J-statistic	36.1518	36.4982	56.5253
Prob(J-statistic)	0.7939	0.7817	0.0975

Note: The dependent variable is financial performance (FP), and *, **, and *** indicate the levels of statistical significance at 10%, 5%, and 1%, respectively.

From these results, it is evident that disclosure, per se, could remain an internal document with little impact. Nevertheless, when this information is filtered through the concept of green marketing, it is emphasized as a factor that is recognized by the students and funders, a factor that has a direct impact on revenues, reputation, and competitive attractiveness of the university. With reference to instrumental validity, or the J-statistic, Model 3 provided a J-value of 56.5 with a p-value of 0.0975, where it was noted that 5% < 10%. This has provided a level of statistical validity to the use of the internal instruments within GMM, which has increased confidence that the results are not skewed by a level of bias, nor is the relationship a result of reverse causality.

Table 9 provides substantial empirical support within the study, addressing the methodological problem of reverse causality, or the question of whether the financial performance is a result of the disclosure and green marketing, or if it is the other way around, with the financially performing universities more likely to disclose and green market. However, the results obtained using the generalized method of moments (GMM) support the former, indicating that the financial performance is a result of the disclosure and green marketing, and not the other way around. This further adds to the validity of the results and the theoretical framework by substantiating the role of disclosure as a strategic signal and green marketing as a magnification of this signal.

6. Discussion

The research contributes to the development of an integrated theoretical framework based primarily on stakeholder theory, with signaling and institutional theories providing supplementary support. The findings show a strong and unambiguous relationship between quality sustainability disclosure and financial performance, while neither measure is linked to university size, age, asset base, research emphasis, but rather to educational emphasis (Pham et al., 2021). From the perspective of the stakeholder theory, the clear and verifiable disclosure of sustainability practices helps build trust, legitimacy, and investment readiness among students, sponsors, and government entities (del Mar Alonso-Almeida et al., 2015). From the signaling perspective, high-quality signals are costly and credible and convey the message that the university is managed effectively, efficiently, and competently, hence addressing information asymmetry and positively influencing financial performance (Connelly et al., 2011; Pham et al., 2021). For Middle Eastern universities, tuition fees and lower levels of state financial support are secondary priorities. The route map from stakeholder alignment through credible signaling also clearly shows the way forward in terms of improving economic performance through high-quality sustainability disclosure (Flórez-Parra et al., 2021).

The green marketing process generally has a positive impact on financial performance, and this effect is even more substantial when combined with effective disclosure practices. In the stakeholder management approach, the use of the green marketing process not only helps create a positive image for the university concerning environmentally responsible practices but can also be efficiently used for the effective communication of the institution's sustainability practices in a student-centred fashion for the benefit of student clients, their parents, donors, and partners (Ham & Lee, 2011; Al-Ahmed et al., 2025). The university adopts a green marketing approach, consistent with the institution's environmentally and socially focused image, delivered for the mutual benefit of clients, including current and prospective students, parents, donors, and partners. Verifiable disclosure data can make the message

even more straightforward regarding the confidence in the campaigns, thereby reducing the risk of green marketing and increasing the likelihood of long-term financial investment (Connelly et al., 2011; Sahibzada et al., 2025). The financial implications of the green marketing approach have been identified in earlier research (Ali et al., 2025; Ramírez et al., 2025).

In conclusion, there is a positive, significant, and profound statistical relationship between sustainability disclosure and green marketing communication. That is, financial returns from disclosure are directly proportional to the expansion of green marketing communication practices. When considering the interaction between these two, disclosure functions as a communication augmentation, which explains why a standalone direct effect of disclosure appears limited but, together, a substantial impact is realized (Pham et al., 2021; Rahi et al., 2022). From the signaling literature, a green communication system acts as an intensifier, whereby a clear, focused, and remarkably credible communication message, utilizing credible green communication channels, not only strengthens knowledge visibility but also represents an effective correction mechanism for imprecise information, through which a signal becomes a valuable resource (Chen, 2010; Connelly et al., 2011). From a stakeholder perspective, value not only arises out of intense information on sustainability but also from an effective use of that information to meaningful stakeholders, yielding concrete outcomes, which range from an improved learning environment, employability, and a broader impact through community interaction (del Mar Alonso-Almeida et al., 2015; Polonsky, 2011). When operating as a transitional system for emerging higher education institutions that exhibit relatively greater communication differentiation, a university system can enhance its competitive and financially advantageous profile by complying with sustainability reporting requirements. This opportunity arises from an effective combination of profound disclosure techniques and active green communication practices (Ali et al., 2025; Ramírez et al., 2025).

7. Conclusions

The research focuses on the role of sustainability reporting and green marketing in determining financial performance within the realm of higher learning institutions. The Middle Eastern region is characterized by the significance of the financial credibility of higher learning institutions, considering the fact that the sector operates under constrained budgetary conditions and is tuition-based. A stronger relationship between sustainability disclosure and financial performance indicates that improved disclosure yields superior financial performance, with real-world implications. On the other hand, financial performance is strengthened through engagement in green marketing as a stand-alone activity. It reflects the importance of information disclosure, which has significant implications for financial performance and contributes to the integrity and effectiveness of institutions of higher learning, including financial institutions. Furthermore, the relationship between disclosure and green marketing is significantly and positively related and indicates that institutions of higher learning can achieve improved financial performance as institutions through enhanced disclosure of information and strengthened green marketing and reflects this theory in relation to institutions of higher learning as well as financial theories as well and indicates that institutions of higher learning have significant roles and implications as institutions through significance of mere disclosure and reflects theory institutions of higher learning and institutions and reflects comprehensive theories and principles as well.

8. Theoretical and managerial contributions

This study focuses on stakeholder theory. This topic examines sustainability reporting and green marketing, and their effects on resource allocation for university activities and performance, as assessed by key stakeholders. This theoretical basis assumes that high-quality, target-market-aimed disclosure and communication directly address stakeholder needs regarding transparency, accountability, and sustainability, thereby likely impacting financial performance in a tuition-based model. The role of signaling and institutional viewpoints supports this central tenet. It explains how sustainability messages are rendered credible under pressures in the Middle Eastern higher education setting. Based on stakeholder theory, this study has general implications for the field of sustainability reporting and, specifically, for the university sector. More specifically, this study (1) jointly specifies the models of quality of disclosure of sustainability and models of green marketing initiatives as the basis of future study, (2) reveals the critical moderating impact of the initiative of green marketing on the relationship between the performance of disclosure of sustainability and the quality of disclosure of sustainability, and (3) provides the approach to the measurement of these elements through dynamic panel data.

From a management and policy analysis vantage, the findings imply that universities must move from a disclosure approach focused on compliance to a more integrated approach focused on evidence-based value communication. This means aligning sustainability reports with established frameworks and ensuring that the indicators reported are traceable to measurable initiatives that stakeholders can observe. In effect, a more substantial harmonization of the disclosure and marketing needs of universities must happen to ensure green campaigns are data-driven, not green-washed, and transform sustainability performance into meaningful stories for students, parents, sponsors, and accrediting organizations. University administrations should seek to integrate the objectives of sustainability in the planning process and assess the outcomes of the alignment of the disclosure and green messaging initiatives with the university's economic indicators, such as enrollment, interest in programs, and grants, over time. This is critical in the context of university finance, particularly in the Middle Eastern region, given the tuition-based model, budgetary constraints, and the global marketplace in terms of attracting future students.

9. Limitations and future research

The limitations of this research suggest avenues for future research. Firstly, the research is based on secondary and observable data, which might not fully capture the qualitative nature of the internalization of sustainability and green initiatives and their externalization through the lens of disclosure and green marketing practices. Future studies could include results from interviews, focus groups, or surveys conducted among students, staff, funders, and policymakers, as well as automated coding, to enrich the composite measure of disclosure and green marketing practices. Secondly, although the dynamic panel group median regression model and the wide range of diagnostics mitigate the limitations of heterogeneity and endogeneity, they do not completely overcome the limitations of selection effects and reverse causality. Future studies could include the results of quasi-experiments, policy shocks, difference-in-differences approaches, and stronger external instruments to test the model. Thirdly, the sample of reporting universities from eight Middle Eastern countries is limited; future studies could include results from research conducted among non-reporting, private, and specialized universities, as well as comparative contexts from developed nations.

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Author contributions

KA and HA conceived the study and were responsible for the design and development of the data analysis. OZ and HA were responsible for data collection and analysis. KA and OZ were responsible for data interpretation. HA wrote the first draft of the article.

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The authors declare that there are no conflicts of interest related to this work.

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