Sustainable Finance And SME Green Growth Under Structural Constraints: The Role Of Financial Literacy In A Fragile Economy

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Abstract: *Access to sustainable finance is widely recognized as a key driver of environmentally sustainable investment and SME growth. However, its effectiveness remains underexplored in fragile and conflict-affected contexts, where structural constraints may shape how financial and managerial mechanisms operate. This study examines the relationship between sustainable finance and SME green growth, and the moderating role of financial literacy, using firm-level data from 363 Palestinian manufacturing SMEs analysed through PLS-SEM. The results show that access to sustainable finance has a significant positive effect on green growth, confirming its central role in supporting sustainable business outcomes. Financial literacy also has a positive direct effect, highlighting its importance in firm-level sustainability decisions, but it does not significantly moderate the relationship between financial access and green growth. These findings suggest that in structurally constrained environments, managerial capability may be limited by systemic barriers, reducing its ability to enhance the impact of financial resources. The study contributes to the business and economic transformation literature by showing that financial access remains the primary driver of SME green growth, while financial literacy plays a complementary rather than amplifying role.*

Keywords: Sustainable finance; SME green growth; Financial literacy; Fragile economies; Structural constraints

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Introduction

Small and medium-sized enterprises (SMEs) are widely recognized as central drivers of employment generation, income distribution, and inclusive economic development (Mamo, 2020; Pu et al., 2021). Their role is particularly critical in developing and fragile economies, where SMEs constitute the backbone of private sector activity and economic resilience under persistent institutional and resource constraints. Yet, the developmental capacity of SMEs in such environments remains highly vulnerable to financial disruption, market instability, and weak productive infrastructures.

In Palestine, SMEs operate within an exceptionally constrained economic environment shaped by political instability, restricted market access, and limited industrial diversification. These structural conditions weaken firm competitiveness and reduce the capacity of SMEs to pursue long-term investment and environmentally sustainable transformation. The situation is particularly acute in Gaza Strip, where prolonged economic blockade, recurrent conflict, and severe mobility restrictions have disrupted market functionality, financial intermediation, and production continuity (UNCTAD, 2024; World Bank, 2023). Recent indicators reveal sharp economic contraction, escalating unemployment, and widespread infrastructure deterioration (PCBS, 2024; ILO, 2024). Rather than temporary shocks, these conditions reflect entrenched structural fragmentation that continues to shape how firms access resources, allocate capital, and sustain productive activity (Khalidi, 2020; Al-Botmeh, 2021; MAS, 2023; PMA, 2023).
Against this backdrop, access to external finance remains one of the most persistent barriers to SME development. Conventional lending systems typically require collateral, formal credit histories, and extensive documentation that many resource-constrained SMEs are unable to provide (Bwembya, 2022; World Bank, 2023). Limited financial access not only constrains business expansion, but also restricts firms' ability to invest in green technologies and environmentally sustainable production processes (Beck & Demirgüç-Kunt, 2017; Levine, 2005). In response, sustainable finance including green loans and sustainability-linked financing mechanisms has increasingly emerged as an important instrument for supporting environmentally responsible business activity while maintaining economic viability (OECD, 2023; UNEP, 2024).

Despite its growing importance, access to sustainable finance remains severely constrained in fragile and conflict-affected environments due to weak financial infrastructures, fragmented institutional systems, and persistent financing gaps (Yoshino & Morgan, 2016; UNEP, 2023; Calice, 2023; UNCTAD, 2024). In Palestine, donor-supported financing initiatives continue to face implementation inefficiencies and institutional coordination problems that limit their effectiveness (Hanini et al., 2021). High borrowing costs, collateral requirements, weak financial records, and constrained lending practices further suppress formal credit accessibility (Qubbaja, 2019; WBG, 2019; Talahmeh, 2020). In Gaza, these pressures are compounded by liquidity shortages and banking sector disruptions, forcing many SMEs to rely on unstable informal financing channels (Megersa, 2020). As a result, firms remain excluded from emerging sustainable markets and unable to undertake the long-term investments required for green transformation (Yoshino & Morgan, 2016; Al-Saidi & Qasem, 2024).

Crucially, improving financial access alone may not guarantee effective sustainability transitions. The extent to which firms can utilize sustainable finance depends heavily on managerial capability and the ability to evaluate, allocate, and manage financial resources strategically. This places financial literacy at the center of the finance–sustainability relationship (Grohmann et al., 2018; Beck & Demirgüç-Kunt, 2017). Financially literate managers are generally better positioned to navigate financing conditions, assess investment

risk, and support environmentally sustainable initiatives (Hussain & Karim, 2018; Aassouli & Habib, 2023; Abbas et al., 2025). However, in highly disrupted environments such as Gaza, the effectiveness of internal managerial capability may itself become constrained by broader structural and institutional instability.

Nevertheless, empirical evidence explaining how financial literacy interacts with sustainable finance to influence SME green growth remains limited, particularly within fragile and conflict-affected economies. Existing studies have largely examined financial access and managerial capability independently, offering limited insight into how their interaction operates under conditions of prolonged instability (Bongomin et al., 2017; Grohmann et al., 2018; Zhang & Li, 2023). Consequently, an important question remains insufficiently addressed: can internal managerial capability meaningfully enhance the developmental impact of sustainable finance when external structural constraints remain highly restrictive?

This study addresses this gap by examining the relationship between access to sustainable finance and SME green growth while evaluating the moderating role of financial literacy using firm-level evidence from Palestinian manufacturing SMEs. By situating the analysis within a fragile and conflict-affected context, the study advances a more context-sensitive explanation of how financial and managerial mechanisms shape sustainable SME development under conditions of structural instability.

Literature review

This section reviews the literature on SME green growth, access to sustainable finance, and financial literacy, with a focus on how these factors interact. It brings together key theoretical and empirical insights to explain how financial resources and managerial capabilities influence firms' environmentally sustainable performance. Drawing on the Resource-Based View (RBV) and financing behavior perspectives, the review provides a foundation for examining how financial literacy shapes the relationship between sustainable finance and SME green growth, particularly in fragile and institutionally constrained environments.

SMEs Green Growth

Green growth has emerged as a key pathway for enhancing the long-term competitiveness and sustainability of small and medium-sized enterprises (SMEs). Beyond conventional economic expansion, it reflects a firm's ability to achieve financial performance while reducing environmental impact and improving resource efficiency. Firms that pursue these sustainable strategies often demonstrate stronger financial resilience, improved operational efficiency, and positive spillover effects on local and regional economies (Ysuoff et al., 2018; Al-Saidi & Qasem, 2024).

In recent years, green growth in SMEs has received increasing scholarly attention, particularly in developing and institutionally constrained economies. In these contexts, many firms struggle to survive beyond early stages due to severe capital scarcity, weak long-term positioning, and limited capacity to adopt eco-innovations (Ysuoff et al., 2018; Al-Saidi & Qasem, 2024; Zhang & Li, 2023). Consequently, integrating sustainability into SME growth strategies has become an operational imperative rather than an optional asset, serving as a core driver for improving firm performance under resource constraints.

Multiple organizational and technological factors shape SMEs' ability to achieve green growth. Scholarly work identifies several distinct dimensions of this process: digital transformation enhances resource efficiency (Kim, 2021), while successful execution requires

embedding sustainability directly into core operations (Yoo et al., 2018). Further, this transition depends heavily on adapting business models and knowledge management systems (Yun et al., 2015), alongside driving workforce capability and market expansion (Owusu et al., 2019).

Emerging empirical evidence also underscores the importance of adopting environmentally sustainable business practices, including investment in clean technologies, improved energy efficiency, and sustainable supply chain management (Zhang & Li, 2023; UNCTAD, 2024; Li et al., 2023). These targeted investments enable SMEs to reduce operational costs, amplify productivity, and access emerging green markets while strengthening regulatory compliance. These insights underscore that green growth reflects a fundamental shift in how SMEs achieve long-term competitiveness while aligning economic objectives with environmental sustainability. Achieving such transformation requires a dual configuration: sufficient external capital to fund sustainable investments, and the internal managerial capability to allocate that capital strategically (OECD, 2023; UNCTAD, 2024). This perspective highlights sustainable finance as a critical enabling resource, while positioning financial literacy as the essential managerial capability that determines whether capital access actually translates into meaningful green growth outcomes (Bongomin et al., 2017; Agyapong & Attram, 2019).

Access to Sustainable Finance of SME

Access to finance is widely recognized as a key condition for the survival, expansion, and long-term competitiveness of small and medium-sized enterprises (SMEs). Adequate financial resources, whether obtained through bank lending, equity financing, or alternative funding mechanisms, enable SMEs to invest in innovation, upgrade production processes, and expand operational capacity. Importantly, access to capital is particularly critical for supporting environmentally sustainable investments, which often require substantial upfront costs and long-term financial commitment.

Despite their economic significance, SMEs consistently encounter substantial financial constraints, including limited access to formal credit, high borrowing costs, and stringent collateral requirements (Armstrong, 2013; Yoshino et al., 2018). Beck and Demirgüç-Kunt (2017) emphasize that such barriers are particularly severe in developing and emerging economies, where financial market imperfections, institutional weaknesses, and limited inclusiveness in lending practices further restrict SMEs' access to external capital (Ahamed & Jelic, 2026). These financing constraints become even more pronounced in fragile and conflict-affected settings, where weak financial infrastructures and disrupted intermediation systems further limit financing continuity and credit accessibility for SMEs (Calice, 2023). As a result, persistent financing gaps continue to constrain SMEs' capacity to achieve both economic and environmentally sustainable growth (Motta, 2020; Bongomin et al., 2017).

In contexts where formal financing is inaccessible, SMEs frequently depend on informal funding sources such as personal savings, family support, or community-based lending. While these mechanisms provide short-term liquidity, they are generally insufficient to support strategic, long-term investments. Although banks remain the primary providers of external finance in many emerging markets (Yoshino & Taqizadeh Hesary, 2021), information asymmetries, complex lending procedures, and risk-averse institutional practices continue to systematically ration SME credit access (Schiffer & Beatrice, 2001).

Extensive empirical evidence confirms that improved access to finance significantly enhances SME performance, productivity, and growth prospects (Wasiuzzaman et al., 2020; Ahamed & Jelic, 2026; Motta, 2018). Within the context of sustainable development, access to dedicated

sustainable finance including green loans, sustainability-linked financing, and environmentally targeted credit programs has emerged as a critical mechanism for enabling firms to adopt environmentally responsible practices and transition toward greener business models (OECD, 2023; UNEP, 2023).

These arguments highlight that access to finance is not only a constraint but also a key driver of sustainable SME growth. From a resource-based view (RBV), access to sustainable finance represents a strategic external resource that enables SMEs to fund the green innovations necessary for long-term transformation (Levine, 2005; Yoshino & Morgan, 2016). However, the ultimate efficacy of this resource depends on internal managerial competence. Financial literacy enhances managers' ability to evaluate investment opportunities and allocate capital efficiently, thereby dictating whether financial access successfully translates into sustainable and environmentally responsible growth outcomes (Beck & Demirgüç-Kunt, 2017; Grohmann et al., 2018).

Financial literacy

Financial literacy refers to the ability of entrepreneurs and managers to acquire, interpret, and apply financial knowledge effectively in organizational decision-making (Marriott & Mellett, 1996; Mandell, 2009). It extends beyond basic awareness to include the analytical capability required to evaluate financing conditions, manage financial risk, plan investments, and allocate resources efficiently (World Bank, as cited in Kalekye & Memba, 2015; Adomako et al., 2015). In SMEs, where financial decisions are typically centralized in the hands of owners or senior managers, financial literacy represents a critical managerial capability influencing firm survival and long-term development.

This capability enables managers to navigate financial systems, interact with formal financial institutions, and identify appropriate financing opportunities (Remund, 2010). Empirical evidence shows that financially literate entrepreneurs are more likely to access formal financial services, secure external funding, and utilize financial instruments effectively (Klapper et al., 2013; Grohmann et al., 2018). By reducing information asymmetry and strengthening creditworthiness, financial capability improves SMEs' participation in formal financial markets and access to growth-enabling resources (Beck & Demirgüç-Kunt, 2017; Demirgüç-Kunt et al., 2020).

A growing body of research links financial literacy to improved firm performance, resilience, and decision-making under stress. Managers with stronger financial skills are better equipped to manage liquidity and absorb market shocks, which directly supports productivity and long-term survival (Cole & Fernando, 2008; Bongomin et al., 2017; Agyapong & Attram, 2019). This becomes particularly important in resource-constrained environments, where limited access to finance and higher uncertainty increase the penalties for sub-optimal financial decisions (Chhatwani & Mishra, 2021; Barno et al., 2021).

In addition to its direct contribution to firm performance, financial literacy helps firms make more effective use of financial access for environmentally sustainable investments. Green technologies and sustainability practices typically require higher upfront costs and longer payback periods, making careful financial evaluation essential. Managers with stronger financial skills are better able to evaluate these high-risk investments and compare complex financing options (Zhang & Li, 2023; OECD, 2022). By contrast, limited financial literacy restricts firms' ability to absorb available financing, thereby neutralizing the potential impact of financial access on sustainable growth.

From a Resource-Based View (RBV) perspective, financial literacy represents a valuable intangible capability that enhances the productivity of external financial resources (Barney, 1991; Freeman et al., 2021). While access to sustainable finance provides the necessary external capital, managerial financial capability determines how effectively this resource is deployed to fund eco-innovations. Pecking Order Theory further suggests that SMEs rely heavily on managerial judgment when selecting financing sources under conditions of uncertainty and information asymmetry (Frank & Goyal, 2003). Financially capable managers are therefore more likely to allocate financial resources strategically and align capital structure decisions with long-term sustainability objectives

H1: Access to sustainable finance has a positive effect on SME green growth.

H2: Financial literacy has a positive effect on SME green growth

H3: Financial literacy positively moderates the relationship between access sustainable finance and SME green growth.

To illustrate these relationships, Figure 1 presents the conceptual model, highlighting the direct and moderating roles of financial literacy in shaping the effect of sustainable finance on SME green growth.

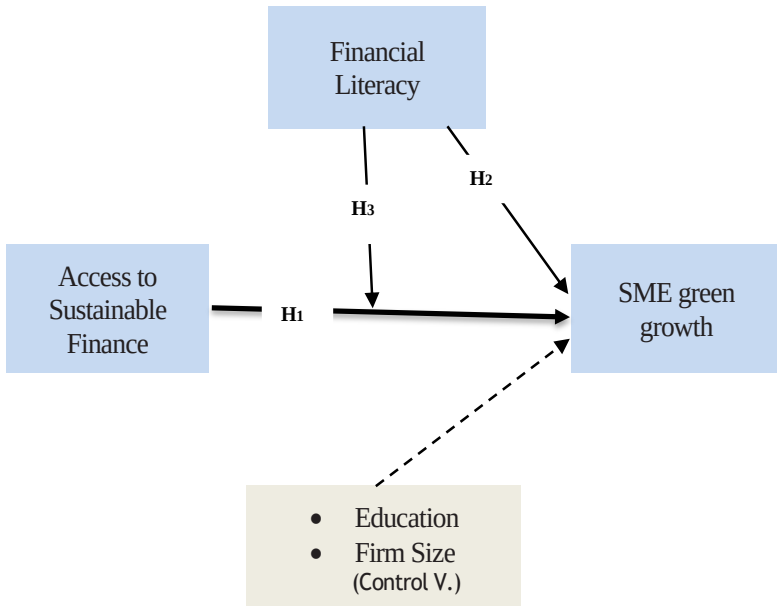

Fig. 1: Conceptual model of sustainable finance and SME green growth
Source: Authors' elaboration

Methodology

Aim of the Research

This study adopts a deductive quantitative research design to examine the relationship between access to sustainable finance and SME green growth, while also assessing the moderating role of financial literacy. The conceptual framework and hypotheses were developed based on prior theoretical and empirical literature and tested using firm-level survey data collected from manufacturing SMEs operating in Gaza Strip. This approach enables a systematic evaluation of how financial and managerial factors shape environmentally sustainable growth within a fragile and institutionally constrained context.

Population and Sample of the Research

Primary data were collected through a structured questionnaire administered to SME owners, chief executive officers, and financial managers, who represent the most informed respondents regarding firm-level financial and strategic decisions. A convenience sampling technique was employed due to the absence of a comprehensive sampling frame and the institutional and accessibility constraints affecting SMEs in the study context. This approach is widely applied in SME and entrepreneurship research when targeting knowledgeable organizational informants (Etikan et al., 2016; Hair et al., 2022).

The study population consisted of 4,374 registered manufacturing SMEs, from which 363 valid responses were obtained. The final sample exceeds the recommended minimum thresholds for structural equation modeling and provides adequate statistical power for empirical analysis (Hair et al., 2022).

Data Collection Tools of the Research

Measurement items were adapted from previously validated scales (Bongomin et al., 2017; Agyapong & Attram, 2019) and refined through expert review to ensure content validity and contextual suitability. Academic specialists and industry practitioners evaluated the questionnaire prior to data collection, and a pilot study was conducted to assess clarity, reliability, and instrument suitability.

Exploratory factor analysis (EFA) and reliability analysis were subsequently performed to confirm the underlying factor structure and internal consistency of the measurement scales. In addition, firm size and manager education level were incorporated as control variables, given their established influence on firm performance and sustainability outcomes (Beck & Demirgüç-Kunt, 2017; Hair et al., 2022). These variables were modeled as direct predictors of SME green growth to isolate the net effects of sustainable finance and financial literacy.

Analysis of Research Data

The data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) through Smart-PLS. PLS-SEM was considered appropriate due to the predictive orientation of the study, the inclusion of moderating relationships, and its suitability for analysing complex models under conditions of potential non-normality and exploratory theory development (Hair et al., 2022; Sarstedt et al., 2017). Following the two-stage analytical procedure recommended by Hair et al. (2022), the measurement model was first assessed to evaluate indicator reliability, internal consistency, convergent validity, and discriminant

validity. Subsequently, the structural model was examined to test the proposed hypotheses and assess the significance of the direct and moderating relationships (Sarstedt et al., 2017). Bootstrapping with 5,000 resamples was applied to evaluate the statistical significance of path coefficients and moderation effects. In addition, the explanatory power of the model (R^2) and effect sizes (f^2) were examined to assess the predictive relevance and relative contribution of the study constructs (Sarstedt et al., 2017).

Results

This section presents the empirical findings derived from the survey data. Prior to hypothesis testing, data screening procedures were conducted to ensure the accuracy, completeness, and suitability of the dataset for multivariate analysis.

Response Rate and Data Screening

As shown in Table 1, a total of 430 questionnaires were distributed, of which 393 were returned, yielding a response rate of 91.4%. After excluding 15 incomplete responses, 378 usable questionnaires remained.

Further screening was conducted to identify potential outliers. Univariate outliers were detected using standardized Z-scores, resulting in the removal of 10 cases. Multivariate outliers were assessed using Mahalanobis distance (D^2), leading to the exclusion of an additional five observations. Following these procedures, the final dataset comprised 363 valid responses, providing a sufficient and reliable sample for structural equation modeling analysis (Hair et al., 2022).

Table 1: Data screening and sample selection

Process	Number of Surveys	Percentage (%)
Distributed Questionnaire	430	100%
Collected Questionnaire	393	91.40%
Uncompleted Answers	15	3.50%
Valid Collected Answers	378	87.90%
Univariate Outliers (Z-scores)	10	2.30%
Multivariate outliers (Mahalanobis distance)	5	1.20%
Final Valid Dataset	363	84.40%

Source: Authors 'calculations

Note: Univariate outliers were identified using standardized Z-scores, while multivariate outliers were detected using Mahalanobis distance (D^2) prior to structural equation modeling analysis.

Respondent and Firm Characteristics

Table 2 presents the demographic characteristics of the 363 respondents. The sample is evenly distributed between small enterprises (49.6%, n = 180) and medium-sized enterprises (50.4%, n = 183), indicating balanced representation across firm sizes. Firm size was subsequently included as a control variable in the structural model, given its established influence on firm performance and sustainability outcomes.

The gender distribution is predominantly male (98.1%, n = 356), reflecting the male-dominated structure of SME ownership and management in the study context. In terms of age, the largest proportion of respondents falls within the 41–50-year category (40.2%, n = 146), followed by those aged 31–40 years (32.5%, n = 118), indicating that most respondents occupy mid-career managerial positions.

Regarding educational attainment, the majority of respondents hold a university degree (58.1%, n = 211), followed by high school qualifications (20.9%, n = 76), professional diplomas (10.7%, n = 39), and graduate degrees (10.2%, n = 37). Education level was also incorporated as a control variable, as managerial capability and financial knowledge may influence firms' sustainability and financing decisions.

The results indicate that respondents possess relevant managerial experience and educational backgrounds, which strengthens the credibility and reliability of their responses.

Table 2: Demographic characteristics of respondents (N = 363)

Variable	Category	Frequency	Percent (%)
Firm Size	Small	180	49.6
	Medium	183	50.4
Gender	Female	7	1.9
	Male	356	98.1
Age	21 - 30 Years	25	6.9
	31 - 40 Years	118	32.5
	41 - 50 Years	146	40.2
	51 Years and Above	74	20.4
Education level	High School	76	20.9
	Professional Diploma	39	10.7
	University Degree	211	58.1
	Graduate Studies	37	10.2
	Total	363	100.0

Source: Authors' calculations

Note: Firm size and education level were included as control variables in the structural model.

Descriptive Statistics of Study Constructs

Table 3 presents the descriptive statistics for the main study constructs: access to sustainable finance, financial literacy, and SME green growth. Access to sustainable finance reports a mean of 3.841 (SD = 0.635), with observed values ranging from 2.00 to 5.00. Financial literacy shows a mean of 3.740 (SD = 0.696), while SME green growth records a mean of 3.868 (SD = 0.601), with comparable minimum and maximum values.

The mean scores exceeding the scale midpoint indicate that respondents generally perceive moderate to relatively high levels of access to sustainable finance, financial capability, and

green growth practices within their firms. The observed standard deviations reflect sufficient variability in responses, supporting the adequacy of the dataset for subsequent structural equation modeling analysis (Hair et al., 2022).

Table 3: Descriptive statistics of study constructs

Variable	Min.	Max.	Mean	Std. Deviation
Access to Sustainable Finance	2.00	5.00	3.841	0.635
Financial Literacy	2.00	5.00	3.740	0.696
SME green growth	2.00	5.00	3.868	0.601

Source: Authors' calculations

Note: All variables were measured using a five-point Likert scale.

Measurement Model Assessment

Table 4 presents the results of the measurement model evaluation, including indicator reliability, internal consistency reliability, and convergent validity. In accordance with established methodological guidelines, indicator loadings should exceed 0.70, Cronbach's alpha and composite reliability (CR) values should be above 0.70, and the average variance extracted (AVE) should exceed 0.50 to confirm adequate construct reliability and convergent validity (Hair et al., 2022).

For access to sustainable finance, indicator loadings range from 0.740 to 0.926, exceeding the recommended threshold. The construct demonstrates strong internal consistency, with a Cronbach's alpha of 0.908 and composite reliability of 0.929. Convergent validity is also supported, as reflected by an AVE value of 0.688.

Financial literacy reports indicator loadings ranging from 0.765 to 0.929, along with a Cronbach's alpha of 0.914 and composite reliability of 0.934, indicating high internal consistency. The AVE value of 0.702 confirms satisfactory convergent validity.

Similarly, SME green growth exhibits indicator loadings between 0.742 and 0.901, Cronbach's alpha of 0.896, composite reliability of 0.921, and an AVE of 0.661, confirming acceptable reliability and convergent validity.

All constructs meet or exceed the recommended thresholds for indicator reliability, internal consistency, and convergent validity, confirming the adequacy and robustness of the measurement model and supporting progression to structural model assessment (Hair et al., 2022).

Table 4: Measurement model reliability and convergent validity

Construct	Item	Loading	Cronbach's Alpha	Composite Reliability	AVE
Access to Sustainable Finance	ATSF1	0.926	0.908	0.929	0.688
	ATSF2	0.740			
	ATSF3	0.833			
	ATSF4	0.771			
	ATSF5	0.855			

	ATSF6	0.838			
Financial Literacy	FL1	0.929	0.914	0.934	0.702
	FL2	0.838			
	FL3	0.871			
	FL4	0.831			
	FL5	0.784			
	FL6	0.765			
SME green growth	SMEGG1	0.901	0.896	0.921	0.661
	SMEGG2	0.798			
	SMEGG3	0.843			
	SMEGG4	0.813			
	SMEGG5	0.742			
	SMEGG6	0.774			

Source: Authors' calculations

Note: All factor loadings exceed the recommended threshold of 0.70. Cronbach's alpha and composite reliability values are above 0.70, and AVE values exceed 0.50, confirming adequate reliability and convergent validity (Hair et al., 2022).

Discriminant Validity Assessment

Table 5 presents the Fornell–Larcker criterion used to evaluate discriminant validity among the study constructs: access to sustainable finance, financial literacy, and SME green growth. Discriminant validity is established when the square root of the average variance extracted (AVE) for each construct exceeds its correlations with other constructs, indicating that each construct shares more variance with its own indicators than with other constructs (Fornell & Larcker, 1981).

As reported in Table 5, the square root of the AVE for access to sustainable finance (0.829), financial literacy (0.838), and SME green growth (0.813) exceeds their respective inter-construct correlations. These findings confirm that each construct is empirically distinct and that the measurement model demonstrates satisfactory discriminant validity.

Table 5: Discriminant validity assessment (Fornell–Larcker criterion)

Construct	Access to Sustainable Finance	Financial Literacy	SME green growth
Access to Sustainable Finance	**0.829**		
Financial Literacy	0.359	**0.838**	
SME green growth	0.685	0.450	**0.813**

Source: Authors' calculations

Note: Diagonal values (bold) represent the square root of AVE.

These results indicate that all constructs meet the recommended discriminant validity criteria (Hair et al., 2022), confirming that each construct is empirically distinct.

Structural Model Assessment and Hypothesis Testing

Table 6 presents the results of hypothesis testing within the structural model. The first hypothesis (H1) demonstrates that Access to Sustainable Finance has a positive and statistically significant effect on SME Green Growth ($\beta = 0.17$, $p = 0.001$).

Similarly, H2 indicates that Financial Literacy exerts a positive and significant effect on SME Green Growth ($\beta = 0.219$, $p < 0.001$). These findings suggest that both access to sustainable finance and financial literacy independently contribute to promoting environmentally sustainable business practices among SMEs.

However, the moderating effect of Financial Literacy on the relationship between Access to Sustainable Finance and SME Green Growth (H3) is not statistically significant ($\beta = –0.062$, $p = 0.056$). Although the interaction coefficient is negative, it does not reach the conventional 5% significance level. Therefore, H3 is not supported.

Overall, the structural model supports the direct effects of sustainable finance and financial literacy on SME green growth, but does not support the moderating role of financial literacy. The structural model was analyzed to test the proposed relationships between sustainable finance access, financial literacy, and SME green growth, including the moderating effect of financial literacy. A bootstrapping procedure with 5,000 resamples was applied to determine the significance of the estimated paths. The detailed results are presented in Table 6.

Table 6: Research Hypothesis Results

Hypo.	Relationship	β	SD	t-value	p-value	Status
H1	Sustainable finance → SME green growth	0.170	0.034	4.949	0.001	Supported
H2	Financial literacy → SME green growth	0.283	0.039	5.674	<0.001	Supported
H3	Sustainable finance × Financial literacy → SME green growth	-0.062	0.039	1.589	0.056	Not Supported
—	Firm size (control) → SME green growth	0.114	0.042	2.071	0.038	Sig.
—	Education level (control) → SME green growth	0.141	0.049	2.873	0.002	Sig.

Source: Authors' calculations

Note: Results are based on bootstrapping with 5,000 resamples using PLS-SEM

Explanatory Power of the Structural Model (R^2)

Table 7 reports the coefficient of determination (R^2) for the endogenous construct. The results indicate that the structural model explains 49.7% of the variance in SME green growth ($R^2 = 0.497$), which can be considered moderate explanatory power according to established PLS-SEM guidelines (Hair et al., 2022). This finding suggests that access to sustainable finance,

financial literacy, and the control variables collectively provide substantial explanatory capability for variations in SME green growth.

Table 7: Coefficient of determination (R^2)

Endogenous construct	R^2	Interpretation
SME green growth	0.497	Moderate

Source: Authors' calculations

Note: R^2 values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory power, respectively (Hair et al., 2022).

Moderation Analysis

Moderation analysis was conducted to examine whether financial literacy influences the strength of the relationship between access to sustainable finance and SME green growth. In Partial Least Squares Structural Equation Modeling (PLS-SEM), moderation is assessed by estimating an interaction term between the predictor and moderator constructs and evaluating its statistical significance using bootstrapping procedures (Hair et al., 2011; Hair et al., 2022; Dawson, 2014).

The results indicate that financial literacy has a positive and statistically significant direct effect on SME green growth ($\beta = 0.283$, $p < 0.001$), reinforcing the importance of managerial financial capability in supporting environmentally sustainable business practices and green investment decisions.

However, the interaction term between access to sustainable finance and financial literacy is not statistically significant ($\beta = –0.062$, $p = 0.056$), indicating that financial literacy does not moderate the relationship between sustainable finance access and SME green growth.

While financial literacy improves firm-level sustainability outcomes directly, it does not strengthen the effectiveness of financial access in the present context. Accordingly, Hypothesis 3 is not supported. Figure 2 illustrates the structural model results, including the standardized path coefficients and the estimated interaction effect.

Rather than representing a weak or inconclusive outcome, this result reflects the structural conditions under which SMEs operate in fragile environments. In contexts such as Gaza, where financial systems are disrupted, access channels are constrained, and institutional support is limited, firm-level capabilities are likely to operate under binding external constraints. Under such conditions, the ability of managerial capability to enhance the impact of financial resources becomes restricted, reducing its role as an amplifier of financial access. This suggests that improving financial literacy alone may generate limited gains unless broader systemic financial and institutional barriers are addressed.

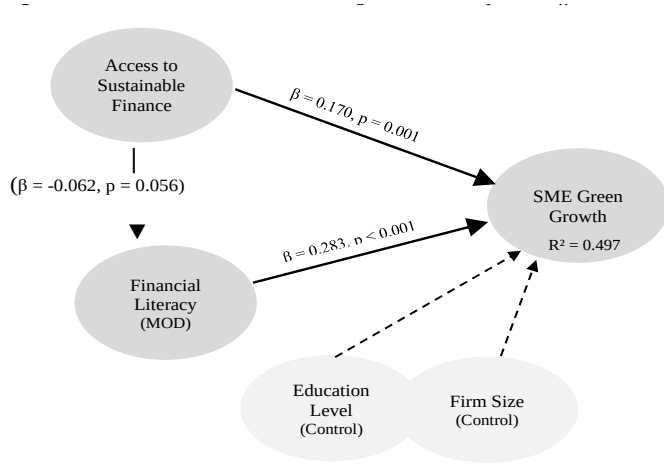

Figure 2. Structural model results showing standardized path coefficients
Source: Authors' elaboration

Effect Size (f^2)

Table 8 presents the effect size (f^2) values, which evaluate the relative contribution of each predictor construct to the explained variance in SME green growth. According to established PLS-SEM guidelines, f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively (Hair et al., 2025).

The results show that access to sustainable finance has a large effect size (f^2 = 0.370), indicating its substantial contribution to explaining SME green growth. Education level demonstrates a medium effect size (f^2 = 0.291), highlighting the importance of managerial capability in supporting sustainability outcomes. In contrast, financial literacy and firm size exhibit small effect sizes, suggesting a more limited, yet meaningful, contribution to explaining variations in SME green growth.

The findings highlight the central role of access to sustainable finance in driving environmentally sustainable growth among SMEs.

Table 8: Effect size (f^2) results

Predictor	Endogenous Construct	f^2	Effect Size
Sustainable finance	SME green growth	0.370	Large
Financial literacy	SME green growth	0.072	Small
Firm size (control)	SME green growth	0.030	Small
Education level (control)	SME green growth	0.291	Medium

Source: Authors' calculations

Note: f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively (Cohen,1988; Hair et al., 2022).

Overall, the results support the proposed direct relationships, highlighting access to sustainable finance as the primary driver of SME green growth. Financial literacy shows a significant direct effect but does not moderate the relationship. Education level contributes meaningfully, while firm size has a smaller influence. These findings provide a basis for further discussion.

Conclusion, Implications, and Limitations

Conclusion

In conclusion, this study addresses an important gap in the sustainable finance and SME literature by examining how financial resources and managerial capabilities operate within a fragile and conflict-affected economy. Using evidence from Palestinian manufacturing SMEs, the findings confirm that access to sustainable finance plays a central role in supporting green growth, eco-innovation, and environmentally sustainable business practices. The results further show that financial literacy contributes directly to firm-level sustainability outcomes, but does not strengthen the relationship between financial access and green growth under conditions of structural fragility. This finding suggests that managerial capability, while important, remains constrained by broader institutional and financial limitations in highly disrupted environments. The study therefore advances a more context-sensitive understanding of the finance–sustainability nexus by demonstrating that the developmental impact of sustainable finance depends not only on internal firm capabilities, but also on the stability and effectiveness of the surrounding financial and institutional infrastructure.

Practical and Policy Implications

From a policy perspective, interventions must prioritize expanding direct access to sustainable capital and strengthening credit infrastructures rather than relying solely on isolated capability-building programs. Because managerial training alone cannot generate meaningful green transitions under conditions of structural fragility, central banks and monetary authorities should reduce credit barriers, establish adaptive risk-sharing mechanisms, and leverage fintech solutions to minimize transaction frictions and improve financing accessibility for SMEs operating in constrained environments (Lee & Shin, 2018; Calice, 2023; OECD, 2023). Furthermore, financial literacy initiatives should not be implemented as standalone remedies, but rather integrated with broader regulatory reforms and digital financial inclusion strategies to ensure that SMEs possess both the financial resources and managerial capabilities required to navigate green market transitions effectively (Zhang & Li, 2023).

Limitations

Several limitations offer clear pathways for future inquiry. First, the empirical focus on manufacturing SMEs in the Gaza Strip limits the immediate generalizability of these findings to service sectors or more stable developing economies. Second, the cross-sectional design captures only a temporal snapshot, omitting how institutional shocks and green growth trajectories co-evolve over time. Future research should deploy longitudinal or mixed-method frameworks and incorporate external parameters including institutional quality metrics, digital ecosystem maturity, and firm-level innovation capabilities to construct a more dynamic, multi-dimensional understanding of SME resilience in fragile jurisdictions.

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