

Green Entrepreneurial Orientation and Sustainable Business Performance: The Mediating Role of Innovation Capability

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ABSTRACT

Backgrounds: Ghanaian MSMEs face growing pressure to improve environmental and sustainability practices under resource constraints, yet existing studies have focused mainly on specific green practices, leaving the role of innovation capability in linking broader green entrepreneurial orientation to sustainable business performance underexplored.

Objectives: This study examines the relationship between green entrepreneurial orientation and sustainable business performance among Ghanaian micro, small and medium-sized enterprises, with particular attention to the mediating role of innovation capability.

Methodology: Data were obtained from 383 owner-managers, founders, and senior decision-makers of MSMEs in the Greater Accra and Ashanti Regions. Green entrepreneurial orientation was operationalised through five dimensions and combined into an equally weighted composite. The data were analysed using multiple regression and regression-based mediation with 5,000 bootstrap resamples.

Findings: Green entrepreneurial orientation was positively associated with innovation capability and sustainable business performance. Innovation capability was positively associated with sustainable business performance and significantly mediated the GEO-performance relationship. Firm size was positively associated with innovation capability, while its direct association with sustainable business performance was not statistically significant. Its indirect association through innovation capability and its total association with performance were significant.

Conclusions: The study provides evidence from Ghanaian MSMEs on a specific pathway linking green entrepreneurial orientation to sustainable business performance through broader innovation capability. The findings also show that firm size is associated with performance indirectly through innovation capability rather than through a statistically significant direct relationship.

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1. INTRODUCTION

Small and medium-sized enterprises are important to Ghana's business activity, yet many operate under resource constraints while facing increasing pressure to improve environmental and sustainability practices. Recent Ghanaian evidence shows that these pressures are already reflected in firms' innovation and performance activities. Karikari et al. (2025), using data from 449 Ghanaian SMEs across several sectors, found that sustainability orientation, resource availability, and digital technology adoption were positively associated with sustainable performance, with green innovation practices providing an important pathway. The study also reports that the level of green-practice

adoption among Ghanaian SMEs remains limited, with gaps in the knowledge, skills, and capabilities needed to implement environmental innovations.

Other Ghanaian studies reinforce the relevance of green innovation and entrepreneurial orientation to SME performance. Appiah et al. (2025), based on 224 manufacturing SMEs in Ghana, found that green process innovation was associated with financial performance under conditions that supported effective resource orchestration. Agyapong et al. (2024), using 246 Ghanaian small firms, found that green creativity was positively associated with financial and environmental performance. Afum et al. (2023) also reported positive relationships between ecopreneurship posture, green practices, green competitiveness, and community-based performance among Ghanaian manufacturing SMEs. More directly related to the present study, Anin et al. (2024) found that green entrepreneurial orientation was positively associated with environmental performance among Ghanaian SMEs, while its financial performance relationship was not significant and was partly channelled through green purchasing.

Although these studies provide useful evidence from Ghana, they examine different parts of the sustainability problem. Existing Ghanaian research has considered green purchasing, green supply chain integration, green creativity, green process innovation, and other green practices, but less attention has been given to innovation capability as the mechanism linking the broader green entrepreneurial orientation of the firm to a combined sustainable business performance outcome. This distinction is important because green entrepreneurial orientation represents a wider strategic posture involving green innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness. Examining how this orientation relates to innovation capability and sustainable business performance can therefore provide a clearer account of the pathway linking entrepreneurial orientation with sustainability outcomes.

International evidence also indicates that the GEO-performance relationship is not uniform across contexts. Positive relationships have been reported among SMEs in Pakistan and Portugal (Coelho et al., 2023; Dahri et al., 2025), whereas insignificant direct relationships have been reported in Indonesian settings (Anjaningrum et al., 2025; Sugangga et al., 2026). Other studies identify innovation-related capabilities and green knowledge mechanisms as important pathways between entrepreneurial orientation and performance (Baquero, 2024; Qiao et al., 2026; Qin et al., 2024; Rong et al., 2024). These differences suggest that the relationship requires further examination in settings where the resource and institutional conditions differ from those represented in much of the existing literature.

This study examines the relationship between green entrepreneurial orientation and sustainable business performance among Ghanaian MSMEs, with particular attention to the mediating role of innovation capability. It also examines firm size as a substantive predictor of innovation capability and sustainable business performance. The study makes three contributions. First, it adds evidence from Ghana to the growing literature on GEO and sustainable business performance while recognising existing Ghanaian work rather than treating the country as an unexplored setting. Second, it tests innovation capability as a mechanism linking GEO with sustainable business performance. Third, it considers firm size within the same model to assess whether enterprise size is associated with the proposed performance pathway.

2. LITERATURE REVIEW

2.1. Literature Search Scope

The literature discussed in this section was drawn from the Scopus-sourced studies already assembled for the manuscript and screened for direct relevance to green entrepreneurial orientation, innovation capability, sustainable business performance, and firm-level characteristics. The review was topic-focused rather than a registered systematic review. Accordingly, statements about gaps refer to the studies identified for this manuscript and are not presented as evidence that no other relevant studies exist.

2.2. Theoretical Foundation: Natural-Resource-Based View

Grounded in the Natural-Resource-Based View (NRBV), the research adopts a framework that broadens the resource-based view by recognizing that environmentally related capabilities can support sustained competitive advantage (Hart, 1995). In the present research, an environmental strategic posture is represented by green entrepreneurial orientation, while an organisational capability that may translate that posture into new products, processes, and practices is represented by innovation capability. This theoretical logic supplies a basis for examining the direct relationship between GEO and sustainable business performance as well as the indirect relationship running through Innovation Capability. Ghanaian evidence, including Anin et al. (2024), has also applied the NRBV to GEO and firm performance, with that study examining green purchasing and supply-chain integration as mechanisms.

2.3. Green Entrepreneurial Orientation and Sustainable Business Performance

A firm's tendency to pursue environmental opportunities through green innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness is what green entrepreneurial orientation reflects. Drawing on the broader entrepreneurial orientation framework of Lumpkin and Dess (1996), this five-dimensional structure finds its green contextualisation consistent with GEO literature, including Jiang et al. (2018). From the NRBV standpoint, such an orientation is capable of guiding firms toward environmentally responsible strategies and toward developing capabilities that support performance. Empirical findings, however, remain inconsistent. A positive relationship between GEO and sustainable performance among Pakistani manufacturing SMEs was reported by Dahri et al. (2025), while Coelho et al. (2023) found a positive relationship among Portuguese industrial SMEs through green product and process innovation. Anin et al. (2024) found, in Ghana, a positive relationship between GEO and environmental performance but not financial performance. These differences suggest that the relationship may depend on the mechanisms through which GEO is translated into firm activities. Hence, the direct association between GEO and Sustainable Business Performance is tested in the present study.

H1: Green entrepreneurial orientation is positively associated with sustainable business performance.

2.4. Green Entrepreneurial Orientation and Innovation Capability

A green entrepreneurial orientation can also shape the way firms search for, develop, and implement new ideas. Firms that proactively identify environmental opportunities and are willing to invest in green initiatives may have stronger incentives to develop innovation-related capabilities. Qin et al. (2024) found that GEO was associated with green innovation-related outcomes, while Rong et al. (2024) reported a relationship between GEO and green innovation capability. Qiao et al. (2026) further identified innovation capabilities as a mechanism connecting GEO with SME performance. Evidence from Ghana also indicates that green creativity and green process innovation are relevant to firm performance (Agyapong et al., 2024; Appiah et al., 2025). On this basis, GEO is expected to be positively associated with Innovation Capability.

H2: Green entrepreneurial orientation is positively associated with innovation capability.

2.5. Innovation Capability and Sustainable Business Performance

The capacity of a firm to produce, cultivate, and put into practice new ideas and solutions is what innovation capability means (Lawson & Samson, 2001). This capability matters for sustainable business performance, since firms must convert environmental and market opportunities into changes across products, processes, and practices. Ghanaian evidence demonstrates that green process innovation is linked to financial performance among manufacturing SMEs (Appiah et al., 2025), while green creativity is linked to financial and environmental performance among small firms (Agyapong et al., 2024). International evidence similarly links innovation capabilities and related green innovation mechanisms with sustainability performance (Coelho et al., 2023; Qiao et al., 2026). These findings provide a basis for expecting a positive relationship between Innovation Capability and Sustainable Business Performance.

H3: Innovation capability is positively associated with sustainable business performance.

2.6. Firm Size, Innovation Capability and Sustainable Business Performance

Firm size is considered because organisational scale can be associated with differences in the resources and capabilities available for innovation and sustainability-related activities. Research on SMEs has identified firm size as one organisational characteristic associated with differences in innovation activity (Raymond & St-Pierre, 2010), while organisational research also recognises the importance of firm characteristics in responses to environmental pressures (Etzion, 2007). These arguments do not imply that larger firms necessarily perform better. Rather, they provide a basis for testing whether firm size is associated with Innovation Capability and Sustainable Business Performance. In the present model, firm size is therefore treated as a substantive predictor rather than only as a statistical control.

H4: Firm size is significantly associated with sustainable business performance directly and indirectly through innovation capability.

2.7. Synthesis and Research Gap

The literature points to a connected sequence in which GEO provides an environmental entrepreneurial orientation, Innovation Capability provides a means of translating that orientation into organisational action, and Sustainable Business Performance represents the resulting performance outcome. The existing evidence supports each relationship but also shows contextual differences in the strength and form of the associations. Ghanaian studies have established the relevance of GEO, green innovation, and sustainability performance, but the specific indirect pathway from a composite GEO measure to sustainable business performance through Innovation Capability remains insufficiently examined. The present study addresses this specific relationship and also examines whether firm size is associated with the pathway. The study uses regression-based mediation with bootstrapping rather than PLS-SEM because the substantive analysis is based on observed composite scores, including an equally weighted GEO composite. The indirect association is evaluated through a bootstrap confidence interval, consistent with the regression-based approach to mediation (Hayes, 2022). The proposed conceptual framework is shown in Figure 1.

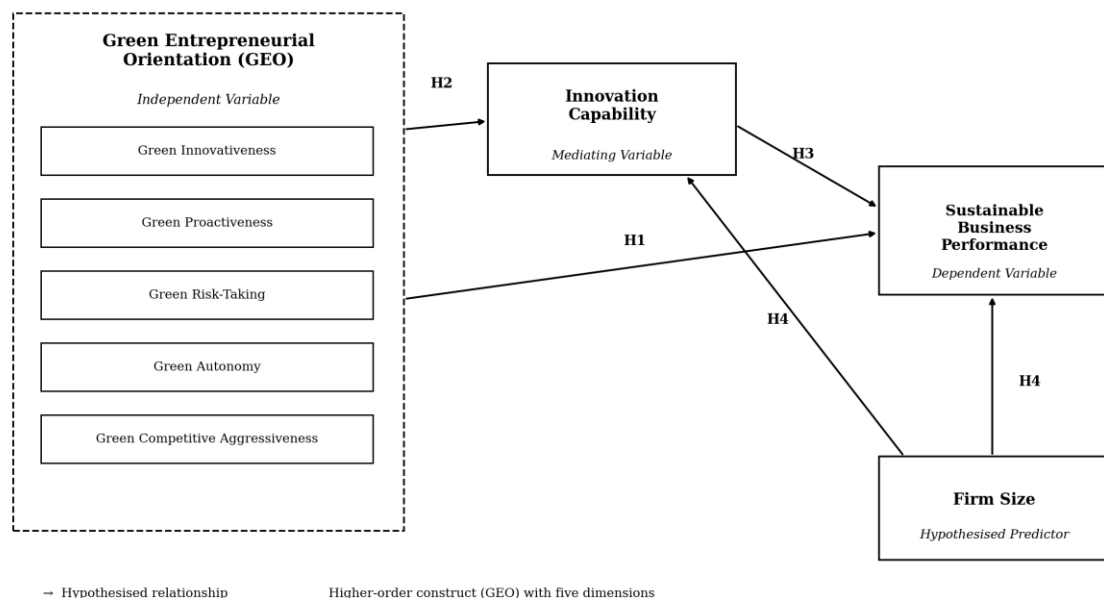


Figure 1. Conceptual Framework
Source: Developed by the authors (2026)

3. METHOD

As shown in Figure 2, the methodology flowchart outlines the sequential stages of the study, from research design to the interpretation of results.



Figure 2. Methodology Flowchart
Source: Developed by the authors (2026)

3.1. Research Design

This research applied a quantitative, cross-sectional, and explanatory design in order to investigate relationships linking green entrepreneurial orientation (GEO), innovation capability, and sustainable business performance. Since the study measured constructs specified by theory and tested hypothesised relationships statistically, a quantitative design was deemed appropriate (Creswell & Creswell, 2018). A cross-sectional design was adopted because data were collected at a single point rather than through repeated observation. This suited assessing associations within a defined population (Saunders et al., 2019). Although this design does not establish temporal causality as a longitudinal design would, the mediation model provided a basis for testing the proposed explanatory mechanism.

3.2. Population, Sampling and Data Collection

The study focused on micro, small and medium-sized enterprises (MSMEs) operating in Ghana, with data collected from firms in the Greater Accra and Ashanti Regions. The 2024 Integrated Business Establishment Survey recorded 434,623 establishments in Greater Accra and 296,338 in Ashanti (Ghana Statistical Service, 2024), giving a combined establishment frame of 730,961. Because this frame covers establishments generally rather than MSMEs specifically, employee-size criteria were applied during screening. For this study, micro enterprises comprised firms with 1–5 full-time employees, small enterprises comprised firms with 6–30 employees, and medium

enterprises comprised firms with 31–100 employees. The unit of analysis was the firm, while the unit of observation was an owner, founder, or senior decision-maker. Key informants were used as they were expected to have sufficient knowledge of strategic issues within the firm (Kumar et al., 1993).

A multi-stage sampling procedure combined proportional regional allocation, enterprise eligibility screening, and purposive respondent selection. The regional target was allocated in proportion to the establishment counts reported by the Ghana Statistical Service. Eligible enterprises were then screened according to the defined employee-size criterion, and an owner, founder, or senior decision-maker was purposively selected as the respondent within each participating firm (Saunders et al., 2019). Because the selection of firms and respondents was purposive, the regional proportions describe the study sampling plan and should not be interpreted as probability-based population estimates. A minimum analytical target of 384 completed responses was set before data collection to provide adequate observations for the planned regression and mediation models. This benchmark was used as a practical sample target rather than as a basis for claiming a 95% confidence level or a 5% population margin of error. The study initially planned for up to 500 responses, and 420 questionnaires were distributed to eligible firms. Following data collection, incomplete questionnaires and repeated submissions were removed, leaving 384 complete responses, representing a response rate of 91.43%. During eligibility screening, one observation was excluded because the firm reported 120 full-time employees, exceeding the defined upper employee-size criterion of 100 employees. The final analytical sample therefore comprised 383 MSMEs, representing a final usable response rate of 91.19%.

3.3. Measurement and Construct Operationalisation

Included in the questionnaire were 35 substantive measurement items, all of which were rated on a five-point scale from strongly disagree to strongly agree. Green entrepreneurial orientation was operationalised through five dimensions, namely green innovativeness, green proactiveness, green risk-taking, green autonomy, and green competitive aggressiveness. Informing the dimensional structure were the five-dimensional entrepreneurial orientation framework of Lumpkin and Dess (1996) and green entrepreneurial orientation research such as Jiang et al. (2018). The wording of the present items was adapted and contextualised for Ghanaian MSMEs, and it underwent review for clarity before full administration. Each GEO dimension contained five items. Dimension scores were averaged to obtain an overall GEO composite, with each dimension contributing equally. This aggregation is an analytical representation of an overarching GEO score and does not imply that the five dimensions are interchangeable. Innovation capability was measured with five items capturing the firm's ability to generate, develop, implement, and incorporate new ideas and knowledge, drawing conceptually on Lawson and Samson (2001). Sustainable business performance was measured with five items covering economic, environmental, and social outcomes, informed by the triple bottom line perspective of Elkington (1997). The five SBP items were analysed as a single observed composite rather than as three separately estimated performance dimensions. Firm size was measured objectively using the number of full-time employees. Because the substantive analysis used observed composite scores in regression rather than a latent-variable SEM, the study does not present SEM-specific CR, AVE, or HTMT statistics; measurement evidence is instead provided through the dimensionality check, internal consistency estimates, and interconstruct correlations reported below.

Following a pilot assessment of item clarity and wording, the questionnaire was administered to an owner, founder, or senior decision-maker at each eligible firm. Participation was voluntary. Clear instructions, confidentiality assurance, separation of measurement sections, and voluntary participation were used as procedural measures to reduce the risk of common method bias (Podsakoff et al., 2003).

3.4. Data Screening and Quality Assurance

Data screening was conducted before the substantive analysis. Following collection, incomplete questionnaires and repeated submissions were removed. The resulting 384 complete records were screened for missing values, duplicate records, duplicate questionnaire-response profiles, invalid values outside the five-point response scale, restricted response patterns, and multivariate extreme observations. No missing questionnaire responses, remaining duplicate records,

duplicate respondent profiles, or invalid Likert-scale values were identified in the 384 complete records. No respondent selected the same response category across all 35 measurement items, and no respondent used only one or two response categories across the complete questionnaire. One observation was excluded solely because the enterprise reported 120 full-time employees and therefore exceeded the defined upper employee-size criterion. No questionnaire responses were altered or imputed. The final dataset contained 383 observations.

A single-factor diagnostic was conducted using unrotated principal component analysis of the 35 measurement items. In the final sample of 383 observations, the first component had an eigenvalue of 7.449 and accounted for 21.23% of the total variance. No single component therefore accounted for the majority of the observed variance. This result provides some evidence against a dominant single-factor problem, although it does not rule out common method bias entirely.

3.5. Data Analysis

Data were analysed in jamovi. The analysis proceeded from data screening and descriptive statistics to reliability and correlation analysis, followed by multiple regression. Mediation was tested using regression-based bootstrapping with 5,000 resamples (Hayes, 2022). The indirect association was considered statistically significant when its bootstrap confidence interval did not include zero. Green entrepreneurial orientation was entered as the predictor, innovation capability as the mediator, sustainable business performance as the outcome, and full-time employees as a predictor of both innovation capability and sustainable business performance. The analysis therefore treated firm size as a substantive predictor rather than as a purely control variable.

3.6. Ethical Considerations

Involvement was voluntary and based on informed consent. At any point, respondents could decline or withdraw freely. Confidentiality and anonymity were preserved, and neither individuals nor firms were identified in the reporting. The study adhered to the committee's requirements and recognised ethical principles, among them the Declaration of Helsinki.

4. RESULTS AND DISCUSSION

4.1. Research Results

4.1.1. Respondent Profile

The final analytical sample comprised 383 usable responses. Table 1 summarises the regional, sectoral, industry, and firm-level characteristics of the participating MSMEs. One firm reporting 120 full-time employees was excluded during eligibility screening because it exceeded the defined upper employee-size criterion of 100 employees.

Table 1. Sample Profile (N = 383)

Characteristic	Category	n	%
Region	Greater Accra	228	59.53
	Ashanti	155	40.47
Industry	Wholesale/Retail	116	30.29
	Services	86	22.45
	Manufacturing	49	12.79
	Agriculture/Food Processing	38	9.92
	Construction	32	8.36
	Hospitality/Tourism	31	8.09
	Transport/Logistics	31	8.09
Enterprise Size	Micro (1–5)	76	19.84
	Small (6–30)	260	67.89
	Medium (31–100)	47	12.27
Firm Age (years)	M = 12.23, SD = 8.09, Range = 1–45	383	—
Full-Time Employees	M = 15.51, SD = 14.34, Range = 1–95	383	—

Source: Primary data processed by the authors (2026)

The study obtained 383 valid responses from SMEs across the Greater Accra (59.53%) and Ashanti (40.47%) Regions, ensuring balanced representation from both study areas. Sectorally, wholesale and retail enterprises comprised the largest group (30.29%), followed by services (22.45%) and manufacturing (12.79%). Agriculture and food processing represented 9.92%, construction made up 8.36%, while hospitality/tourism and transport/logistics accounted for 8.09% each. By enterprise scale, the majority of firms were small enterprises employing 6 to 30 staff (67.89%), followed by micro enterprises (1 5 employees, 19.84%) and medium-sized firms (31 100 employees, 12.27%). On average, participating firms had operated for 12.23 years (\$SD = 8.09\$, range: 1 45 years) and employed 15.51 full-time workers (\$SD = 14.34\$, range: 1 95 employees).

4.1.2. Item-Level Descriptive Statistics and Normality

Table 2 reports item-level means, standard deviations, skewness, kurtosis, and Shapiro-Wilk statistics for the 35 measurement items in the final sample of 383 observations. All items departed significantly from normality ($p < .001$). The skewness and kurtosis values were nevertheless relatively small in magnitude. Given the ordinal five-point response format and these distributional characteristics, bootstrap confidence intervals were used for the mediation analysis rather than relying on normal-theory inference for the indirect associations.

Table 2. Item-Level Descriptive Statistics and Normality (N = 383)

Item	M	SD	Skewness	Kurtosis	Shapiro-Wilk W	p
GI1	2.97	0.880	0.061	0.103	0.885	< .001
GI2	3.00	0.888	0.253	-0.138	0.885	< .001
GI3	3.01	0.859	0.015	-0.067	0.885	< .001
GI4	3.01	0.885	-0.140	-0.207	0.889	< .001
GI5	3.00	0.891	-0.005	-0.526	0.888	< .001
GP1	2.99	0.880	-0.026	-0.439	0.888	< .001
GP2	2.98	0.924	-0.009	-0.169	0.898	< .001
GP3	3.03	0.912	-0.093	-0.320	0.896	< .001
GP4	2.99	0.904	-0.118	-0.348	0.893	< .001
GP5	3.00	0.885	-0.041	-0.268	0.891	< .001
GRT1	3.00	0.917	0.005	-0.369	0.897	< .001
GRT2	3.00	0.885	-0.109	-0.113	0.889	< .001
GRT3	3.01	0.876	-0.025	-0.179	0.889	< .001
GRT4	3.00	0.891	0.040	-0.120	0.892	< .001
GRT5	2.98	0.876	-0.200	-0.306	0.884	< .001
GA1	3.01	0.889	-0.088	-0.254	0.891	< .001
GA2	2.99	0.867	0.161	-0.535	0.878	< .001
GA3	3.00	0.891	-0.027	-0.373	0.891	< .001
GA4	3.00	0.891	0.162	-0.270	0.890	< .001
GA5	3.01	0.882	-0.048	-0.078	0.889	< .001
GCA1	3.02	0.892	-0.031	-0.133	0.892	< .001
GCA2	3.00	0.892	-0.067	-0.084	0.891	< .001
GCA3	2.97	0.886	0.096	-0.374	0.889	< .001
GCA4	3.00	0.892	-0.200	-0.084	0.888	< .001
GCA5	3.01	0.882	-0.072	-0.340	0.889	< .001
IC1	3.02	0.907	0.223	-0.292	0.890	< .001
IC2	3.01	0.899	-0.124	-0.154	0.892	< .001
IC3	3.00	0.885	0.132	-0.165	0.889	< .001
IC4	3.00	0.886	-0.091	-0.075	0.890	< .001
IC5	2.97	0.877	0.131	-0.231	0.888	< .001
SBP1	3.01	0.908	0.069	-0.293	0.895	< .001
SBP2	3.00	0.870	-0.173	-0.285	0.884	< .001
SBP3	2.99	0.899	0.124	-0.252	0.893	< .001
SBP4	2.99	0.896	-0.084	-0.035	0.891	< .001
SBP5	3.01	0.894	-0.015	-0.149	0.893	< .001

Source: Primary data processed by the authors (2026)

4.1.3. Exploratory Measurement Structure Check

An exploratory principal component analysis with orthogonal varimax rotation was conducted on the 35 measurement items to examine whether the observed item structure was broadly consistent with the seven intended measurement components: the five GEO dimensions, Innovation Capability, and Sustainable Business Performance. Sampling adequacy was satisfactory (KMO = .880), and Bartlett's test of sphericity was statistically significant, $\chi^2(595) = 4608.25$, $p < .001$. The seven retained components explained 57.65% of the total variance. All 35 items loaded most strongly on their intended component, with primary component loadings ranging from .649 to .789. The largest secondary loading was .228. This pattern provides exploratory evidence that the item groupings used to construct the observed composites were distinguishable in the final sample. The analysis is treated as an exploratory structure check rather than as a confirmatory test of a latent measurement model. The results are summarized in Table 3.

Table 3. Exploratory Measurement Structure Check (N = 383)

Indicator	Result
Kaiser-Meyer-Olkin measure	.880
Bartlett's test	$\chi^2(595) = 4608.25$, $p < .001$
Retained components	7
Cumulative variance explained	57.65%
Primary component loadings	.649 to .789
Largest secondary loading	.228

Source: Primary data processed by the authors (2026)

4.1.4. Assessment of Potential Common Method Bias

An unrotated principal component analysis of the 35 measurement items was also used as a single-factor diagnostic. In the final sample of 383 observations, the first component had an eigenvalue of 7.449 and explained 21.23% of the total variance. No single component accounted for the majority of the variance. This result suggests that a dominant single-factor pattern was not evident, although a single-factor diagnostic cannot establish that common method bias is absent. The procedural safeguards described above therefore remain important when interpreting the findings.

4.1.5. Reliability

Table 4 presents the scale reliability statistics for the seven measured constructs, showing that all values exceeded the recommended .70 threshold. Cronbach's alpha ranged from .769 for Innovation Capability to .829 for Green Risk-Taking, while McDonald's omega ranged from .769 to .829. These findings suggest that acceptable internal consistency is present across the five GEO dimensions, Innovation Capability, and Sustainable Business Performance. Internal consistency on its own does not confirm convergent or discriminant validity, so the exploratory measurement structure check above is examined together with these reliability estimates.

Table 4. Scale Reliability Statistics (N = 383)

Construct	Items	Cronbach's α	McDonald's ω
Green Innovativeness	5	0.807	0.809
Green Proactiveness	5	0.824	0.825
Green Risk-Taking	5	0.829	0.829
Green Autonomy	5	0.823	0.823
Green Competitive Aggressiveness	5	0.811	0.811
Innovation Capability	5	0.769	0.769
Sustainable Business Performance	5	0.796	0.796

Source: Primary data processed by the authors (2026)

4.1.6. Correlation Analysis

Table 5 presents Pearson correlations among the five GEO dimensions, the GEO composite, Innovation Capability, Sustainable Business Performance, and full-time employees. The GEO composite was positively associated with Innovation Capability ($r = .213$, $p < .001$) and Sustainable

Business Performance ($r = .233, p < .001$). Full-time employees were positively associated with Innovation Capability ($r = .133, p = .009$) and Sustainable Business Performance ($r = .129, p = .012$), but not with the GEO composite ($r = .051, p = .317$). The intercorrelations among the five GEO dimensions were positive but moderate, ranging from .309 to .408, which is consistent with treating them as related dimensions rather than identical indicators.

Table 5. Pearson Correlations Among Study Variables (N = 383)

Variable	1	2	3	4	5	6	7	8	9
1. GI	—								
2. GP	.357***	—							
3. GRT	.343***	.408***	—						
4. GA	.362***	.326***	.322***	—					
5. GCA	.309***	.385***	.321***	.331***	—				
6. IC	.113*	.176***	.174***	.122*	.148**	—			
7. SBP	.080	.176***	.149**	.213***	.185***	.318***	—		
8. GEO	.682***	.721***	.696***	.677***	.678***	.213***	.233***	—	
9. Employees	.008	.025	.105*	.022	.016	.133**	.129*	.051	—

Source: Primary data processed by the authors (2026)

4.1.7. Regression Results

Table 6 presents the regression models used in the mediation analysis. GEO was positively associated with Innovation Capability ($B = 0.2833, \beta = .206, p < .001$), while full-time employees were also positively associated with Innovation Capability ($B = 0.0055, \beta = .123, p = .014$). Together, the predictors explained 6.03% of the variance in Innovation Capability. In the outcome model, GEO was positively associated with Sustainable Business Performance ($B = 0.2428, \beta = .171, p < .001$), and Innovation Capability was positively associated with Sustainable Business Performance ($B = 0.2791, \beta = .270, p < .001$). The direct association between full-time employees and Sustainable Business Performance was not statistically significant ($B = 0.0039, \beta = .084, p = .082$).

The model explained 13.66% of the variance in Sustainable Business Performance. The relatively modest R^2 values indicate that the model captures only part of the variation in the two outcomes and that other organisational, market, and institutional factors may also contribute to innovation capability and sustainable business performance. Regression diagnostics did not indicate serious multicollinearity or residual problems. Variance inflation factors ranged from 1.003 to 1.064. The residual normality tests were non-significant across the three regression equations, and the Breusch-Pagan tests did not indicate significant heteroscedasticity. Durbin-Watson statistics were close to 2, ranging from 1.965 to 2.087. The largest Cook's distance was .060, indicating no influential observation of concern under the diagnostic criteria applied.

Table 6. Regression Models Predicting Innovation Capability and Sustainable Business Performance (N = 383)

Predictor	B	SE	β	t	p
Outcome: Innovation Capability ($R^2 = .060$)					
Intercept	2.064	0.209	—	9.89	< .001
GEO	0.283	0.068	.206	4.14	< .001
Full-Time Employees	0.0055	0.0022	.123	2.47	.014
Outcome: Sustainable Business Performance ($R^2 = .137$)					
Intercept	1.374	0.232	—	5.92	< .001
GEO	0.243	0.069	.171	3.50	< .001
Innovation Capability	0.279	0.051	.270	5.49	< .001
Full-Time Employees	0.0039	0.0022	.084	1.74	.082
Total model: Sustainable Business Performance ($R^2 = .068$)					
Intercept	1.950	0.215	—	9.08	< .001
GEO	0.322	0.070	.227	4.58	< .001
Full-Time Employees	0.0054	0.0023	.117	2.36	.019

Source: Primary data processed by the authors (2026)

4.1.8. Mediation Analysis

The indirect association between GEO and Sustainable Business Performance through Innovation Capability was positive and statistically significant ($B = 0.0791$, 95% CI [0.0356, 0.1279]) based on 5,000 bootstrap resamples. Because the direct association between GEO and Sustainable Business Performance remained significant after Innovation Capability was included ($B = 0.2428$, $p < .001$), the findings provide support for partial mediation. Full-time employees also showed a significant indirect association with Sustainable Business Performance through Innovation Capability ($B = 0.00153$, 95% CI [0.00034, 0.00300]). However, the direct association between full-time employees and Sustainable Business Performance was not statistically significant ($B = 0.00388$, $p = .082$), while the total association was significant ($B = 0.00542$, $p = .019$). Table 7 presents the indirect, direct, and total effects, showing that Innovation Capability partially mediates the relationship between GEO and Sustainable Business Performance.

Table 7. Indirect, Direct, and Total Effects (Bootstrap Percentile 95% CI, N = 383)

Effect	B	SE	95% CI LL	95% CI UL	β	z	p
Indirect: GEO → IC → SBP	0.0791	0.024	0.0356	0.1279	.056	—	—
Indirect: Employees → IC → SBP	0.00153	0.0007	0.00034	0.00300	.030	—	—
Direct: GEO → SBP	0.2428	0.0693	—	—	.171	—	< .001
Direct: Employees → SBP	0.00388	0.0022	—	—	.084	—	.082
Total: GEO → SBP	0.3219	0.0703	—	—	.227	—	< .001
Total: Employees → SBP	0.00542	0.0023	—	—	.117	—	.019

Source: Primary data processed by the authors (2026)

Hypothesis assessment: H1 was supported because GEO was positively associated with SBP. H2 was supported because GEO was positively associated with IC. H3 was supported because IC was positively associated with SBP and the GEO-to-SBP indirect association through IC was significant. H4 received partial support because the firm-size indirect and total associations were significant, but the direct association with SBP was not statistically significant.

4.2. Discussion

This study examined the relationships among green entrepreneurial orientation (GEO), innovation capability, and sustainable business performance among Ghanaian MSMEs. The discussion compares the present findings with previous empirical studies, paying attention to differences in context, constructs, samples, analytical approaches, and the mechanisms through which relationships were examined. H1, H2, and H3 were supported, while H4 received partial support. The findings therefore both confirm parts of the existing literature and show where the Ghanaian MSME context differs from evidence reported elsewhere.

4.2.1. Green Entrepreneurial Orientation and Sustainable Business Performance (H1)

H1 proposed that green entrepreneurial orientation would be positively associated with sustainable business performance. The result supported this hypothesis ($B = 0.2428$, $\beta = .171$, $p < .001$). Thus, firms in the present sample that reported stronger green entrepreneurial orientation also reported stronger sustainable business performance. This finding is consistent with Dahri et al. (2025), who examined 380 manufacturing SMEs in Pakistan using SmartPLS-SEM and found positive associations among green entrepreneurial orientation, green innovation, green intellectual capital, and sustainable firm performance. It is also broadly consistent with Coelho et al. (2023), who studied 369 industrial SMEs across 13 Portuguese districts and found that GEO was positively related to green product and process innovation and that these innovations contributed to sustainability performance across the economic, environmental, and social dimensions. The present study therefore confirms the general direction reported in these studies, although the analytical model differs because

the present study estimates the relationship using an overall GEO composite and a regression-based model.

The Ghanaian evidence provides a more nuanced comparison. Anin et al. (2024), using 225 SMEs in Ghana, found that GEO had a positive direct association with environmental performance but not with financial performance. They further showed that green purchasing provided an important pathway through which GEO was associated with performance, particularly under stronger supplier and customer integration. The present study differs in two respects. First, sustainable business performance was assessed as a composite outcome incorporating economic, environmental, and social dimensions rather than examining environmental and financial performance separately. Second, innovation capability rather than green purchasing was examined as the principal mediating mechanism. The significant direct association observed in the present study therefore confirms the environmental-performance component of Anin et al.'s findings but extends the evidence by showing that, when performance dimensions are considered jointly, GEO is also positively associated with the broader sustainable business performance construct. The result should nevertheless not be interpreted as evidence that GEO has the same relationship with every individual performance dimension. This distinction is important because the present composite outcome and broader innovation capability mechanism do not reproduce the same measurement and model specification used by Anin et al. (2024).

The finding also differs from Dewi Anjaningrum et al. (2025), who examined 253 Indonesian batik SMEs and found that GEO had no significant direct association with sustainable performance. In that study, green knowledge management and ambidextrous green innovation operated as sequential mediators. The difference between that result and the present significant direct association indicates that the GEO-performance relationship is not uniform across settings and model specifications. Differences in industry, national context, performance measurement, and the mediating mechanisms included in the model may be relevant, although the present cross-sectional data cannot establish which of these factors accounts for the difference. Taken together, the evidence supports H1 in the Ghanaian sample, while also confirming that the direct GEO-performance relationship remains context-dependent in the wider literature. The present cross-sectional evidence cannot determine whether industry, national context, performance measurement, or the selected mediating mechanisms account for the difference.

4.2.2. Green Entrepreneurial Orientation and Innovation Capability (H2)

H2 proposed a positive association between GEO and innovation capability, and the result supported the hypothesis ($B = 0.2833$, $\beta = .206$, $p < .001$). This finding is consistent with Qin et al. (2024), who analysed 383 Chinese manufacturing firms and found that GEO was positively related to green innovation and that green innovation formed part of the pathway connecting GEO with firm performance. It is also consistent with Rong et al. (2025), who used data from 300 employees in Chinese manufacturing and service organisations and found that GEO was positively related to green innovation capability, which was subsequently linked with entrepreneurial success. Coelho et al. (2024) similarly reported that GEO was positively associated with green product and green process innovation among Portuguese industrial SMEs. Across these studies, the common finding is that a stronger environmental entrepreneurial orientation is accompanied by greater attention to innovation-related activities.

The present study nevertheless differs from much of this literature in the way innovation capability is defined. Qin et al. (2024), Coelho et al. (2023), and Rong et al. (2024) focused specifically on green innovation or green innovation capability, whereas the present study measured broader innovation capability through the firm's ability to generate and implement new ideas. The significant GEO-innovation capability association therefore suggests that the relationship is not limited to explicitly labelled green innovation activities. It indicates that a broader orientation towards green entrepreneurial opportunity may be accompanied by a wider organisational capacity for innovation. Evidence from Ghana provides supporting context: Agyapong et al. (2024) linked green creativity and innovation with firm performance among Ghanaian small firms, while Appiah et al. (2025) showed that green process innovation was associated with financial performance among Ghanaian manufacturing SMEs. Those studies did not test the GEO-to-general-innovation-capability relationship directly, so the present finding adds a more specific empirical link between

entrepreneurial orientation and the capability required to translate that orientation into organisational action. H2 is therefore supported, while the difference in construct definitions should be considered when comparing the magnitude of relationships across studies. The present result therefore extends the literature by considering a broader organisational innovation capability rather than a specifically green innovation outcome.

4.2.3. Innovation Capability and Sustainable Business Performance (H3)

H3 proposed that innovation capability would be positively associated with sustainable business performance. The finding supported this hypothesis ($B = 0.2791$, $\beta = .270$, $p < .001$). Innovation capability had the largest standardised coefficient among the predictors in the outcome model, indicating that the capacity to generate and implement new ideas was more strongly associated with sustainable business performance than the direct GEO association in the present model. This result is consistent with Coelho et al. (2023), where green product and process innovation were linked with sustainability performance across the triple bottom line. It is also consistent with Qin et al. (2024), who found that green innovation formed part of the mechanism through which GEO was associated with firm performance, and with Rong et al. (2024), who reported a relationship between green innovation capability and entrepreneurial success. Qiao et al. (2026) similarly found that innovation capabilities partially mediated the relationship between GEO and SME performance. The present study therefore confirms the broader argument that entrepreneurial orientation alone is not the only relevant organisational resource; the ability to develop and implement new ideas is also closely associated with performance outcomes.

The Ghanaian evidence points in the same direction. Appiah et al. (2025), using 224 Ghanaian manufacturing SMEs, found that green process innovation was associated with financial performance under conditions of effective resource orchestration. Agyapong et al. (2024) also reported relationships among green creativity, innovation, and financial and environmental performance among Ghanaian small firms. The present result extends these findings because the innovation construct is broader than green process innovation or green creativity, while the dependent variable combines economic, environmental, and social aspects of business performance. The finding should therefore be read as confirmation of the importance of innovation capability for sustainable performance, rather than as evidence that every form of innovation will produce the same performance outcome. H3 is supported within the scope of the sampled Ghanaian MSMEs.

4.2.4. The Mediating Role of Innovation Capability

The mediation results provide a more direct comparison with studies that have examined mechanisms linking GEO with performance. The indirect association between GEO and sustainable business performance through innovation capability was significant ($B = 0.0791$, 95% CI [0.0356, 0.1279]). At the same time, the direct GEO-performance association remained statistically significant ($B = 0.2428$, $p < .001$). The evidence therefore indicates partial mediation. This result is consistent with Qiao et al. (2026), who reported that innovation capabilities partially mediated the relationship between GEO and SME performance. It is also broadly consistent with Qin et al. (2024), who showed that GEO was associated with firm performance through green innovation and green entrepreneurship image. Rong et al. (2024) likewise examined green innovation capability as an intervening mechanism between GEO and entrepreneurial success. The common point across these studies and the present study is that innovation-related capability provides a pathway through which an entrepreneurial orientation can be translated into performance.

The present finding also differs from studies reporting a stronger form of mediation. Anjaningrum et al. (2025) found an insignificant direct GEO-performance relationship among Indonesian batik SMEs and identified green knowledge management and ambidextrous green innovation as sequential mediators. Coelho et al. (2023) likewise placed green product and process innovation between GEO and sustainability performance and examined ambidexterity as a moderating condition. Anin et al. (2024), in Ghana, identified green purchasing as an important mechanism linking GEO with environmental and financial performance. The present study adds to these studies by showing that a broader innovation capability construct can operate as a significant mechanism while the direct GEO-performance association remains significant. This means that innovation capability does not replace the direct association in the present sample. Rather, it accounts

for part of the association between GEO and sustainable business performance. Because the study is cross-sectional, this statistical mediation should be interpreted as evidence of an indirect association within the proposed model and not as proof of a temporal causal sequence. Because the data are cross-sectional, this mediation result is interpreted as an indirect association within the estimated model rather than proof of a temporal causal sequence.

4.2.5. Firm Size, Innovation Capability and Sustainable Business Performance (H4)

H4 received partial support. Firm size, measured by the number of full-time employees, was positively associated with innovation capability ($B = 0.0055$, $\beta = .123$, $p = .014$). However, its direct association with sustainable business performance was not statistically significant ($B = 0.0039$, $\beta = .084$, $p = .082$). The indirect association through innovation capability was significant ($B = 0.00153$, 95% CI [0.00034, 0.00300]), and the total association with sustainable business performance was also significant ($B = 0.00542$, $p = .019$). The result therefore does not support a direct firm-size relationship with sustainable business performance at the .05 level. Instead, it indicates that differences in firm size are associated with innovation capability, which is in turn associated with sustainable business performance.

This result is consistent with the broader organisational argument that firm characteristics and resource availability can shape firms' capacity to undertake innovation and respond to environmental pressures (Etzion, 2007; Raymond & St-Pierre, 2010). Raymond and St-Pierre (2010), for example, examined manufacturing SMEs and showed the relevance of firm-level characteristics and R&D resources to innovation activity. The present study does not reproduce that analysis because firm size is not used to explain R&D intensity; instead, employee size is entered as a substantive predictor of innovation capability and performance. The significant firm-size-to-innovation relationship therefore provides empirical support for considering organisational scale when examining innovation capability among MSMEs. At the same time, the nonsignificant direct performance path cautions against assuming that larger firms automatically achieve better sustainable business performance. The significant indirect association is more consistent with a capability-based explanation in which organisational scale is related to innovation capability, and innovation capability is related to performance. The finding is therefore better interpreted as a contextual extension of the model than as evidence that firm size is a direct theoretical determinant of sustainable business performance. The significant indirect association is more consistent with a capability pathway in which organisational scale is related to innovation capability, which is then related to performance.

4.2.6. Summary of Findings in Relation to Prior Literature

These findings are broadly consistent with earlier evidence while also showing some differences. The positive association between GEO and Sustainable Business Performance is consistent with findings reported among Pakistani and Portuguese SMEs (Dahri et al., 2025; Coelho et al., 2023). The GEO-to-Innovation Capability and Innovation Capability-to-performance relationships are also consistent with evidence from Chinese and Emirati firms (Qin et al., 2024; Rong et al., 2024; Baquero, 2025). The partial mediation observed here is closer to the pattern reported by Qiao et al. (2026) than the full mediation reported by Anjaningrum et al. (2025). The firm-size finding adds a contextual result because the identified studies did not directly test firm size as a predictor within this same model.

5. CONCLUSION

This study examined the relationship between green entrepreneurial orientation and sustainable business performance among Ghanaian MSMEs, with particular attention to the mediating role of Innovation Capability. The findings show positive associations between GEO and Innovation Capability, GEO and Sustainable Business Performance, and Innovation Capability and Sustainable Business Performance. Innovation Capability significantly mediated the GEO-performance relationship, while the direct GEO-performance association remained significant, indicating partial mediation. Firm size was positively associated with Innovation Capability and showed a significant indirect association with Sustainable Business Performance, but its direct association with performance was not statistically significant. Accordingly, H1, H2, and H3 were

supported, whereas H4 received partial support. These findings should be interpreted as evidence of relationships within the sampled MSMEs rather than as causal or population-level estimates for all Ghanaian MSMEs.

The study contributes to knowledge in three ways. First, it provides empirical evidence for relationships derived from the Natural-Resource-Based View in a Ghanaian MSME setting rather than treating the theory itself as directly tested. Second, it identifies Innovation Capability as an important mechanism linking GEO with Sustainable Business Performance while showing that the direct GEO-performance association remains significant. Third, it introduces firm size as a substantive contextual variable and shows that its relationship with performance is expressed indirectly through Innovation Capability in the present sample, while the direct association is not statistically significant. These contributions extend the empirical discussion beyond the Asian and other developing-country contexts represented in recent GEO research.

The findings suggest that Ghanaian MSME owner-managers should not treat environmental entrepreneurial orientation separately from the capacity to innovate. Support programmes can combine environmental management training with practical assistance in product development, process improvement, technology adoption, and implementation of new ideas. The significant indirect relationship through Innovation Capability also indicates that building capability is relevant when firms seek to translate green orientation into sustainable performance. Because firm size was positively associated with Innovation Capability, targeted technical and innovation support for smaller enterprises may be relevant, although the present study did not directly measure resource constraints or establish that smaller firms lack such resources.

Several limitations qualify these findings. The cross-sectional design does not establish temporal precedence or causal direction. The use of a single respondent and self-reported measures means that common method bias cannot be ruled out completely despite the procedural safeguards and diagnostic checks. The equally weighted GEO composite may also conceal differences among green innovativeness, green proactiveness, green risk-taking, green autonomy, and green competitive aggressiveness. The exploratory measurement structure check supports the intended grouping of items, but it is not a substitute for confirmatory factor analysis or a latent-variable measurement model. The study covered only Greater Accra and Ashanti Regions and used purposive selection, limiting transferability to other Ghanaian regions and MSMEs. The SBP measure was treated as a single composite rather than as separately estimated economic, environmental, and social dimensions. Finally, the literature synthesis was topic-focused rather than a fully systematic review, so statements about gaps should be understood as provisional rather than exhaustive.

Future research should examine the proposed relationships using longitudinal and multi-source designs, extend data collection beyond Greater Accra and Ashanti Regions, and test the five GEO dimensions separately. Further studies could examine additional mechanisms through which GEO is associated with sustainable business performance, including green purchasing, green knowledge management, green process and product innovation, and resource orchestration. Researchers could also test firm size in larger and more diverse MSME samples and examine whether its role changes across industries or institutional environments.

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Conflict of Interest Statement

The authors declare no competing interests relevant to the content of this article.

Author Contributions

T.M.A.: Conceptualization, Methodology, Investigation, Formal Analysis, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization.

A.W.: Conceptualization, Supervision, Validation, Project Administration, Resources, Writing – Review & Editing.

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Informed Consent

Participants were informed about the purpose of the study, participation was voluntary, and participants retained the right to decline or withdraw. No personal identifiers were collected.

Ethical Approval

The study was conducted in accordance with the committee's requirements and recognised ethical principles, including the Declaration of Helsinki. Respondents' consents were obtained to participate in the study.

Data Availability

The de-identified dataset used for the analysis is available from the corresponding author [T.M.A] upon reasonable request and may be supplied to the editor or reviewers for verification, subject to applicable ethical and confidentiality requirements.

Declaration of Generative AI and AI-assisted Technologies

The authors used AI-assisted tools during the preparation of the manuscript for proofreading, language editing, improving clarity, and checking for inconsistencies. Specifically, ChatGPT, Claude, and Grammarly were used for these editorial purposes. The use of these tools was limited to reviewing and refining the manuscript after the substantive research and writing had been completed. No section of the manuscript was initially written using generative AI. All literature and other scholarly materials used in the manuscript were identified and reviewed through first-hand searches of Scopus and the relevant original sources. The data analysis was conducted independently using jamovi. The authors reviewed all AI-assisted suggestions and take full responsibility for the accuracy, interpretation of the data, statistical analyses, conclusions, and final content of the manuscript.

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