Routledge
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Economic Research-Ekonomska Istraživanja

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rero20

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To cite this article: Michael Karikari Appiah, Aloysius Sam, Emmanuel Twum & Enchill Godslove (2023) Modelling the influencing of green entrepreneurship orientation on sustainable firm performance: a moderated mediation model, Economic Research-Ekonomska Istraživanja, 36:2, 2179094, DOI: 10.1080/1331677X.2023.2179094

To link to this article: https://doi.org/10.1080/1331677X.2023.2179094

Published online: 20 Mar 2023.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA
2023, VOL. 36, NO. 2, 2179094
https://doi.org/10.1080/1331677X.2023.2179094

Modelling the influencing of green entrepreneurship orientation on sustainable firm performance: a moderated mediation model

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ABSTRACT

This paper aims to develop an integrated model to enhance the relationship between green entrepreneurship orientation (GEO), and sustainable firm performance to encourage sustainable consumption and production, by integrating Natural Resource Based View, and Dynamic Capability Theories with slight modification. We have approached this study through deductive reasoning, and the quantitative research approach. Structured questionnaire has been used to gather data from Green Entrepreneurs across different sectors in Ghana. The analyses have been conducted with the aid of SMART-PLS version 3.3.1 algorithm. Structural Equation Modelling technique has been used to test our hypotheses. Our results have shown that GEO drives green innovative performance, and firm performance. Moreover, green innovative capability significantly moderated the relationship between GEO, and green innovation performance. Again, green innovative performance significantly mediated the relation between GEO, and Sustainable firm performance. In conclusion, environmental sustainability could be achieved through GE, and Environmental Innovative Performance (EIP). Likewise, Green dynamic capability could be used to strengthen the relationship between GEO, and EIP. The implications of this study include the emergence of an integrated model to enhance green entrepreneurship development and environmental sustainability, and social realisation of Sustainability Development Goals 4, 8, 12, and 13 in a developing economy context.

ARTICLE HISTORY
Received 23 November 2022
Accepted 5 February 2023

KEYWORDS
Green entrepreneurship orientation; firm performance; green innovative capability; sustainability development

JEL CODES
Q50; Q55; M11; M21

1. Introduction

The Paris Climate Accord is gradually changing our production and consumption patterns as part of the greater efforts to ensure a sustainable balance between the planet, prosperity

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and partnership as enshrined in the United Nations 2030 Agenda for sustainable development to save mankind, and the environment. Seemingly, the carrying capacity of the natural environment is gradually dissipating as a consequence of resources extraction far exceeding the rate of resources regeneration (Appiah et al., 2021a; Ferreras-Méndez et al., 2022; Nezhad et al., 2022; San et al., 2022). Environmental issues have become a management challenge as organizations seek ways to reduce negative impacts on the environment and achieve sustainable development. However, the effectiveness of sustainable development depends on the conscious efforts of organizations to successfully implement innovative environmental best practices (Rashid et al., 2015). Therefore, environmental awareness is increasing day by day and so is the need for green entrepreneurs in society. Green entrepreneurship refers to a specific subcategory of entrepreneurship that aims to create and implement solutions to environmental problems and promote social change so as not to harm the environment (Appiah et al., 2022a; Feng et al., 2022; Frare & Beuren, 2022).

According to the Organization for Economic Cooperation and Development (OECD), green businesses are those that strive to operate in an environmentally friendly manner, using clean production technologies or producing green products that make their business truly green (Ebrahimi & Mirbargkar, 2017; Krzakiewicz & Cyfert, 2019; Issau et al., 2022;). Green entrepreneurship is a useful tool to promote a green economy (Wacheux & Roussel, 2005; Huang et al., 2021; Susanto et al., 2021). Green entrepreneurship is a way to achieve sustainability of our natural resources usually dominated by Small and Medium Enterprises (SMEs). These SMEs serve as a source of growth and development through job creation, innovations, human capital development, and revenue generation (Verma and Kumar, 2021; Appiah et al., 2022b; Appiah et al., 2022c; TzeSan et al. 2022). The World Bank group has argued that SMEs account for more than 90% of all businesses and 60% of all jobs worldwide. The surge in green entrepreneurs in Ghana is dominated by SMEs. What is missing from extant literature is that there is no suitable baseline model to guide SMEs to invest in green entrepreneurship, this gap is addressed by the study.

This paper aims to develop an integrated model to explain the relationship between Green Entrepreneurship and Sustainable Firm Performance to encourage sustainable consumption and production, while taking urgent actions to combat climate change by integrating Natural Resource Based View, and Dynamic Capability Theories in a low resource's context. Therefore, GEO in this study can be viewed as a dynamic responsibility to the external environment. This responsibility is typically based on four different criteria: pollution reduction, product stewardship, and sustainability. Based on the NRBV concept, this study proposes that GEO is a strategic resource embedded at the heart of an organization's culture that enables companies to capitalize on opportunities and argues that it is a dynamic capability to achieve sustainable environmental performance (Afum et al., 2021; Susanto, 2021; Verma and Kumar, 2021; Akomea et al., 2022; Fallah & Soori, 2022; Luu, 2022). The following corresponding research questions (RQ) have been formulated from the objective to guide the study:

RQ1: What is the relationship between GEO on GIP?

RQ2: What is the mediating role of GIP in between the GEO and FP?

RQ3: What is the moderating effect of GIC in between the GEO and FP?

This paper contributes immensely to existing policies, theories, and empirics and conceptualization of green entrepreneurship. This study is first of kind to presents moderated mediation model to enhance environmental sustainability using GEO, green dynamic capability, and EIP in Ghana to guide policymakers and practitioners. Moreover, a novel model has been developed to guide environmental sustainability practices in order to encourage corporate environmental commitment and firms' performance in Ghana where sustainability initiatives are still at the takeoff stage. Green entrepreneurs could use this model that is economically profitable, protects the environment, and creates social value which is a blend of sustainable development pillars to create a desirable outcome. Our results have shown that green entrepreneurship orientation drives green innovation performance and, firm performance through environmental, social, and financial. Moreover, green innovative capability significantly moderated the green entrepreneurship orientation and green innovation capability. The theoretical implication of the paper includes the emergency of a newly integrated model to enhance the relationship between green entrepreneurship development and environmental sustainability in the context of emerging country. Besides, by integrating existing competing theories we have produced a robust model with strong predictability, and could be used to explains GEO and environmental performance better. The new model emphasis the symbiotic relationship between: pollution prevention, product stewardship and sustainability while maintaining a capability that enables a firm to respond in a timely and rapid manner to the environmental needs of its stakeholders from the perspective of an emerging economy where such models are scantily developed. This can be achieved through clean technologies and improved systems that reduce hazardous waste, green education programmes, green workshops, green activities and green products that add value to these environmental activities. The practical and social implications of the study is that green entrepreneurs play an important role in addressing unemployment, poverty, and implementing green practices and environmental stewardship than other businesses. The outcome of this study also contributes immensely towards social realization of Sustainability Development Goals 4, 8, 12, and13. The rest of the paper has been presented in the following format. The section 2, presents literature review which focuses on theoretical, conceptual, empirical and hypotheses development, section 3, presents the research methodology adopted for the paper, section four presents results, the section five presents discussions and conclusion while final section presents implications and limitations of the paper.

2. Literature review and hypotheses development

2.1. Theoretical background

In an effort to develop a core model to guide GEO and sustainable business performance, we brought together.

Natural Resource-Based View (NRBV), and Dynamic Capability (DC) theories to form a powerful model. Inspired by traditional resource theory, NRBV argues that prioritising the environment and social context can enhance firm competitiveness (Hart, 1995; Golicic & Smith, 2013). This originally led to the development of three symbiotic resource concepts: pollution prevention, product stewardship and sustainability. Green

entrepreneurship is the search for environmentally friendly ways to reduce pollution and increase environmental sustainability; GEO is an active capability (Patel, 2019; Gu, 2022; Luu, 2022; Sebaka and Zhao, 2022). Environmentally friendly products and processes are central to GEO (Demirel et al, 2019). This can be achieved through clean technologies and improved systems that reduce hazardous waste, green education programmes, green workshops, green activities and green products that add value to these environmental activities. On the other hand, dynamic capability theory helps companies to disseminate green knowledge, conduct research and implement the most appropriate environmental techniques (Cepeda-Carrion et al., 2017; Aboelmaged & Hashem, 2019; Feng et al., 2022; Frare & Beuren, 2022; Martinez-Falco and Sanchez-Garcia, 2022). A green dynamic capability is a resource that enables a firm to respond in a timely and rapid manner to the environmental needs of its stakeholders (Teece, 2018). Zahra et al. (2009) argue that dynamic capabilities enable firms to acquire new business skills and knowledge and reduce the cognitive difficulties associated with finding and identifying green opportunities. Based on these theories, the research framework presented in Figure 1 is used in this study to clarify the links between, green entrepreneurship, green innovation performance and firm performance.

2.2. Empirical review–GEO, GIP, GDC, and EP

Presented herein are some of the current crucial and related studies that that are consistent with the present paper. These include: Green entrepreneurship, green innovation, green innovation capability, environmental performance, and ultimately corporate sustainability. For instance, Lăzăroiu et al. (2020a) examine green procurement in the context of environmentally friendly behaviour and the adoption of sustainable development policies. The authors detailed how green procurement can be effectively used to promote circular economy, building materials, sustainability and green sustainable supply chain. carbon footprint, pollution, energy and climate change. In a related study, Lăzăroiu et al. (2020b) explore how organisations can move from high-level environmental management development to higher levels of corporate sustainability. The authors argue that

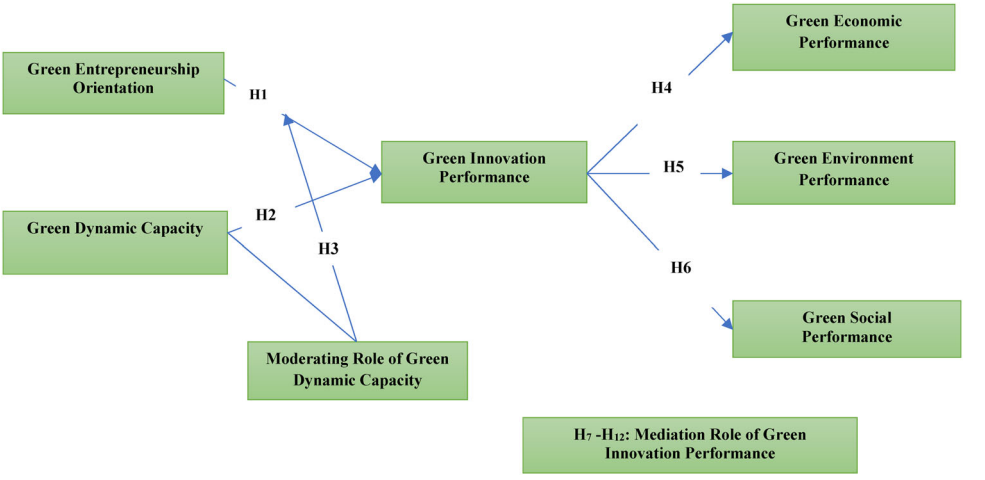

Figure 1. Research framework.
Source: ourselves using SMART-PLS and SPSS Softwares.

there is a link between sustainability management, organisational leadership for sustainable development, organisational knowledge and corporate sustainability. Recently, Frare and Beuren (2022) analyze the role of green process innovation in the relationship between green business orientation, proactive sustainability strategies and environmental performance in agri-technology companies and found that complete They reported that green process innovation plays an important role in providing a complete mediation between green business orientation and proactive sustainability strategies and environmental performance in agri-technology companies. Moreover, Nikolaou et al. (2018) examine the key factors that motivate entrepreneurs to invest in green business and how green business contributes to environmental sustainability and find that several specific institutional and resource factors play an important role in the decision-making of green entrepreneurs, as well as some specific environmental practices that entrepreneurs often use to address environmental issues. Sun et al. (2022) in the context of two developing countries find that Green Business Orientation (GBO) is a key factor for green entrepreneurship development, as well as a key factor for green entrepreneurship development. intellectual capital (IC) as GBO) and the relationship between sustainable business outcomes through the coordinating role of environmental awareness and green technology dynamics (GTD), and reported that IC as GB0, as well as environmental awareness and GTD, significantly influence sustainable outcomes.

Drawing on NRBV, Makhloufi et al. (2021) examine the effect of green business orientation on innovation performance (IC) and environmental performance (EP) and find that the adoption of green carbon emissions (GCI), environmental cooperation (EC) and EP significantly affect GEO. In addition, GEO has a positive impact on GCI and EP. Indeed, GEO partially mediates the link between GCI, EC and logistics in green innovation and EP. Again, Afum et al. (2021) also examined the mediating role of sustainable supply chain management and green radical product innovation (GRPI) in the relationship between Sustainable Enterprise Orientation (SEO) and sustainability performance and found that SEO has a direct significant positive impact on environmental and social performance. impact, but not on financial performance. Moreover, Xing et al. (2022) again examine the impact of green business and green innovation on carbon emissions in Asian high-polluting countries and report that in the short run, the linear estimates of green entrepreneurship are significant in China and India. Chang and Shiu (2020) examine how two specific organizational capabilities (alliance management capability and absorptive capability) independently complement open innovation strategies (internal and external) to improve eco-innovation performance under high environmental uncertainty, and find that alliance management capability complements internal and external strategies in a highly dynamic environment. Turulja and Bujgoric (2019) draw on the concept of dynamic capabilities and the theory of deliberation and change to explain the nature of the impact of environmental turbulence on the relationship between product and process innovation and firm performance, and report that environmental turbulence does not affect the relationship between innovation and performance. In addition, Syed et al. (2022) relied on Information Processing Theory (IPT) and NRBV to evaluate the role of Social Network Technology (SMT) in internal and external environmental collaboration and green innovation, and show that SMT has a positive impact on internal and external environmental collaboration. Also, Heekenda et al. (2022) further analysed

innovation capacity, disruptive technology and knowledge creation and their impact on sustainability of SMEs and found that innovation capacity, disruptive technology and knowledge creation have a positive impact on sustainability. Similarly, Zulkiffli et al. (2022) investigate the role of eco-innovation capacity in improving sustainable business performance during the ongoing pandemic and report that most manufacturing SMEs used eco-innovation and eco-innovation as important business opportunities during the pandemic. However, the study found that the relationship between eco-innovation and sustainable business performance was not significant. In addition, Fu et al. (2021) examined the relationship between innovation and SME performance and found a significant relationship between innovation and SME performance, while external environment moderated innovation and SME performance. Inferring from the empirical reviews, it could be seen that several studies have been conducted from various countries focusing on different aspects of corporate sustainability and environmental performance. Our current study is among paucity of empirical studies that considers GEO, green innovation performance, green dynamic capability, and environmental performance from the context of a Sub-Saharan African Country (Ghana).

2.3. Hypotheses development

2.3.1. Green entrepreneurship orientation

Green entrepreneurial orientation (GEO) emphasizes environmental activities, mainly through the adoption of environmentally friendly business practices (Jiang et al., 2018; Habib et al., 2020; Appiah et al., 2022a; Feng et al., 2022; Frare & Beuren, 2022). GEO is a new commitment aimed at improving the financial and environmental aspects of organizations (Jiang et al., 2018). In particular, studies have shown that there is major role for GEO in order to achieve the sustainability performance of a firm (Schaefer et al, 2015; Jiang et al., 2018; Asadi et al., 2020). The concept of GEO is based on the theory of green entrepreneurship and entrepreneurial orientation (Guo et al., 2020). GEO 'includes corporate behaviors related to risk-taking, innovation, competitive aggressiveness, and autonomy' (Covin & Miller, 2014). Fatoki (2019) states that GEO can be described as the tendency of firms to focus on opportunities that bring economic and environmental benefits through the introduction of green products and services GEO includes eco-innovation and motivation to pursue green opportunities, as well as risk-taking behavior (Gibbs & O'Neill, 2014; Pratono et al., 2018). In view of the ongoing argument the study hypothesizes as follow:

H1: GEO positively and significantly relate to green innovation performance

2.3.2. Green dynamic capability

Green dynamic capability is the resource that enables a company to respond to the environmental needs of its stakeholders in a timely and rapid manner (Teece, 2018; Feng et al., 2022; Falco and Sanchez-Garcia, 2022; Frare & Beuren, 2022; Martinez-). Green dynamic capabilities involve using resources that existed to create a new capability in order to operate in the dynamic markets, and are green behaviors that respond to dynamic situations (Yousaf, 2021). Therefore, green dynamic capabilities are considered as a solid foundation for providing value to company stakeholders,

such as employees, customers (Huang et al., 2016), communities (Rossiter & Smith, 2018), business partners (Kobarg et al., 2020), and shareholders (Hong et al., 2020). Green dynamic capabilities focus on integrating, building, and transforming the resources both internally and externally which relate to the protection of the environment. Green dynamic capability refers to a company's ability to collect, identify, and evaluate external information, such as green technologies, green needs, and various policy changes related to green business development (Lin & Chen, 2017; Huang et al., 2021; Xu et al., 2021; Abadzhiev et al., 2022; Chouaibi et al., 2022). Base on this argument the study hypothesizes as follow:

H2: Green dynamic capability positively and significantly relates GIP

H3: Green dynamic capability significantly moderates the relationship between GEO and GIP

2.3.3. Green innovation performance (GIP)

The process of the reduction of pollution, management of the environment friendly products and subsequently developing a sustainable environment is known as GIP (Hart & Dowell, 2011; Habib et al., 2020; Rehman et al., 2020). Therefore, with the help of the GIP, GEO can achieve better performance in the environment (Corrocher & Solito, 2017). Eco-innovation performance refers to the improvement of a firm's product design and production processes in terms of environmental protection and management. Some researchers argue that when assessing green innovation performance, the positive impact of production cost savings and utilization efficiency improvements, as well as human resource utilization, asset utilization, and asset recovery should be considered in addition to economic and environmental benefits (Wang, 2012; Ahmad, 2015; Rashid et al., 2015; Mancha & Yoder, 2015; Schaltegger et al., 2015; Baumgartner & Rauter, 2017; Adamu et al., 2019). With respect to the above argument the study hypothesizes as follow:

H4: GIP positively and significantly relate to Green Economic Performance

H5: GIP positively and significantly relate to Green Environmental Performance

H6: GIP positively and significantly relate to Green Social Performance

3. Methodology

3.1. Research design

This paper is anchored on objectivist ontology, and quantitative research approach to develop a new green entrepreneurship and sustainable firm performance model to increase green entrepreneurs, promote decent work, encourage sustainable consumption and production while taking urgent actions to combat climate change by integrating NRBV, and DC theories. The objectivist assumption as used in this paper entails that the researchers are independent of the variables being investigated. throughout the period under investigation, while the quantitative approach supports the application of mathematical and statistical models in scientific investigation (Saunders et al., 2012). Previous related studies (Appiah et al., 2022b; Appiah et al., 2022c, TzeSan et al., 2022) have used these research methods and techniques.

3.2. Instrument measurements

As indicated in the Table 1, the data used to measure the different structures came from previous studies. All questions were rated on a five-point Likert scale ranging from 1 to 5 strongly disagree and 5 to 5 strongly agree. The approved questions were sent to three (3) green entrepreneurship experts to whose comments helped refine the questions to fit the context of this study green entrepreneurship companies in Ghana.

3.3. Data collection

The target population of the study was comprised green entrepreneurs in Ghana who have duly registered their businesses with the Registrar General Department within the last 5 years. A list of 1000 entrepreneurs was randomly compiled from the database of registered companies, from which 300 comprising waste to energy companies, industrial emission elimination companies, recycling and waste management companies, vertical gardens and farms, and solar energy companies. The selected companies were conducted on phone to obtain their consent to participate in the survey, 18 companies declined their participation, 11, companies could not be reached. The questionnaires were sent to 271 companies that expressed interest to participate. The head or owner of each of the companies was given questionnaire to answer. Overall, 239 questionnaires were returned, 35 were rejected due to incorrect and incomplete responses. Therefore, 204 useable questionnaires were used for the study, representing 75.3 percent response rate which is consistent with prior studies (Appiah et al., 2022b; Appiah et al., 2022c). The participants were selected using stratified and simple random sampling techniques. The study the classifications among the green entrepreneurs were used as strata, then then samples were drawn from each stratum until the 204-sample size was attained. The random sampling is effective towards fair representation and reduces sample errors. In our efforts to ensure valid and reliable model, Common method biases, such as social desirability, were eliminated using the procedures proposed by Podsakoff et al. (2003). First, the anonymity of the questionnaire was preserved: respondents were asked to answer honestly and assured that there were no right or wrong answers. A well-tested and validated scale helps eliminate task ambiguity (Podsakoff et al., 2003). In our study,

Table 1. Measurement instruments, sources and support theories.

Construct (Type of construct)	No. of items	Sources of items	Underlying theories
		Dependent Variable	
Green Economic Performance	4	Li (2014); Muangmee et al. (2021)	NRBV Theory
Green Environmental Performance	4	Asadi et al. (2020); Muangmee et al. (2021)	NRBV Theory
Green Social Performance	4	Asadi et al. (2020); Muangmee et al. (2021)	NRBV Theory
		Independent Variables	
Green Entrepreneurship Orientation	5	Chen (2007) Asadi et al. (2020); Muangmee et al. (2021)	NRBV Theory
		Moderating Variable	
Green Dynamic Capability	5	Hung et al. (2010); Singh et al. (2021)	Dynamic Capability theory
Green Innovation Performance	4	Chen (2007) Asadi et al. (2020); Muangmee et al. (2021)	NRBV Theory

Author's Compilation.

pre-tested scales were used to measure constructs. During pilot testing, scale items were refined to eliminate ambiguous concepts, unclear and unfamiliar terms, and ambiguous questions (Podsakoff et al., 2003). A preliminary exploratory factor analysis of the pilot data confirmed the multidimensional nature of the data.

3.3.1. Data analysis

The study was analyzed using SMART-Partial Least Square (PLS) and Structural Equation Modelling (SEM) methods. The main difference between SEM and traditional regression models is that the former can conduct multiple relationships simultaneously, including mediation and moderation (Hair et al., 2019). PLS-SEM has advantages over covariance SEM when studying predictive research models and models at an early stage of theoretical development, as in this study (Hair et al., 2019). Since the study of green entrepreneurship and sustainable entrepreneurship is still in the early stages of empirical research, and the purpose of this study was to explore how developing a new model of green entrepreneurship and sustainable entrepreneurship can improve actor PLS-SEM analysis first presents the results of the measurement model and then the results of the full structural model. This paper uses both mediation and mitigation models. The models were analyzed using appropriate checks to ensure that the recommended good fit thresholds were met (Hair et al., 2019). Metric weights were checked for good fit. As recommended, data with loads below 0.70 were excluded (Hair et al., 2019). Internal consistency analysis of the constructs showed that the recommended combined reliability for all items was at least 0.70. In assessing convergent validity, the AVE was considered above 0.5, indicating acceptable convergent validity (Hair et al., 2019).

4. Results

4.1. Descriptive statistics and normality test

Table 2 shows the tests for normality based on results of the means, standard deviation, skewness and kurtosis. The results show that green innovation performance, has the highest composite mean of 3.63, green environmental performance a component of sustainability performance scored a mean of 3.59, green entrepreneurship scored a mean of 3.53, green dynamic capability scored a mean of 3.53, green social performance scored a mean of 3.52 while green economic performance scored a mean of 3.42. These results imply that majority of the participants have somewhat agreed to the statements posed before them. To assess the normality of the distribution of the data, the skewness and kurtosis values were estimated: According to Hair et al. (2014) and Bryne (2010), a data is considered normally distributed if the skewness value is between -2 to 2 and the kurtosis value is between -7 to 7. Skewness and kurtosis measure the symmetry and peaks of a data distribution. The results show that the skewness and kurtosis values are within an acceptable range for a normal distribution. Thus, the data is normally distributed. As showed in the Table 5, all the variance inflation factor (VIF) scores were less than 5 (VIF <5) which according to Hair et al. (2014) is an indication that multicollinearity problem was not a major issue in the model.

Table 2. Descriptive statistics and normality test.

	Items	Mean	Std. D	Composite Mean	Skewness	Kurtosis
	GENP	3.559	1.116		−.787	.039
Green Environmental Performance	GENP1	3.672	1.012		−.504	−.047
	GENP2	3.549	1.081	3.59	−.549	−.300
	GENP4	3.603	1.152		−.864	.138
	GDC1	3.407	1.255		−.477	−.701
	GDC2	3.598	1.096		−.657	−.101
Green Dynamic Capability	GDC3	3.569	1.089	3.53	−.544	−.314
	GDC4	3.637	1.110		−.676	−.112
	GDC5	3.446	1.273		−.497	−.719
	GEO1	3.603	1.152		−.864	.138
	GEO2	3.422	1.240		−.394	−.824
Green Entrepreneurial Orientation	GEO3	3.549	1.081	3.56	−.549	−.300
	GEO4	3.676	1.063		−.654	.048
	GEO5	3.574	1.014		−.457	−.186
	GEP1	3.373	1.216		−.351	−.837
Green Economic Performance	GEP2	3.539	1.190	3.42	−.472	−.620
	GEP3	3.377	1.204		−.421	−.626
	GEP4	3.426	1.229		−.428	−.662
	GIP1	3.632	.999		−.488	−.006
Green Innovation Performance	GIP2	3.578	1.066	3.63	−.586	−.147
	GIP3	3.642	1.165		−.882	.148
	GIP4	3.672	1.012		−.504	−.047
	GSP1	3.603	1.152		−.864	.138
Green Social Performance	GSP2	3.632	.999	3.52	−.488	−.006
	GSP3	3.446	1.253		−.411	−.750
	GSP4	3.422	1.212		−.439	−.697

Source: ourselves using SMART-PLS and SPSS Softwares.

Table 3. Discriminant and convergent validity with Fornell and Larcker (1981) Approach.

	CA	CR	AVE	GDC	GEP	GEO	GENP	GIP	GSP
GDC	0.889	0.919	0.697	***.835***					
GEP	0.908	0.936	0.784	.836	***.886***				
GEO	0.894	0.923	0.706	.652	.785	***.840***			
GENP	0.899	0.930	0.769	.817	.719	.784	***.877***		
GIP	0.896	0.928	0.763	.821	.784	.745	.680	***.874***	
GSP	0.857	0.903	0.699	.814	.809	.765	.715	.685	***.836***

Note: Square values of the AVEs are shown in the diagonal.
Source: ourselves using SMART-PLS and SPSS Softwares.

Table 4. Heterotrait-Monotrait ratio (HTMT) using Henseler et al. (2015) criteria.

	GDC	GEP	GEO	GENP	GIP	GSP
Green Dynamic Capability						
Green Economic Performance	.731					
Green Entrepreneurship Orientation	.052	.746				
Green Environmental Performance	.015	.759	.079			
Green Innovation Performance	.027	.766	.071	.059		
Green Social Performance	.047	.712	.038	.021	.048	

GDC = Green Dynamic Capability; GEP = Green Economic Performance; GEO = Green Entrepreneurship Orientation; GENP = Green Environmental Performance; GIP = Green Innovation Performance; GSP = Green Social Performance.
Source: ourselves using SMART-PLS and SPSS Softwares.

4.2. Measurement model (discriminant and convergent validity)

As illustrated in the Tables 3 and 4, the measurement model has been assessed using discriminant validity and convergent validity measures. To assess the convergent validity the composite reliability (CR), Factor Loadings and AVE scores were assessed. The metric loadings were checked to ensure that they were of sufficient magnitude. Composite

Table 5. Output of variance inflation factor (VIF) test and cross loadings.

	VIF	GDC	GEP	GEO	GENP	GIP	GSP
GENP	*2.534*	.308	.329	.425	**.888**	.275	.249
GENP1	*1.834*	.321	.313	.525	**.820**	.219	.215
GENP2	*3.017*	.229	.486	.397	**.892**	.296	.386
GENP4	*2.401*	.242	.490	.60	**.904**	.239	.241
GDC1	*1.806*	**.719**	.409	.319	.593	.299	.286
GDC2	*2.617*	**.910**	.130	.271	.568	.210	.234
GDC3	*1.876*	**.788**	.227	.221	.541	.103	.256
GDC4	*2.886*	**.902**	.197	.220	.535	.228	.248
GDC5	*2.179*	**.839**	.120	.369	.459	.273	.209
GEO1	*2.569*	.342	.190	**.860**	.404	.339	.341
GEO2	*1.765*	.432	.171	**.753**	.449	.650	.454
GEO3	*2.248*	.429	.386	**.897**	.492	.396	.486
GEO4	*1.754*	.498	.403	**.780**	.439	.456	.333
GEO5	*2.998*	.450	.421	**.899**	.476	.376	.445
GEP1	*2.964*	.422	**.884**	.338	.472	.357	.399
GEP2	*2.434*	.433	**.864**	.385	.435	.207	.383
GEP3	*2.933*	.436	**.886**	.483	.468	.373	.305
GEP4	*3.161*	.467	**.908**	.371	.488	.235	.277
GIP1	*2.641*	.429	.249	.381	.455	**.901**	.211
GIP2	*2.051*	.430	.311	.350	.492	**.814**	.262
GIP3	*2.921*	.435	.359	.312	.373	**.856**	.259
GIP4	*2.816*	.221	.113	.225	.120	**.919**	.815
GSP1	*2.732*	.242	.290	.160	.204	.239	**.841**
GSP2	*2.502*	.329	.349	.281	.255	.301	**.911**
GSP3	*2.034*	.220	.342	.338	.314	.194	**.787**
GSP4	*2.275*	.141	.214	.475	.239	.242	**.800**

Source: ourselves using SMART-PLS and SPSS Softwares.

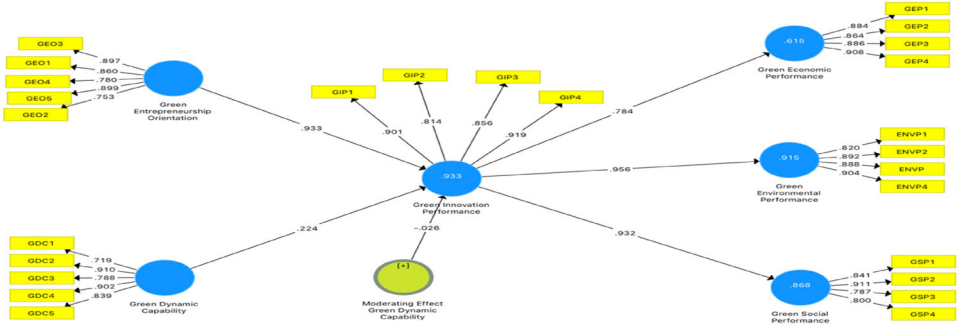

Figure 2. R-square values and factor loadings.
Source: ourselves using SMART-PLS and SPSS Softwares.

analysis of the structures revealed that all items had a recommended CR of 0.70 or higher. To validate the CR scores, the factor loadings were assessed, as recommended, items with loadings below 0.70 were discarded, the results have showed that all the loadings exceeded 0.70 as showed in Table 5, and Figure 2. The convergent validity assessment considered an AVE value greater than 0.50, indicating acceptable convergent validity (Hair et al., 2019). To evaluate discriminant validity, all the squared root of AVEs scores were assessed, and revealed that the correlated constructs scores were below the values of the squared rooted AVEs suggesting an acceptable discriminant validity. To validate the AVE measures, the Heterotrait-Monotrait Ratio (HTMT) was used. For an acceptable discriminant validity, HTMT ratios should not exceed 0.90, as seen in the

Table 6. Path coefficient.

Hypothesis	Path-Coefficients	Beta	Mean	Std. D	T-statistics	Decisions
H1	GEO ->GIP	.933	.923	.084	11.050***	Supported
H2	GDC ->GIP	.224	.224	.103	2.181*	Supported
H3	GEO*GIC ->GIP	−.026	-.024	.012	2.055*	Supported
H4	GIP ->GEP	.784	.787	.041	19.180***	Supported
H5	GIP ->GENP	.956	.957	.008	119.338***	Supported
H6	GIP ->GSP	.932	.933	.007	130.965***	Supported
H7	GDC ->GIP ->GEP	.175	.176	.081	2.174*	Supported
H8	GEO ->GIP ->GSP	.869	.861	.079	11.056***	Supported
H9	GEO ->GIP ->GEP	.731	.725	.065	11.221***	Supported
H10	GEO ->GIP ->GENP	.892	.883	.080	11.118***	Supported
H11	GDC ->GIP ->GENP	.214	.215	.098	2.177*	Supported
H12	GDC ->GIP->GSP	.208	.209	.096	2.177*	Supported

GDC = Green Dynamic Capability; GEP = Green Economic Performance; GEO = Green Entrepreneurship Orientation; GENP = Green Environmental Performance; GIP = Green Innovation Performance; GSP = Green Social Performance; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ns = not significant.
Source: ourselves using SMART-PLS and SPSS Softwares.

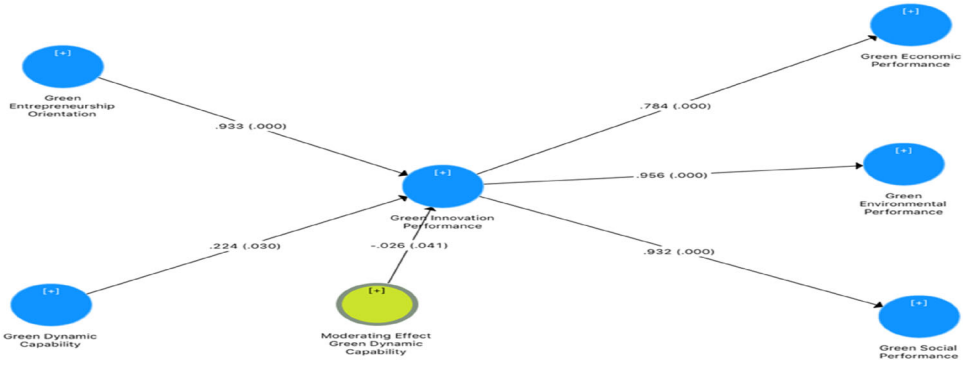

Figure 3. Path-coefficients and *p*-values.
Source: ourselves using SMART-PLS and SPSS Softwares.

Table 4 the height HTMT ratio was 0.766 which is far below 0.90, therefore the discriminant validity of the model is acceptable (Henseler et al., 2015).

4.3. Structural model

As showed in the Figure 2, the predictive power of the model ranged between 0.615 to 0.933. The results have shown that green entrepreneur orientation and green dynamic capability explained 0.933 variance of green innovation performance. That is 93.3% changes in green innovation are explained by green entrepreneurship orientation and green innovation capability. Moreover, green innovation performance account for 61.5% variance in green economic performance, 91.5% in green environmental performance, and 86.8% in green social performance. These results have showed that the model has high predictive power and relevance. To validate these results predictive relevance test was conducted and the Q-square value of 0.346 suggests that the model has predictive relevance. The Table 6 and Figure 3, presents result of the path -coefficients and the hypotheses testing.

As showed in Table 6, all the twelve hypotheses of the model have been supported. The results as showed in the Table 6, have revealed that GEO has significant effect

Table 7. Model fit.

	Saturated model	Estimated model
SRMR	.051	.064
NFI	.576	.655

Standardized Root Mean Square Residual (SRMR), Normed Fit Index (NFI).
Source: ourselves using SMART-PLS and SPSS Softwares.

(B = 0.899, t-value= 11.050) on GIP, GDC has significant effect (B = 0.224, t-value= 2.181) on GIP. GDC significantly moderates (B = 0.-026, t-value= 2.055) the relationship between GEO and GIP. Again, GIP has significant effect (B = 0.784, t-value= 19.180) on GEP, GIP has significant effect (B = 0.956, t-value= 119.338) on GENP, and GIP has significant effect on (B = 0.932, t-value= 130.965). Moreover, the results have showed that GIP significantly mediates the relation between GDC and Sustainable Performance Dimension (GEP, GENP, and GSP). Finally, the results have showed that GIP significantly mediates the relation between GEO and Sustainable Performance Dimension.

As showed in Table 7 the SRMR values ranged from 0.051 to 0.641 respectively for saturated and estimated models. The NFI results ranged from 0.576 to 0.655. Hu and Bentler (1999) has suggested that the acceptable value for SRMR should be 0.08 or lesser and NFI should be between 0 and 1. Given the results of the model, it can be said that the model has a acceptable fit.

5. Discussions and conclusions

5.1. Discussions

This paper has been conducted develop an integrated model to explain the relationship between green entrepreneurship orientation and sustainable firm Performance. One of the specific research questions seeks to examine the relationship between GEO and green innovation performance. Our results have shown that green entrepreneurship orientation drives green innovation performance and, firm performance through environmental, social, and financial which is consistent with prior studies (Patel, 2019; Gu, 2022; Luu, 2022; Sebaka and Zhao, 2022). Moreover, one of the questions of the paper seeks to examine the moderating role of green innovative capability on the relationship between GEO and GIP. Our results have showed that green innovative capability significantly moderated the green entrepreneurship orientation and green innovation capability. Again, the last research question of the paper seeks to examine the mediating roles of GIP in between GEO and sustainable performance dimensions on one hand and the role of GIP in between GDC and sustainable performance dimensions on the other hand (Jiang et al., 2018; Habib et al., 2020; Appiah et al., 2022a; Feng et al., 2022; Frare & Beuren, 2022). Our indicative results have showed that GIP significantly mediates the relation between GDC and sustainable performance dimensions. Finally, the results have showed that GIP significantly mediates the relation between GEO and Sustainable performance dimensions (Wang, 2012; Ahmad, 2015; Rashid et al., 2015; Mancha & Yoder, 2015; Schaltegger et al., 2015; Baumgartner & Rauter, 2017; Adamu et al., 2019). Recently, many developing countries are rapidly expanding their energy supply through green business infrastructure, as policy makers and investors around

the world increasingly recognize that energy is an important element in improving living standards and sustaining economic growth (Habib et al., 2020; Frare & Beuren, 2022; Appiah et al., 2022a; Feng et al., 2022). In line with long-term global trends in areas such as education, health and hygiene, universities are changing and teaching entrepreneurship. In order to keep pace with sustainable, social and economic development, green entrepreneurship is a tool to help save the environment from destruction (Sadiku-Dushi et al., 2019; Sadiku-Dushi et al., 2019). Despite the enthusiasm for green entrepreneurship, some students abandon their decision to pursue a green career due to personal and financial constraints. As green entrepreneurship is an unexplored and under-researched area, this study makes an original contribution to the related literature. In particular, studies have shown that there is major role for GEO in order to achieve the sustainability performance of a firm (Miller, 2011; Schaefer et al, 2015; Jiang et al., 2018; Rostain, 2021; Asadi et al., 2020). GEO includes corporate behaviors related to risk-taking, innovation, competitive aggressiveness, and autonomy (Covin & Miller, 2014; Guo et al., 2020). Fatoki (2019). GEO creates opportunities that bring economic and environmental benefits through the introduction of green products and services GEO includes eco-innovation and motivation to pursue green opportunities, as well as risk-taking behavior (Pratono et al., 2018; Feng et al., 2022). Recently, Frare and Beuren (2022) analyze the role of green process innovation in the relationship between green business orientation, proactive sustainability strategies and environmental performance in agri-technology companies and found that complete They reported that green process innovation plays an important role in providing a complete mediation between green business orientation and proactive sustainability strategies and environmental performance in agri-technology companies. Moreover, Nikolaou et al. (2018) examine the key factors that motivate entrepreneurs to invest in green business and how green business contributes to environmental sustainability and find that several specific institutional and resource factors play an important role in the decision-making of green entrepreneurs, as well as some specific environmental practices that entrepreneurs often use to address environmental issues. Again, Lăzăroiu et al. (2020a) examine green procurement in the context of environmentally friendly behaviour and the adoption of sustainable development policies and detailed how green procurement can be effectively used to promote circular economy, building materials, sustainability and green sustainable supply chain. carbon footprint, pollution, energy and climate change. In a related study, Sun et al. (2022) in the context of two developing countries find that green business orientation (GBO) is a key factor for green entrepreneurship development, as well as a key factor for green entrepreneurship development. intellectual capital and the relationship between sustainable business outcomes through the coordinating role of environmental awareness and green technology dynamics, and reported that IC as GB0, as well as environmental awareness and, significantly influence sustainable outcomes.

5.2. Conclusions

The main aim of this was to develop an integrated model to explain the relationship between green entrepreneurship orientation and sustainable firm Performance to

encourage sustainable consumption and production, while taking urgent actions to combat climate change by integrating NRBV, and Dynamic capability theory with unique focus on a low resource's context. The study has found that green entrepreneurship orientation drives green innovation performance and, firm performance through environmental, social, and financial. Moreover, green innovative capability significantly moderated the green entrepreneurship orientation and green innovation capability. Again, green innovative performance significantly mediated the relation between green dynamic capability and sustainable performance. Finally, green innovative performance significantly mediated the relation between green entrepreneurship and Sustainable performance. These results have theoretical, practical and social implications.

6. Implications and limitations

6.1. Practical, theoretical and social implications

Policy makers and practitioners could use the newly developed model as guide to educate youth and adults with the relevant entrepreneurial skills in order to promote decent work while taking urgent actions to combat climate change and its impacts. Green investors could deploy the findings in this study to generate and share sustainability knowledge and subsequent transfer the knowledge to other operational areas. The paper has established that conceptual constructs such as green innovative performance and green dynamic capability exert strong and positive effects on the existing relationship between green entrepreneurship orientation and sustainable firm performance. Entrepreneurs who choose to go green stand a better change of outperforming their colleagues in the traditional entrepreneurship since the former has in addition to economic profits, social and environmental contribution which give them a competitive edge in any industry. The theoretical implication of the paper includes the emergency of a newly integrated model to enhance the relationship between green entrepreneurship development and environmental sustainability in the context of emerging country. Besides, by integrating existing competing theories we have produced a robust model with strong predictability, and could be used to explains GEO and environmental performance better. The new model emphasis the symbiotic relationship between: pollution prevention, product stewardship and sustainability while maintaining a capability that enables a firm to respond in a timely and rapid manner to the environmental needs of its stakeholders from the perspective of an emerging economy where such models are scantily developed. This can be achieved through clean technologies and improved systems that reduce hazardous waste, green education programmes, green workshops, green activities and green products that add value to these environmental activities. The practical and social implications of the study is that green entrepreneurs play an important role in addressing unemployment, poverty, and implementing green practices and environmental stewardship than other businesses. The outcome of this study also contributes immensely towards social realization of Sustainability Development Goals 4, 8, 12, and13. The rest of the paper has been presented in the following format.

6.2. Limitations and future studies

Contextually, this paper focused on developing an integrated model to explain the relationship between Green Entrepreneurship and Sustainable Firm Performance to encourage sustainable consumption and production by integrating NRBV and dynamic capability with evidence from a developing country context. It is suggested that both the contextual and locational scope could be enhanced in future studies. Moreover, the current study focused on the entire green entrepreneurship sector due to lack of adequate information on green entrepreneurs in Ghana. It is suggested that future studies should focus on only one sector e.g., waste management, waste to energy sector or solar energy or vertical farming or at best conduct a comparative study between two sectors.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Abadzhiev, A., Sukhov, A., Sihvonen, A., & Johnson, M. (2022). Managing the complexity of green innovation. *European Journal of Innovation Management*, *25*(6), 850–866. https://doi.org/10.1108/EJIM-02-2022-0098

Aboelmaged, M., & Hashem, G. (2019). Absorptive capacity and green innovation adoption in SMEs: The mediating effects of sustainable organisational capabilities. *Journal of Cleaner Production*, *220*, 853–863. https://doi.org/10.1016/j.jclepro.2019.02.150

Adamu, A. A., Wan, C. Y., & Gorondutse, A. H. (2019). Determinants of Sustainable Performance of SMEs: A Proposed Framework. *International Journal of Research and Scientific Innovation (IJRSI)*, *VI*(VI), 182–188.

Afum, E., Issau, K., Agyabeng-Mensah, Y., Baah, C., Dacosta, E., Essandoh, E., & Agyenim Boateng, E. (2021). The missing links of sustainable supply chain management and green radical product innovation between sustainable entrepreneurship orientation and sustainability performance. *Journal of Engineering, Design and Technology*, *21*(1), 167–187. https://doi.org/10.1108/JEDT-05-2021-0267

Ahmad, S. (2015). Green human resource management: Policies and practices. *Cogent Business & Management*, *2*(1), 1030817. https://doi.org/10.1080/23311975.2015.1030817

Akomea, S. Y., Agyapong, A., Ampah, G., & Osei, H. V. (2022). Entrepreneurial orientation, sustainability practices and performance of small and medium enterprises: Evidence from an emerging economy. *International Journal of Productivity and Performance Management*, https://doi.org/10.1108/IJPPM-06-2021-0325

Albort-Morant, G., Leal-Rodríguez, A. L., Fernández-Rodríguez, V., & Ariza, M. A. (2018). Assessing the origins, evolution and prospects of the literature on dynamic capabilities: A bibliometric analysis. *Eur Res Manag Bus Econ*, *24*(1), 42–52. https://doi.org/10.1016/j.iedeen.2017.06.004

Aldrich, H. E., & Waldinger, R. (1990). Ethnicity and entrepreneurship. *Annual Review of Sociology*, *16*(1), 111–135. https://doi.org/10.1146/annurev.so.16.080190.000551

Appiah, K. M., Akolaa, A. R., & Ayisi-Addo, K. A. (2022a). Modelling the impact of macroenvironmental forces on investment in renewable energy technologies in Ghana: The

moderating role of entrepreneurship orientation dimensions. *Cogent Economics & Finance*, *10*(1), 1–23. https://doi.org/10.1080/23322039.2022.2071387

Appiah, K. M., Odei, A. S., Kumi-Amoah, G., & Yeboah, A. S. (2022b). Modeling the impact of green supply chain practices environmental performance: The mediating role of ecocentricity. *African Journal of Economic and Management Studies*, *13*(4), 551–567. https://doi.org/10.1108/AJEMS-03-2022-0095

Appiah, K. M., Sedegah, D., Ayisi-Addo, K. A., & Gyening, K. E. (2022c). Modeling the influence of industry forces on intention to invest in renewable energy resources with the moderating effect of sustainable competitive strategy. *Cogent Engineering*, *9*(1), 1–20. https://doi.org/10.1080/23311916.2022.2138101

Asadi, S., Seyedeh, O. P., Mehrbakhsh, N., Rusli, A., Sarminah, S., Elaheh, Y., Nahla, A., & Nor, S. R. (2020). Investigating Influence of Green Innovation on Sustainability Performance: A Case on Malaysian Hotel Industry. *Journal of Cleaner Production*, *258*, 120860. https://doi.org/10.1016/j.jclepro.2020.120860

Baumgartner, R. J., & Rauter, R. (2017). Strategic Perspectives of Corporate Sustainability Management to Develop a Sustainable Organization. *Journal of Cleaner Production*, *140*, 81–92. https://doi.org/10.1016/j.jclepro.2016.04.146

Byrne, B. M. (2010). *Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming.* (2nd ed.). Taylor and Francis Group.

Cepeda-Carrion, I., Martelo-Landroguez, S., Leal-Rodríguez, A. L., & Leal-Millán, A. (2017). Critical processes of knowledge management: An approach toward the creation of customer value. *European Research on Management and Business Economics*, *23*(1), 1–7. https://doi.org/10.1016/j.iedeen.2016.03.001

Chen, Y. S. (2007). The Positive Effect of Green Intellectual Capital on Competitive Advantages of Firms. *Journal of Business Ethics*, *77*(3), 271–286. https://doi.org/10.1007/s10551-006-9349-1

Cheng, C. C. J., & Shiu, E. C. (2020). Leveraging open innovation strategies for fueling eco-innovation performance in dynamic environments. *Sustainability Accounting, Management and Policy Journal*, *11*(7), 1245–1270. https://doi.org/10.1108/SAMPJ-04-2018-0103

Chouaibi, S., Chouaibi, J., & Rossi, M. (2022). ESG and corporate financial performance: The mediating role of green innovation: UK common law versus Germany civil law. *EuroMed Journal of Business*, *17*(1), 46–71. https://doi.org/10.1108/EMJB-09-2020-0101

Corrocher, N., & Solito, I. (2017). How do ¦ rms capture value from environmental innovations? An empirical analysis on European SMEs. *Industry and Innovation*, *24*(5), 569–585. https://doi.org/10.1080/13662716.2017.1302792

Covin, J. G., & Miller, D. (2014). International Entrepreneurial Orientation: Conceptual Considerations, Research Themes, Measurement Issues, and Future Research Directions. *Entrepreneurship: Theory and Practice*, *38*(1), 11–44. https://doi.org/10.1111/etap.12027

Ebrahimi, P., & Mirbargkar, S. M. (2017). Green entrepreneurship and green innovation for SME development in market turbulence. *Eurasian Business Review*, *7*(2), 203–228. https://doi.org/10.1007/s40821-017-0073-9

Fallah, M. R., & Soori, M. (2022). Presenting a framework for the successful entry of women entrepreneurs into green entrepreneurship. *Journal of Science and Technology Policy Management*, https://doi.org/10.1108/JSTPM-03-2021-0041

Fatoki, O. (2019). Entrepreneurial marketing and performance of small and medium enterprises in South Africa. *Journal of Reviews on Glbal Economics*, *8*, 1429–1437.

Feng, T., Li, Z., Shi, H., & Jiang, W. (2022). Translating leader sustainability orientation into green supply chain integration: A missing link of green entrepreneurial orientation. *Journal of Business & Industrial Marketing*, *37*(12), 2515–2532. https://doi.org/10.1108/JBIM-05-2021-0241

Ferreras-Méndez, J. L., Llopis, O., & Alegre, J. (2022). Speeding up new product development through entrepreneurial orientation in SMEs: The moderating role of ambidexterity. *Industrial Marketing Management*, *102*, 240–251. https://doi.org/10.1016/j.indmarman.2022.01.015

Flagstad, I., & Johnsen, S. A. K. (2022). The psychology of green entrepreneurship: Founder-driven development of green climate in small-scale companies. *Cogent Business & Management*, *9*(1), 1–9. https://doi.org/10.1080/23311975.2022.2079245

Frare, A. B., & Beuren, I. M. (2022). The role of green process innovation translating green entrepreneurial orientation and proactive sustainability strategy into environmental performance. *Journal of Small Business and Enterprise Development*, *29*(5), 789–806. https://doi.org/10.1108/JSBED-10-2021-0402

Fu, Q., Sial, M. S., Arshad, M. Z., Comite, U., Thu, P. A., & Popp, J. (2021). The Inter-Relationship between Innovation Capability and SME Performance: The Moderating Role of the External Environment. *Sustainability*, *13*(16), 9132. https://doi.org/10.3390/su13169132

Gibbs, D., & O'Neill, K. (2014). Rethinking sociotechnical transitions and green entrepreneurship: The potential for transformative change in the green building sector. *Environment and Planning A: Economy and Space*, *46*(5), 1088–1107. https://doi.org/10.1068/a46259

Golicic, S. L., & Smith, C. D. (2013). A Meta-Analysis of Environmentally Sustainable Supply Chain Management Practices and Firm Performance. *Journal of Supply Chain Management*, *49*(2), 78–95. https://doi.org/10.1111/jscm.12006

Gomes, G., Seman, L. O., Berndt, A. C., & Bogoni, N. (2022). The role of entrepreneurial orientation, organizational learning capability and service innovation in organizational performance. *Revista de Gestão*, *29*(1), 39–54. https://doi.org/10.1108/REGE-11-2020-0103

Gu, S. (2022). Green innovation; a way to enhance economic performance of Chinese hotels. *International Journal of Innovation Science*, https://doi.org/10.1108/IJIS-07-2021-0128

Guo, Y., Wang, L., & Chen, Y. (2020). Green Entrepreneurial Orientation and Green Innovation: The Mediating Effect of Supply Chain Learning. *SAGE Open*, *10*(1), 215824401989879. https://doi.org/10.1177/2158244019898798

Habib, A., Bao, Y., & Ilmudeen, A. (2020). The impact of green entrepreneurial orientation, market orientation and green supply chain management practices on sustainable firm performance. *Cogent Business & Management*, *7*(1), 1743616. https://doi.org/10.1080/23311975.2020.1743616

Hair, J., Hult, T., Ringle, C., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage Publications, Inc.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to Use and How to Report the Results of PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hart, S. L. (1995). A natural-resource-based view of the rm. *The Academy of Management Review*, *20*(4), 986–1014. https://doi.org/10.2307/258963

Hart, S. L., & Dowell, G. (2011). Invited editorial: A natural-resource-based view of the firm: Fifteen years after. *Journal of Management*, *37*(5), 1464–1479. https://doi.org/10.1177/0149206310390219

Heenkenda, H., Xu, F., Kulathunga, K., & Senevirathne, W. (2022). The Role of Innovation Capability in Enhancing Sustainability in SMEs: An Emerging Economy Perspective. *Sustainability*, *14*(17), 10832. https://doi.org/10.3390/su141710832

Henseler, J., Ringle, M. C., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hong, M., Drakeford, B., & Zhang, K, 1 School of Economics and Management, Hunan Institute of Technology, Hengyang 421002, China. (2020). The impact of mandatory CSR disclosure on green innovation: Evidence from China. *Green Finance*, *2*(3), 302–322. https://doi.org/10.3934/GF.2020017

Huang, S., Pickernell, D., Battisti, M., Soetanto, D., & Huang, Q. (2021). When is entrepreneurial orientation beneficial for new product performance? The roles of ambidexterity and market turbulence. *International Journal of Entrepreneurial Behavior & Research*, *27*(1), 79–98. https://doi.org/10.1108/IJEBR-02-2020-0103

Huang, X.-X., Hu, Z.-P., Liu, C.-S., Yu, D.-J., & Yu, L.-F. (2016). The relationships between regulatory and customer pressure, green organizational responses, and green innovation performance. *Journal of Cleaner Production*, *112*, 3423–3433. https://doi.org/10.1016/j.jclepro.2015.10.106

Hung, Y. Y. R., Yang, B., Lien, Y.-H B., McLean, N. G., & Kuo, Y.-M. (2010). Dynamic capability: Impact of process alignment and organizational learning culture on performance. *Journal of World Business*, *45*(3), 285–294. https://doi.org/10.1016/j.jwb.2009.09.003

Issau, K., Soni, S., & Acquah, I. S. K. (2022). Ghanaian SMEs' perspective on the interrelationship between market and entrepreneurial orientations. *Revista de Gestão*, *29*(2), 139–157. https://doi.org/10.1108/REGE-03-2021-0038

Jiang, W., Chai, H., Shao, J., & Feng, T. (2018). Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective. *Journal of Cleaner Production*, *198*, 1311–1323. https://doi.org/10.1016/j.jclepro.2018.07.104

Kobarg, S., Stumpf-Wollersheim, J., Schlägel, C., & Welpe, I. M. (2020). Green together? The effects of companies' innovation collaboration with different partner types on ecological process and product innovation. *Industry and Innovation*, *27*(9), 953–990. https://doi.org/10.1080/13662716.2020.1713733

Krzakiewicz, K., & Cyfert, S. (2019). Strategic orientations of the organization-entrepreneurial, market and organizational learning. *Management*, *23*(1), 7–19. https://doi.org/10.2478/manment-2019-0001

Latif, B., Mahmood, Z., Tze San, O., Mohd Said, R., & Bakhsh, A. (2020). Coercive, normative and mimetic pressures as drivers of environmental management accounting adoption. *Sustainability*, *12*(11), 4506. https://doi.org/10.3390/su12114506

Lăzăroiu, G., Ionescu, L., Uiă, C., Hurloiu, I., Andronie, M., & Dijmărescu, I. (2020a). Environmentally Responsible Behavior and Sustainability Policy Adoption in Green Public Procurement. *Sustainability*, *12*(5), 2110. https://doi.org/10.3390/su12052110

Lăzăroiu, G., Ionescu, L., Andronie, M., & Dijmărescu, I. (2020b). Sustainability Management and Performance in the Urban Corporate Economy: A Systematic Literature Review. *Sustainability*, *12*(18), 7705. https://doi.org/10.3390/su12187705

Lin, Y., & Chen, Y. (2017). Determinants of green competitive advantage: The roles of green knowledge sharing, green dynamic capabilities, and green service innovation. *Quality & Quantity*, *51*(4), 1663–1685. https://doi.org/10.1007/s11135-016-0358-6

Luu, T. T. (2022). Fostering green service innovation perceptions through green entrepreneurial orientation: The roles of employee green creativity and customer involvement. *International Journal of Contemporary Hospitality Management*, *34*(7), 2640–2663. https://doi.org/10.1108/IJCHM-09-2021-1136

Makhloufi, L., Meirun, T., Belaid, F., & Yacob, N. A. (2021). Impact of Green Entrepreneurship Orientation on Environmental Performance: The Natural Resource-Based View Perspective. *Research Square*, 1–37. https://doi.org/10.21203/rs.3.rs-166004/v1

Mamabolo, A., Rose, E., & Mamabolo, M. A. (2019). Transformational leadership as an antecedent and SME performance as a consequence of entrepreneurial orientation in an emerging market context. *Int. J. Entrep*, 2019, *23*(4), 1–16.

Mancha, R. M., & Yoder, C. Y. (2015). Cultural antecedents of green behavioral intent: An environmental theory of planned behavior. *Journal of Environmental Psychology*, *43*, 145–154. https://doi.org/10.1016/j.jenvp.2015.06.005

Miller, D. (2011). Miller (1983) revisited: A reflection on EO research and some suggestions for the future. *Entrepreneurship Theory and Practice*, *35*(5), 873–894. https://doi.org/10.1111/j.1540-6520.2011.00457.x

Muangmee, C., Kot, S., Meekaewkunchorn, N., Kassakorn, N., & Khalid, B. (2021). Factors determining the behavioural intention of using food delivery apps during COVID-19 pandemics. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), 1297–1310. https://doi.org/10.3390/jtaer16050073

Mudjijah, S., Surachman, S., Wijayanti, R., & Andarwati, A. (2022). The Effect of Entrepreneurial Orientation and Talent Management on Business Performance of the Creative Industries in Indonesia. *J. Asian Financ. Econ. Bus*, *9*, 105–119.

Muriithi, R. W., Kyalo, T., & Kinyanjui, J. (2019). Assessment of the relationship between entrepreneurial orientation, organisational culture adaptability and performance of Christian faith-based hotels in Kenya. *Int. J. Entrep. Knowl*, *7*, 31–45.

Nikolaou, I. E., Tsagarakis, K. P., & Tasopoulou, K. (2018). An examination of ecopreneurs' incentives through a combination between institutional and resource-based approach: A preliminary study. *Management of Environmental Quality: An International Journal*, *29*(2), 195–215. https://doi.org/10.1108/MEQ-01-2017-0004

Fatoki, O. (2019). Green entrepreneurial orientation and firm performance in South Africa," *Entrepreneurship and Sustainability Issues*. *Entrepreneurship and Sustainability Issues*, *7*(1), 247–262. https://doi.org/10.9770/jesi.2019.7.1(19)

Pratono, A. H. (2018). From social network to firm performance: The mediating effect of trust, selling capability, and pricing capability. *Management Research Review*, *41*(6), 680–700. https://doi.org/10.1108/MRR-03-2017-0080

Ramanathan, R., Ramanathan, U., & Bentley, Y. (2018). The debate on flexibility of environmental regulations, innovation capabilities and financial performance – A novel use of DEA. *Omega*, *75*(C), 131–138. https://doi.org/10.1016/j.omega.2017.02.006

Rashid, N., Jabar, J., Yahya, S., & Samer, S. (2015). State of the Art of Sustainable Development: An Empirical Evidence from Firm's Resource and Capabilities of Malaysian Automotive Industry. *Procedia - Social and Behavioral Sciences*, *195*, 463– 472. https://doi.org/10.1016/j.sbspro.2015.06.488

Rehman, S. U., Kraus, S., Shah, S. A., Khanin, D., & Mahto, R. V. (2020). Analyzing the relationship between green innovation and environmental performance in large manufacturing rms. *Technological Forecasting and Social Change*, *163*, 120481.

Rossiter, W., & Smith, D. J. (2018). Green innovation and the development of sustainable communities: The case of Blueprint Regeneration's Trent Basin development. *Int. J. Entrep. Innov*, *19*, 21–32.

Rostain, M. (2021). The impact of organizational culture on entrepreneurial orientation: A meta-analysis. *Journal of Business Venturing Insights*, 2021, *15*, e00234. https://doi.org/10.1016/j.jbvi.2021.e00234

Sadiku-Dushi, N., Dana, L.-P., & Ramadani, V. (2019). Entrepreneurial marketing dimensions and SMEs performance. *Journal of Business Research*, *100*, 86–99. https://doi.org/10.1016/j.jbusres.2019.03.025

Saunders, M., Lewis, P., & Thornhill, A. (2012). Research Methods for Business Students. *Pearson Education Ltd.*,

Schaltegger, S., Erik, G. H., & Florian, L.-F. (2015). Business Models for Sustainability: Origins, *Present Research, and Future Avenues. Organization & Environment*, *29*, 3–10.

Singh, S., Del Giudice, M., Jabbour, C. J. C., & Latan, H. (2021). Stakeholder pressure, green innovation, and performance in small and medium-sized enterprises: The role of green dynamic capabilities. *Business Strategy and the Environment*, *31*(1), 500–514.

Syed, M. W., Song, H., & Junaid, M. (2022). Impact of social media technologies on environmental collaboration and green innovation: A mediation–moderation model. *Kybernetes, Vol. ahead-of-Print No. ahead-of-Print*, https://doi.org/10.1108/K-05-2022-0737

Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, *51*(1), 40–49. https://doi.org/10.1016/j.lrp.2017.06.007

Turulja, L., & Bajgoric, N. (2019). Innovation, firms' performance and environmental turbulence: Is there a moderator or mediator? *European Journal of Innovation Management*, *22*(1), 213–232. https://doi.org/10.1108/EJIM-03-2018-0064

Tze San, O., Latif, B., & Di Vaio, A. (2022). GEO and sustainable performance: The moderating role of GTD and environmental consciousness. *Journal of Intellectual Capital*, *23*(7), 38–67. https://doi.org/10.1108/JIC-10-2021-0290

Wacheux, & Roussel, P. (2005)., *Management des RessourcesHumaines: Méthodes de Rechercheen Sciences HumainesetSociales*. De Boeck Education. 2005.

Wang, N., Zhang, J., Zhang, X., & Wang, W. (2022). How to Improve Green Innovation Performance: A Conditional Process Analysis. *Sustainability 2022*, *14*(2938), 1–18. https://doi.org/10.3390/su14052938

Wang, Y. (2012). Comparative study on the performance of green technology innovation in Different regions of China. *Tech. Econ*, *31*, 52–59.

Xing, C., Liu, X., & Ozturk, I. (2022). Entrepreneurship and environmental sustainability in highly polluting Asian economies: The role of eco-innovation. *Economic Research-Ekonomska Istraživanja*, 1–14. https://doi.org/10.1080/1331677X.2022.2142821

Yousaf, Z. (2021). Go for green: Green innovation through green dynamic capabilities: Accessing the mediating role of green practices and green value co creation. *Environmental Science and Pollution Research*, *28*(39), 54863–54875. https://doi.org/10.1007/s11356-021-14343-1

Zahra, S. A., Filatotchev, I., & Wright, M. (2009). How do threshold rms sustain corporate entrepreneurship? The role of boards and absorptive capacity. *Journal of Business Venturing*, *24*(3), 248–260. https://doi.org/10.1016/j.jbusvent.2008.09.001

Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*. *111*(2), 261–273. https://doi.org/10.1016/j.ijpe.2006.11.029

Zulkiffli, S. N., ʻAtikah, Zaidi, N. F. Z., Padlee, S. F., & Sukri, N. K. A. (2022). Eco-Innovation Capabilities and Sustainable Business Performance during the COVID-19 Pandemic. *Sustainability*, *14*(13), 7525. https://doi.org/10.3390/su14137525

Appendix A: Measurement Instrument

Constructs
Green entrepreneurial Orientation
GEO1: Our organization uses less or non-polluting/toxic materials.
GEO2: Our organization has a strong tendency for high-risk green product development projects which have a chance for very high returns.
GEO3: Our firm organization a strong emphasis on green R&D, technological leadership, and innovation.
GEO4: Our firm organization a tendency to initiate green actions for competitors to respond to.
GEO5: Our organization has a tendency to be a market leader, always first in introducing green products, services, or technologies.
Green Innovation Performance
GI1: Our organization uses less or non-polluting/toxic materials.
GI2: Our organization improves environmentally friendly packaging for existing and new products.
GI3: Our organization recovers end-of-life products and recycling.
GI4: Our organization uses eco-labeling.
Green Dynamic Capability
GDC1: Our organization is aware of business opportunity or threat possibility
GDC2: Our organization leaders possess entrepreneurial characteristics
GDC3: There is ability to communicate and coordinate effectively among the departments
GDC4: Our organization is able to understand the needs of the customers
GDC5: Our organization has the ability to develop new green products or technology
Green Social Performance
GSP1: The customers' satisfaction has increased during the last 3 years.
GSP2: The customers' motivation has increased during the last 3 years.
GSP3: Our organization serving more beneficiaries (disadvantaged people) or solving environmental issues.
GSP4: Our organization provides more social or environmentally friendly services in the community
Green Economic Performance
GEP1: Our organization has decrease of cost for energy consumption.
GEP2: Our organization has improved capacity utilization.
GEP3: Our organization has decreased the fee for waste treatment.
GEP4: Our organization has decreased the penalty costs for environmental accident.
Green Environmental Performance
GENP1: Our organization has achieved important environment-related certifications.
GENP2: On average, the overall environmental performance of our organization has improved over the past five years.
GENP3: The resource consumption our organization e.g., water, electricity, and gas has been decreased during the last 3 years.
GENP4: Our organization has improved on environmental compliance.

Source: ourselves using SMART-PLS and SPSS Softwares.