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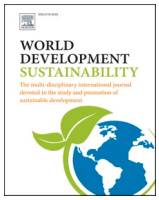

Impact of corporate social responsibility, technological capability, and green entrepreneurial orientation on green innovation and sustainable performance

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ABSTRACT

The primary purpose of this paper was to explore the effect of green entrepreneurial orientation, technological capability, and corporate social responsibility on sustainable performance and green innovation. It also aimed to verify if green innovation has any significant effect on the sustainable performance of small and medium enterprises. A quantitative research approach was utilized for data collection using a survey tool being distributed on several small and medium enterprises' owners/managers in the United Arab Emirates. The samples SMEs are from services, manufacturing and trade industries. A total of 226 usable responses were obtained from all the respondents. The software of SmartPLS was employed to analyze the data and verify the hypotheses of this research. The findings confirmed that the effect of green innovation on sustainable performance is significant. Furthermore, the outcomes displayed that green entrepreneurial orientation, technological capability and corporate social responsibility positively affect green innovation and sustainable performance. Overall, the paper contributes to the literature via the examination of the predictors of sustainable performance and green innovation by bringing original insights from small and medium enterprises in the United Arab Emirates.

1. Introduction

In response to the increasing prevalence of environmental challenges, governments and corporations are prioritizing sustainable production approaches and incorporating sustainable practices into fundamental corporate actions [1]. In relation to that, green economic growth has been regarded as a noteworthy business objective for firms to address ecological market needs [2]. Moreover, green innovation has emerged as a significant approach to minimize carbon emissions, reform the economic growth model, and ensure environmental development. Green innovation can minimize the undesired effects of business practices on the environment by introducing novel products, services, or processes from time to time [3]. By promoting green innovation, companies can meet their social obligations, attain economic prosperity, and protect the environment [4]. An increasing number of organizations are opting for green innovation as a strategic approach to attain sustained competitive advantages. However, despite the increased interests toward green innovation in recent years, there are limited empirical researches that explored its antecedents [2].

Earlier research viewed green entrepreneurial orientation (GEO) as a significant strategy for enhancing green innovation [4,5]. According to the natural resource-based view (NRBV), GEO is a dynamic capability that, when integrated with a firm's culture, allows it to discover, capture, and sustain ecological initiative [6]. This in turn enhances the dynamic process of a company's green innovativeness [7]. The term "GEO" refers to a proactive strategic tendency of a firm to exploit

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environmentally friendly business opportunities [5,8]. GEO can be fostered through proactively embracing green business practices and forecasting future opportunities. However, there has been contradictory results in earlier studies regarding the association among GEO and green innovation. Although some researchers reported that GEO has a favorable effect on green innovation [1,2], other studies found that there is no relationship between them [5]. Furthermore, Muangmee et al. [1] stressed on the necessity for conducting more studies on the actual impact of GEO on green innovations in small and medium enterprises' (SMEs') context.

As a result of a series of government regulations and expectations towards various enterprises, corporate social responsibility (CSR) has also been recognized as a crucial element in attaining sustainable performance and green innovation [9]. Mo et al. [10] asserted that CSR efforts can significantly enhance the innovative outcomes of businesses. Companies can foster trust with diverse business stakeholders through CSR activities, thereby establishing a robust network that boosts innovation resources, mitigate the risks of innovation, and conserves both the resources and time [11]. Thus, it will enhance a firm's capability to improve its green innovation practices. According to previous studies, green innovation can be influenced by several variables, such as government interventions [12], green dynamic capability [13], stakeholders' pressure [14] and green market orientation [15]. However, minimal emphasis was placed on CSR as a fundamental element for promoting green innovation. Moreover, less research has been undertaken about the CSR's role in affecting green innovation in developing economies [16]. Mukhtar et al. [17] added that while prior investigations have emphasized on the connections among CSR and business performance, there is insufficient research that investigated whether CSR really affects sustainable performance and green innovation.

Earlier studies also stressed on the important role of technological capabilities in driving a firm's innovative performance [4,18]. Its significance is progressively escalating in accordance with the demand for developing innovative offerings that incorporate emerging technology to satisfy growing market expectations [19]. Possessing superior embedded technological capabilities results in enhanced product attributes and efficient performance, hence promoting customer happiness [20]. Liao et al. [21] found that technological capability is vital for enhancing product innovation and accelerating the pace of product development. In particular, technological capability can be conceptualized as a company's ability to employ advanced technological features in its business operations [22]. As technical capabilities are integrated into organizational routines over time, they become increasingly valuable, cannot be easily imitable or substituted by the rivals [18], and hence represents a key approach for attaining long-term competitive advantage. However, there are minimal researches that explored the associations among technological capability and green innovation, mainly, in the region of the middle east. Therefore, the role of technological capability in predicting green innovation warrants special examination [23].

In relation to the gaps and literature aforementioned above, this research seeks to examine whether green entrepreneurial orientation, technological capability, and CSR have any effect on sustainable performance as well as green innovation in SMEs' context. It also aims to make a valuable contribution to the literature by verifying the influence of green innovation on sustainable performance. The UAE context was selected to conduct this research, because the Government wishes to increase the total contribution and business growth of all SMEs in the country in order to be the main engine for sustainable development and prosperity. Nevertheless, SMEs nowadays face high rivalry, and therefore, they have to look for different approaches to boost their sustainable performance.

This paper is structured based on different parts as follows: first, the literature review about the aforementioned variables along with their connections with green innovation and sustainable performance are presented in the following section. Based on the literature, the hypotheses are formulated in the same section. In the next section, the methodology employed for data collection is highlighted in details. After that, the results along with their interpretations followed by the discussion are presented. Finally, this paper ends by outlining the implications as well as limitations and forthcoming research suggestions.

2. Literature review

2.1. Theoretical background

Building on the RBV perspective which was developed by Barney [24], the NRBV paradigm was further introduced by Hart [25] as an extension to RBV. This study is built upon the NRBV and considers GEO as a resource that allows enterprises to attain sustainable performance. This can be achieved by strengthening the influence of GEO on green innovation. The assertions of NRBV posit that enterprises should actively enhance and synchronize their engagements with the ecological environment. Within the framework of NRBV, GEO signifies a company's responsibility towards integrating sustainable environmental practices as a fundamental component of its entrepreneurial activities [24,26]. It indicates that enterprises should actively seek out, identify, and capitalize on available environmental innovation opportunities for the purpose of improving their sustainable performance. GEO encompasses the ability to introduce innovative offerings, suggesting that a proactive and creative strategy toward environmental concerns significantly influences the nature and frequency of technological innovations implemented by a company [4,6,27]. Essentially, GEO is a strategic framework that drives a company to create new or enhanced environmentally sustainable products, processes, technologies, and services—hallmarks of green innovation [4,8]. Consequently, NRBV is a proper theory for explaining the impact of resources and capabilities on green innovation as well as sustainable performance. In SMEs, the sustainable performance can be assessed vial the triple bottom line (TBL) approach which integrates three key dimensions: economic, environmental and social aspects. Specifically, financial performance is used to measure the economic success, while environmental performance can be evaluated based on an enterprise's ability to minimize operation costs, resource usage and material waste. on the other hand, social performance can be measured via employee satisfaction, community well-being and customer happiness.

Furthermore, this paper follows the stakeholder theory, a prevalent framework in the earlier literature that elucidates the influence of CSR on sustainable performance and green innovation. In 1984, Freeman developed stakeholder theory to highlight the need of generating beneficial values for business stakeholders, that are essential for the growth of organizations [28]. The stakeholder theory posits that the actions of enterprises are consistently evaluated from the perspective of stakeholder expectations [29–31]. According to this theory, CSR reinforces the ability of businesses in improving green innovation in firms through four primary channels: legal and governmental bodies, local communities, customers, and organizational staff. Firms that put high emphasis on CSR tend to demonstrate greater innovative capabilities [32,33]. The significance of green innovation is acknowledged in the opportunities it provides to enhance environmental management efficacy while fulfilling environmental protection standards [34,35]. Consequently, green innovation has not been merely regarded as an approach to respond to environmental requirements, but also as a means to enhance sustainable performance [16].

In addition, dynamic capability (DC) theory represents the foundation for explaining the impact of technological capabilities on both sustainable performance and green innovation. The DC theory represent an extension to the RBV and enable us to comprehend the determinants of the competitive advantage of enterprises in fluctuating and turbulent contexts [36,37]. DCs include the assessment of technological prospects in order to be innovative and adapt to changes in market and the

business landscape for the purpose of satisfying market needs and ensuring sustainable performance [38,39]. The acquisition of distinctive capabilities is propelled by the desire to attain specific goals [40]. When organizations transcend compliance-based operations, they cultivate competencies, engage in continuous improvement, and attain sustainable performance [41]. In addition, enterprises typically augment their technological proficiency to foster innovation by allocating resources to research and development for the cultivation of such capabilities [42,43]. Based on DC theory, technological capability positively influences green innovation which ultimately improve business competitiveness and sustainable performance.

This paper provides a key theoretical contribution to the literature through the examination of the joint effects of CSR, GEO, and technological capability on both green innovation and sustainable performance. Earlier studies have not collectively tested the aforementioned factors in one research model, particularly, in the UAE's SMEs' context. For instance, Padilla-Lozano and Collazzo [16] and Mukhtar et al. [17] focused in their studies only on CSR's effect on green innovation. Similarly, some prior studies tested the impact of CSR on sustainable performance [32,44–46]. Other researchers also investigated the role of GEO in fostering green innovation [4,5] and sustainable performance [6,8]. On the other hand, certain studied emphasised on the role of technological capability in affecting green innovation [18,47,48] and a firm's sustainable performance [49,50]. Therefore, the present paper advances the literature by integrating CSR, GEO, and technological capability to examine their impact on green innovation and sustainable performance in one unique research framework.

2.2. Green innovation

In prior researches, the term "green innovation" was often referred to sustainable innovation, environmental innovation, and ecological innovation [51]. According to Li et al. [34], green innovation can be fostered via integrating clean technologies and sustainable practices to minimize pollution by minimizing energy consumption and hazardous waste, hence enhancing environmental performance. Green innovation encompasses the introduction of new offerings that add significant values for consumers and enterprises while mitigating the negative impacts on the environment [1,2,4,16]. In the entire industrial contexts, green innovation enhances processes and operations that comply with the design of ecological products and mitigate environmental impact [52,35]. Sarkar et al. [53] acknowledged that green innovative firms, including those that implement environmentally friendly practices in their goods and operations, can attain significant levels of economic sustainability by minimizing excess and improving productivity. Implementing green methods enhances organizations' market positions and financial performance [8,52,54]. Green innovation, according to some researchers has a direct impact on operational performances, which in turn contribute to the financial success of businesses [35,55]. Furthermore, practices of green innovation have a favorable impact on organizational expenditures by reducing energy usage and discharge waste [56]. Thus, the following research hypothesis is projected:

H1: Green innovation positively affects sustainable performance.

2.3. Green entrepreneurial orientation

GEO was expressed in prior literature as a proactive strategic approach that emphasizes on exploring and monitoring sustainable business activities and adopting favourable practices that benefit business stakeholders [27,57]. It encompasses the introduction of eco-friendly products, minimizing carbon emissions, enhancing the environment of green workplace, and improving job satisfaction as well as environmental reputation [58–60]. GEO entails the willingness to introduce innovative offerings that are friendly to the environment and enhance the wellbeing of a society [57]. Asad et al. [61] reported that firms which adopt GEO pay high attention to environmental issues and therefore, they focus on introducing green products. In the SMEs' context, GEO enables enterprises to create ecologically innovative goods, hence improving their sustainability [6,58]. Effective resource allocation for green innovation reduces expenses and mitigates detrimental influences on the environment and society [62]. According to Guo, et al. [2], organizations that possess a robust GEO are likely to exhibit environmental responsibility and frequent innovation across their processes, products, strategies, services, or business models. The authors further outlined that GEO could enhance business initiatives and the readiness to embrace risks associated with green technology, hence fostering green innovation. Recent research also suggested that GEO positively affects green innovation [1,5,59] and is essential for enhancing financial performance as well as reducing the negative consequences of the environment [60]. In relation to the above discussion, the subsequent hypotheses are presented:

H2: GEO positively affects green innovation.

H3: GEO positively affects sustainable performance.

2.4. Technological capability

Technological capability denotes the ability of a company in utilizing diverse technologies for the introduction of novel offerings [63,48]. When technological capabilities are integrated into organizational routines over time, they become increasingly valuable, hard to imitate, and cannot be substituted easily by other rivals [64,49] and hence serve as a significant source of competitive advantage. Successful enterprises invest significantly in developing their technological capabilities that can enable them to gain necessary skills and expertise to deploy and exploit diverse resources and knowledge for embracing green innovation [48]. In the past literature, numerous studies have acknowledged the role of technological capabilities for shaping green innovation [18,65,49]. In order to respond to the technological change, businesses must constantly innovate across a wide range of functional areas. Technological capabilities allow enterprises to foster environmentally friendly innovations through their management practices, design of products, production, and advertising [49]. If an organization aims to penetrate a market with more advanced goods and/or services, it must seek new technology opportunities and leverage them effectively [66,67]. Prior researches highlighted the vital role of technological capability in influencing green innovations [56,23] and sustainable performance [68,69–70]. García-Sánchez et al. [47] outlined that technological capabilities enhance organizational learning and encourage the generation of ideas for developing innovative products. In addition, Tidd and Bessant [71] reported that technological capabilities allow enterprises to develop innovative products in order to ensure their survival in today's dynamic market environment. In relation to the above discussion, the next hypotheses are projected:

H4: Technological capability positively affects green innovation.

H5: Technological capability positively affects sustainable performance.

2.5. Corporate social responsibility

CSR is a principle through which firms voluntarily incorporate environmental and social considerations into their operations and stakeholder interactions [10,11,72]. It pertains to corporate activities that emphasize on fulfilling an organization's ethical, economic, social, and philanthropic obligations to various stakeholders [16,32,73]. CSR entails that enterprises should endeavour to make a beneficial effect on society, not only through their offerings, but also throughout their daily activities [17,33]. When an enterprise engages in social responsibility, it maintains a sustained interest in enhancing the value it provides, both socially and economically, while addressing the needs of its stakeholders [74]. Nowadays, firms are widely interested in green innovation practices to lessen the undesirable impact of their business actions on the environment and maintain competitiveness in the worldwide market.

Consequently, companies which adopt CSR for fostering green innovation possess a competitive advantage over their rivals by effectively addressing societal and stakeholder expectations through environmentally friendly offerings [44,75]. Le et al. [45] also regarded CSR as a crucial strategy for attaining sustainable development and environmentally friendly goals by fostering green innovation within the realms of the environment, workforce, community, and customers. Similarly, Zhang et al. [76] acknowledged the significance of CSR practices in promoting societal benefits and environmental preservation. In relation to the above discussion, the following hypotheses are postulated:

H6: CSR positively affects green innovation.

H7: CSR positively affects sustainable performance.

3. Methodology

The key aim of this study is to test the drivers of green innovation and sustainable performance. Therefore, a structured questionnaire was utilized for data collection, focusing on small and medium-sized firms (SMEs) in the United Arab Emirates (UAE) as the target population for this study. A quantitative research method has been regarded as a suitable approach for collecting the data when the main aim of a study is to verify the correlations between constructs [77]. Consistent with prior researches, 437 questionnaires were distributed with official approval on several owners and managers of SMEs, as they possess adequate knowledge regarding the performance of their enterprises. Data collection was conducted using several approaches, including self-administered and online surveys. Owing to the difficulties in collecting the data from the approached respondents, a convenience sampling method was employed. This approach resulted in 235 returned questionnaires, of which 9 were either incomplete or invalid. Upon the exclusion of invalid questionnaires, 226 were used for analysis, yielding a response rate of 51.7 %. The demographic results revealed that 71.2 % of the sampled respondents are males, whereas females made only 28.8 % of the overall responses. Regarding the work experience, 9.3 % of the participants have below 5 years, whereas 32.7 % of them have from 5 to 10 years. Among the respondents, 16.4 % had around 11 to 15 years of work experience, whereas 41.6 % had more than 15 years of industrial experience. Finally, the descriptive statistics showed that most of the respondents who took part in answering the survey are from the service sector (59.3 %), 29.2 from SMEs involved in trade sector, whereas 11.5 % are from manufacturing industry.

The survey questionnaire was organized into two sections/parts (section A captured demographic questions, while section B covered the measurement items of all constructs). A 5-point Likert scale was employed across each item. Besides that, we used pre-existing survey items tailored to our study setting to construct our questionnaire, which increased confidence in its reliability and validity. Before collecting the required data, a preliminary questionnaire was pilot tested with a small subset of the target respondents from SMEs who have adequate expertise about the constructs selected to conducted this research. Subsequently, the questionnaire underwent minor revisions. First, four items to measure green innovation were taken from the paper of Guo et al. [2]. Next, six items were utilized to measure sustainable performance with reference to the study of Akanmu et al. [78]. To measure GEO, five items were adapted from Guo et al. [2]. This study also relied on six items for measuring CSR by adapting them from the study of Le [44]. Finally, we measured technological capability using five items adopted from Aydin [19]. Prior to the main data collection process, a pilot test was conducted in order to check the reliability of all adapted measurement scales for each construct. The findings verified that Cronbach's Alpha values for the measurement items of green innovation (0.834), sustainable performance (0.792), GEO (0.884), CSR (0.896), and technological capability (0.715) fall in the acceptable range.

All collected data were analyzed via SmartPLS 4.0. This software is considered appropriate for analyzing the relationships among constructs in complex models and does not require the normal distribution of data. Moreover, similar prior studies have relied on SmartPLS for analyzing the linkages between the selected constructs [79].

4. Analysis of results

In this research, we alleviated the possible risks associated with common method bias (CMB) using several strategies. Initially, we distributed the survey on senior executives who are well-versed in the firms' management of green innovation. These executives are regarded as sources of precise and dependable knowledge. Secondly, we assessed the likelihood of common method variance utilizing Harman's single component test for all constructs in the research [80]. The EFA analysis indicated that no singular factor accounted for most of the variance, with the first factor encompassing merely 34.1 % of the total variance, that is lower than the key threshold of 50 %. Additionally, all constructs were loaded on distinct factor components. The aforementioned findings indicate that CMB does not have any serious issue in this investigation.

The constructed measurement model was estimated based on confirmatory factor analysis by calculating factor loadings and Cronbach's alpha, checking the composite reliability and average variance extracted (AVE) for the purpose of verifying convergent validity as well as discriminant validity. Initially, it was determined that all factor loadings fall within the permitted range of 0.5 to 1. Subsequently, to evaluate construct reliability, we examined composite reliability and Cronbach's alpha of each variable. Our measurements indicated that the composite reliability of the constructs ranged from 0.803 to 0.927 (refer to Table 1). The Cronbach alpha values also ranged from 0.741 to 0.901, exceeding the criterion of 0.7, indicating that our measurement model for present study is acceptable [81]. Next, the AVE was utilized to measure the convergent validity. The findings depicted that all AVE values fall between 0.522 and 0.717, surpassing the criteria of >0.50, hence indicating that the convergent validity of our model is well

Table 1
CFA results.

Constructs	Items	Factor loadings	Cronbach's Alpha	CR	AVE
Green Entrepreneurial Orientation	GEO1	0.529	0.820	0.878	0.598
	GEO2	0.922			
	GEO3	0.768			
	GEO4	0.866			
	GEO5	0.723			
Technological Capability	TC1	0.911	0.839	0.892	0.675
	TC3	0.805			
	TC4	0.776			
	TC5	0.787			
Corporate Social Responsibility	CSR1	0.798	0.901	0.927	0.717
	CSR2	0.857			
	CSR3	0.841			
	CSR4	0.848			
	CSR5	0.877			
Green Innovation	GI1	0.708	0.741	0.803	0.577
	GI2	0.846			
	GI3	0.717			
Sustainable Performance	EC1	0.542	0.895	0.915	0.522
	EC2	0.813			
	EC3	0.841			
	ENV1	0.801			
	ENV2	0.804			
	ENV3	0.647			
	ENV4	0.645			
	SOC1	0.659			
	SOC2	0.638			
	SOC3	0.770			

Source: Authors' own findings.
Note: CR: Composite Reliability; AVE: Average Variance Extracted.

established [81].

Moreover, the cross-loading matrix and Fornell-Larcker assumptions were used to evaluate discriminant validity. In accordance of these formulas, measurement items' outer loadings on the related construct must be larger than their loadings on all other constructs in order for the cross-loading evaluation to be considered valid. The cross-loading matrix results in our study indicated that the loading of all measurement items is greater on their designated construct. Furthermore, discriminant validity was assessed by ensuring that the square root of every variable AVE surpasses all correlation values of those that fall in the respective column and row [82]. Through our investigation, it was found that the square root of the AVE represented in bold diagonal values exceeds the off-diagonal correlations in the respective rows and columns (refer to Table 2). Consequently, the combined outcomes of the cross-loading validate that the data's discriminant validity is achieved.

In order to verify all the research hypotheses between the constructs, a structural model was constructed (see Fig. 1). Initially, we used bootstrapping procedure with 5000 subsamples to examine the path coefficient. To determine explanatory power of the study's structural model, we looked at the R2 value in the dependent variable. This research relied on the t-statistics and path coefficients (β) for testing the hypotheses. As depicted in Table 3, green innovation positively effects on sustainable performance ($t = 2.524$, $\beta = 0.179$, $p < 0.05$) Therefore, H1 is verified. Similarly, GEO has a positive impact on green innovation ($t = 3.737$, $\beta = 0.303$, $p < 0.001$) and sustainable performance ($t = 2.767$, $\beta = 0.284$, $p < 0.05$). So, hypothesis H2 and H3 are supported. Further, Technological capability has found direct positive relationship with green innovation ($t = 5.434$, $\beta = 0.361$, $p < 0.05$) and sustainable performance ($t = 5.843$, $\beta = 0.432$, $p < 0.05$); therefore, H4 and H5 are supported. Finally, the results showed that CSR positively impact green innovation ($t = 2.280$, $\beta = 0.248$, $p < 0.001$) and sustainable performance ($t = 1.979$, $\beta = 0.143$, $p < 0.05$). Therefore, H6 and H7 are supported.

5. Discussion

This paper focused primarily on examining the determinants of sustainable performance and green innovation in SMEs' context. The findings established that green innovation has a positive effect on sustainable performance. Additional support can be observed in earlier researches [55,83,84] which verified the link among both constructs. Green innovation allows manufacturers to create and develop items that do not cause harm to the environment [72]. Companies leading in green innovation may gain a competitive edge and charge premium prices for their creative eco-friendly products, thereby enhancing their environmental performance [85]. Mukhtar et al. [17] also added that in order to attain the sustainable development goals, green innovation is vital and can be fostered by coming up with novel products, services and processes that provide value for customers and enterprises while avoiding any harm to the environment. The finding demonstrates that, in the context of environmentally conscious corporate rivalry, green innovation is essential for SMEs. Green innovation allows SMEs to promote sustainable production and enhance performance outcomes. The use of green innovation will yield enhanced sustainable performance, including cost effectiveness, increased profitability, heightened customer satisfaction, reduced environmental pollution, enhanced product quality, and an elevated reputation. Consequently, the owners/managers of SMEs must enhance their comprehension of the importance of ongoing innovation in green product and process improvements to attain improved business success.

Next, the results revealed that GEO positively affects green innovation as well as sustainable performance. The prior studies indicated that GEO has a robust and significant correlation with cleaner output [2,60,86]. Furthermore, recent researches confirmed that eco-design and green innovation are two examples of environmentally conscious business practices that contribute to a more sustainable community and long-term success [57]. Majali et al. [5] also stated that GEO improves sustainability and accelerates green product innovation. In particular, enterprises that focus on GEO are fundamentally motivated by sustainability performance, resulting in a focus on their environmentally friendly initiatives in thinking, invention, innovation, motivation, manufacturing, and all other activities that confer significant competitive benefits. Earlier literature [58] also acknowledged that effective entrepreneurs can detect various opportunities that are valuable to their enterprises before others and act upon them by introducing innovative products and services to enhance sustainable performance. Additionally, GEO can strategically promote the development of green creative products, hence improving sustainable business performance [1]. As such, the primary purpose of GEO is to adopt environmentally friendly manufacturing practices and to provide environmentally friendly goods and services [87]. Consequently, if a firm has a robust GEO, it will exhibit a responsibility towards environmental management and introduce innovative products, and services to meet stakeholders' needs [61].

Furthermore, this research found that technological capability has the strongest effect on both green innovation as well as sustainable performance. The finding was supported by earlier literature which clearly reported about the positive effect of technological capability on green innovation [38,48] and sustainable performance [88,50]. According to Aydin [19], technological capability allows companies to convert market insights into new product innovations. Zhang et al. [23] added that the utilization of new technologies is essential for enhancing organizational capabilities and competencies that are required for achieving sustainability. Possessing superior technological capabilities results in enhanced product features, efficient functions, and high-quality new offerings, hence promoting customer pleasure [19]. Firms that acquire robust technological capabilities tend to be acquainted with the technologies pertinent to a specific domain, thus, enabling them to fully leverage existing knowledge and technical resources to enhance their goods [89]. According to Zhou and Wu [18], the acquisition of technological knowledge enhances the ability of an enterprise to assess and employ new technologies and capabilities in product innovations. Consequently, it can swiftly spot emerging trends in technology, test out new designs, and come up with innovative products that push the limits of what is currently possible in terms of technology.

The final hypotheses, which states that CSR positively influences green innovation as well as sustainable performance were supported. The findings showed the effect size of CSR on both constructs is the weakest among the other constructs. Past research [17,75] also verified the positive impact of CSR on green innovation. Dai et al. [79] also displayed that CSR had a favourable impact on green product and process innovation. Other studies also confirmed that CSR significantly influences the sustainable performance of enterprises [44,46]. Likewise, Mo et al. [10] reported that the success, growth, and expansion of a business depends on its CSR initiatives. In the current era which is characterized by environmental awareness, customers are inclined to purchase eco-friendly items and expect firms to adopt sustainable business practices. To remain competitive, SMEs must prioritize green innovation to satisfy the needs and wishes of different stakeholder groups. CSR compels enterprises to enhance product innovations, develop ecologically sustainable products and processes, and mitigate

Table 2
Discriminant validity.

	1	2	3	4	5
1. Corporate Social Responsibility	**0.847**				
2. Green Entrepreneurial Orientation	0.223	**0.774**			
3. Green Innovation	0.332	0.552	**0.760**		
4. Sustainable Performance	0.529	0.623	0.639	**0.649**	
5. Technological Capability	0.562	0.460	0.589	0.562	**0.821**

Source: Authors' own findings.

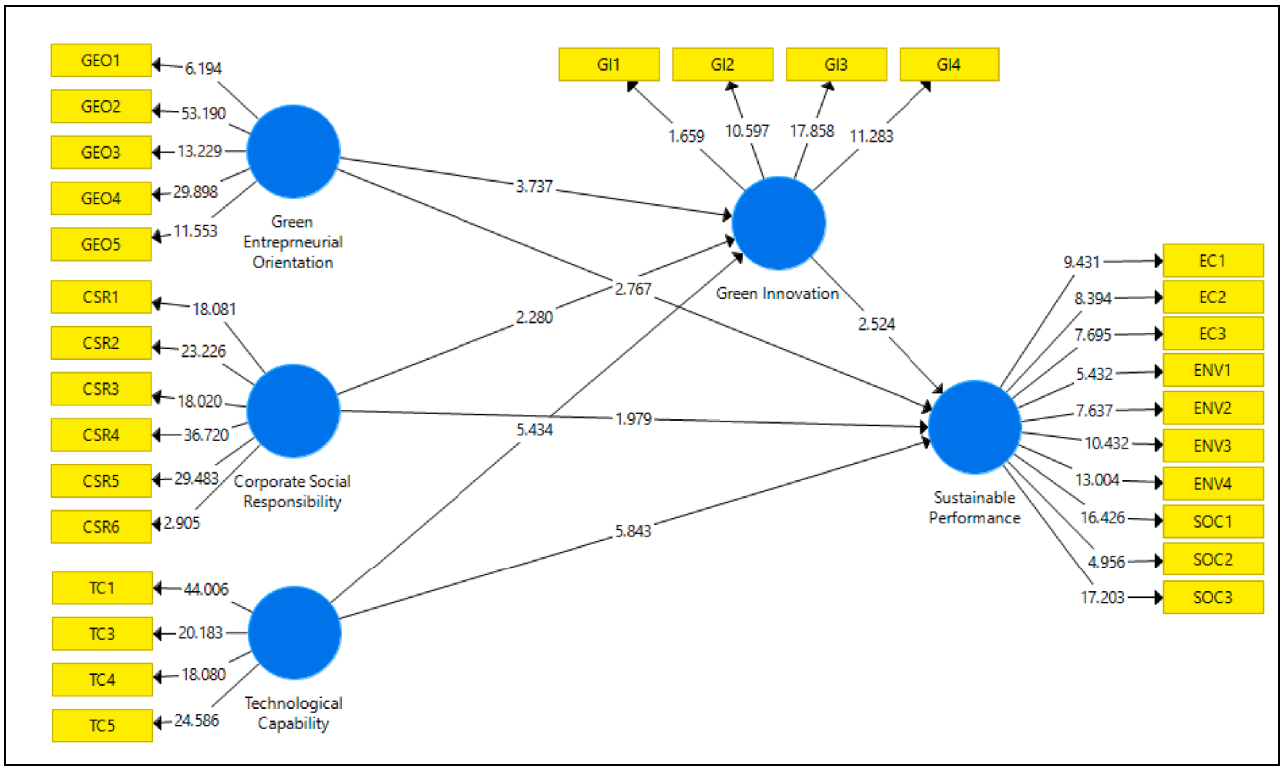

Fig. 1. Structural model.
Source: Authors' own findings

Table 3
Results of hypotheses.

Hypotheses			Original Sample	Std. Deviation	*t*-value	*P*-Value
Green Innovation	→	Sustainable Performance	0.179	0.071	2.524	0.012
GEO	→	Green Innovation	0.303	0.081	3.737	0.000
GEO	→	Sustainable Performance	0.284	0.103	2.767	0.006
Technological Capability	→	Green Innovation	0.361	0.066	5.434	0.000
Technological Capability	→	Sustainable Performance	0.432	0.074	5.843	0.000
CSR	→	Green Innovation	0.248	0.109	2.280	0.023
CSR	→	Sustainable Performance	0.143	0.072	1.979	0.048

Source: Authors' own findings.

the adverse effects of their daily operations on the environment [16]. Accordingly, SME owners and managers should be aware that implementing CSR policies will inspire green ideas within the firm.

6. Theoretical implications

The primary purpose of this research was to investigate the impact of GEO, technological capability, and CSR on sustainable performance and green innovation. It also aimed to test the link among green innovation and sustainable performance in SMEs' setting. The findings showed that GEO, CSR, and technological capability all positively affects both green innovation and the sustainable performance of SMEs. Besides that, green innovation was found as a positive predictor of sustainable performance. This paper has some contributions to the management literature on sustainable performance and the green innovation. Primarily, green innovation is a robust strategy to showcase a firm's abilities and enhances business performance, especially within SMEs' context. The integration of green innovation into the RBV offers a new theoretical perspective to test enterprises' performance in developing markets. Secondly, prior researches have put large emphasis on the effect of GEO, technological capability, and CSR on innovation, but the sustainability aspect was not sufficiently examined. This research has enhanced the prior literature by integrating sustainability into the developed conceptual model. Moreover, the current study examined the impact of green innovation on enhancing the sustainable performance in the SMEs' setting, thereby adding to the existing literature on RBV theory.

Moreover, the majority of published research papers in this field have focused primarily on the external influences of green innovation adoption, but there is a limited research been conducted about its internal determinants of green innovation or the organizational processes involved. While GEO, CSR, and technological capability are acknowledged in past researches as important internal factors of an enterprise, there are limited studies that explored their impact on green innovation. Nevertheless, earlier studies reported inconsistent results regarding the effect of green innovation on firm performance. Consequently, this paper intended to contribute to the current literature on green innovation theory by investigating their effects on green innovation. Additionally, there has been mixed findings from empirical studies regrading the determinants of sustainable performance and green innovation. Finally, another major theoretical contribution in the present paper is represented by the examination of the linkages among the variables in the model in emerging country (UAE) as most of the previous researches were done in different contexts.

7.1. *Practical implications*

Practically, the findings carry various implications for decision makers in SMEs' setting. Firstly, this paper verified that GEO favourably influences green innovation. The findings indicate that in order for SMEs

to build their green innovation capabilities, the management should focus on fostering GEO and fit in it into business strategic agenda. Policy makers should stay tuned to emerging trends in their industry and be proactive in upgrading their product, process, and services while adopting sustainable business practices that emphasize on environmental performance. For instance, they can establish a policy for training programs that deliberately motivate them to improve their GEO, thus fostering better green innovation. Moreover, the decision-makers in SMEs can integrate green values into their corporate strategic objectives and reward employees who come up with promising ideas that align with them. It is also advised to invest in research and development as well as pilot projects for developing environmentally friendly products. Finally, collaborating with external stakeholders and monitoring trends via social media channel can be important sources of green ideas and gaining access to financial funding.

The outcomes also displayed that technological capability positively affect sustainable performance and green innovation. Consequently, businesses should look for the means to enhance their technological capabilities. The lack of necessary technological capabilities for using the data they get from internal or external environments to form new and novel products, creates an urgency for them to figure out how to acquire such capabilities. Policymakers in SMEs should prioritize the adoption of emerging technologies, including cloud computing, online communication platforms, and industry-specific solutions in order to support sustainability objectives. It is also vital to regularly conduct internal audit on digital resources, employees' competencies, and technological infrastructure in order to identify any potential gaps and respond accordingly. Besides that, building stronger connections with research centres and institution may enable SMEs to strengthen their technological and innovation capabilities. Finally, policy makers can enrich the technological capabilities in their enterprises by seeking for the necessary support from domestic governments and apply for tax exemption.

Furthermore, the outcomes of this research verified that CSR positively impacts both sustainable performance and green innovation. This finding suggests that managers aiming to improve their firms' environmental performance should formulate a CSR strategy to better anticipate and comprehend stakeholders' expectations and competitors' actions. This information must be handled more expeditiously, and the environmental policies of various departments should be synchronized to enhance their sustainable performance. Furthermore, policy makers in SMEs should prioritize building trust with external stakeholders via CSR programs, thereby developing a corporate network that nurtures the resources for innovation, mitigates innovation risks, and conserves time and resources. This will ultimately improve their capabilities in cultivating green innovation. Finally, decision-makers in SMEs should adopt responsible marketing practices, use energy efficient resources, and support the well-being of employees in order to establish trust among business stakeholders and supporting environmental goals. For instance, they may synchronize and optimize CSR programs to lessen pollution and hazardous waste, thus enhancing environmental quality and nurturing societal well-being.

Finally, the findings validated that green innovation is a significant and positive predictor of sustainable performance. Consequently, senior executives in SMEs should devise appropriate strategies that aim to minimize operational costs through enhanced operational activities in order to gain a competitive advantage and enhance their sustainable performance. In order to maintain their growth, SMEs should also promote environmentally friendly innovative processes and manufacturing while using green technology. Moreover, policy makers in SMEs should use renewable energy resources, minimize energy consumption via the introduction of energy-efficient technologies, and effectively deal with pollutants and material waste that minimize manufacturing costs. They should also prioritize the effective usage of raw materials and explore innovative means to convert waste into marketable products that provide extra revenue. Additionally, collecting necessary data about industry trends, customers' expectation, and regulatory changes can encourage SMEs to search for novel innovation opportunities by finding out and assessing potential unmet market needs or detecting any issues that are typically raised by business stakeholders.

8. Limitations and future research

This paper, like many prior investigations, has certain limitations that could be considered in upcoming researches. First, this study exclusively presents evidence pertaining to SMEs; hence, subsequent research can address this limitation by examining a sample of large corporations. Secondly, the sample of enterprises examined in this study is limited to the UAE context; thus, future research can enhance the generalizability of the findings by replicating the proposed approach with data from different countries. Furthermore, the study relied on a cross-sectional methodology; therefore, it is recommended for future researches to concentrate on a longitudinal design to examine the link among the variables, thereby enhancing these measuring indicators and deriving more comprehensive results. Finally, the study focused on examining only three predictors of sustainable performance and green innovation. For this reason, future research may consider testing other factors, for instance digital leadership and green marketing.

CRediT authorship contribution statement

Jalal Rajeh Hanaysha: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Mohammed Abushabeh:** Methodology, Investigation, Conceptualization. **Said Yousef Dwikat:** Writing – review & editing, Software, Methodology. **Mohammad Fawzi Shubita:** Writing – original draft, Validation, Data curation, Conceptualization. **Muhammad Naeem Sharif:** Writing – review & editing, Writing – original draft, Conceptualization. **Sajead Mowafaq Alshdaifat:** Writing – review & editing, Writing – original draft, Resources, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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