Optimizing Green Knowledge Acquisition through Entrepreneurial Orientation and Resource Orchestration for Sustainable Business Performance

Purpose – Considering the importance of green knowledge in firms' sustainability, this study investigates the mediating mechanism of green knowledge acquisition (GKA) and the moderating role of resource orchestration capability (ROC) in the relationship between green entrepreneurial orientation (GEO) and corporate sustainable performance (CSP).

Design/methodology/approach – Using a sample of 388 executives from 195 small and medium-sized enterprises (SMEs) in the UAE, this study used partial least squares structural equation modelling to examine the proposed relationships among the constructs.

Findings – The research shows that GEO affects CSP's environmental, economic, and social aspects of CSP. This study also highlights the mediating role of GKA in the relationship between GEO and CSP. The moderated mediation analysis results indicate that when ROC is elevated, GEO's indirect influence on environmental and economic performance through GKA is more pronounced.

Practical implications – This study provides useful insights and a novel approach for manufacturing industries and authoritative bodies to alleviate environmental deterioration and improve CSP by encouraging GKA through green entrepreneurship.

Originality/value – This study enriches the existing literature on GEO, GKA, and CSP by focusing on environmental challenges and applying the resource-based view (RBV) framework. The study's findings broaden the theoretical basis for green entrepreneurship, provide guidance on enhancing CSP in manufacturing firms, and advance green entrepreneurship research.

Keywords: Green entrepreneurial orientation, Green knowledge acquisition, Corporate sustainable performance, resource orchestration capability

Paper type Research paper

1. Introduction

In recent years, organisations have faced various social, technological, and environmental transformations that have affected their operations (Abbas and Sağsan, 2019). Technology has brought about significant changes, including the eradication of geographical barriers between businesses and customers, and has led to globalisation. Customers in the modern era can not only easily contact different suppliers all over the world, but can also find substitutes that meet their needs at a lower cost (Mardani et al., 2018), making the acquisition and maintenance of competitive advantage a real challenge for firms (Shahzad et al., 2020). Manufacturing companies encounter numerous challenges, including meeting stakeholder expectations, cost reduction, regulatory compliance, risk management, innovation, and competitiveness (Shehzad et al., 2023). To meet customer demands and advance sustainable development goals,

manufacturers must adopt a performance-enhancing approach. To accomplish these goals—maintaining a competitive advantage, adhering to laws, enhancing brand reputation, gaining access to finance, and attracting and retaining top talent—manufacturing companies must achieve sustainable corporate performance (CSP). As a result, there is increased interest in improving CSP as a useful technique for gaining a competitive edge in today's corporate environment (Abbas and Khan, 2022).

The manufacturing industry has become a major contributor to environmental issues, leading to growing concerns regarding its impact on the environment (Shehzad et al., 2022d). Manufacturing companies are responsible for pollution, waste production, and threats to human lives (Zailani et al., 2012). In response to the depletion of natural resources and intensification of global warming, businesses are under immense pressure from the public and other stakeholders to adopt environmentally friendly practices that promote corporate sustainability (Davenport et al., 2019). The need for sustainable practices in the industrial sector is crucial for addressing global problems. Wijethilake (2017) classified a company's CSP into three categories: environmental, social, and economic sustainability. Companies with strong CSP have better financial returns and reduced risk exposure (Abbas and Sağsan, 2019; Yusliza et al., 2020), which benefits society, the environment, and the company's economy. Given the importance of CSP for manufacturing companies and its potential benefits, this research issue is new, exciting, and significant.

To explore and clarify the potential antecedents of CSP, this study examines the influences of green entrepreneurial orientation (GEO) on CSP, mediated by green knowledge acquisition (GKA). Additionally, it investigates the moderating effect of resource crchestration capability (ROC) on these relationships. This research is expected to enhance the understanding of the interplay between these constructs and contribute to the literature on green entrepreneurship, GKA, and CSP.

First, research has highlighted the importance of GEO as a significant factor in promoting sustainable performance (Jiang et al., 2018; Schaefer et al., 2015). GEO refers to a company's strategic approach to innovation, risk-taking, and proactive development of long-term solutions (Jiang et al., 2018; Shehzad et al., 2023). GEO may help manufacturers stand out, obtain a long-term competitive edge, and improve the world's future sustainability prospects (Wang et al., 2023). Although previous research covered the key motives and advantages for green entrepreneurship (Gast et al., 2017), how GEO promotes sustainable performance remains conflicting. Some earlier studies argue that offering green products and services harms a

company's performance, whereas others show that green entrepreneurship positively impacts financial and environmental performance (Jiang et al., 2018; Gibbs and O'Neill, 2014). Some even argue that fostering entrepreneurship is not always correlated with economic advantages (Parrish, 2010). In the corporate sustainable development context, GEO has emerged as a significant antecedent of a firm's performance (Jiang et al., 2018), although research on the effect of GEO on various components of a firm's sustainable performance is contradictory. Hence, it is imperative to conduct additional research to eliminate this inconsistency and gain a more profound understanding of how GEO impacts various facets of a CSP. The current research intends to clarify the relationships between GEO and three dimensions of CSP, namely, environmental, economic, and social performance, using the lens of the resource-based approach in light of conflicting findings about the performance consequences of GEO. Thus, this study proposes the first research question:

RQ1. Does GEO significantly influence firms' environmental, economic, and social performance?

Second, according to resource-based theory, the knowledge source is one of the most important elements of a company (Shehzad et al., 2023; Barney, 1991). According to Martínez-Ros and Kunapatarawong (2019), firms must obtain knowledge that includes green knowledge about green technology and requirements (Chen et al., 2019). The acquisition of green knowledge is a central research focus, as noted by Chen et al. (2014), and has a significant impact on green innovation, as highlighted by Liao (2018). GEO and company performance may vary under various environmental circumstances (Jiang et al., 2016). According to Bojica and Fuentes (2012) and Patel et al. (2015), businesses may execute their entrepreneurial orientation using knowledge efficiently. Green entrepreneurship and GKA complement a firm's attributes, which may boost its long-term success Jiang et al. (2018). Organisations with strong GEO are more likely to devote resources to green knowledge development because they recognise the importance of environmental sustainability in attaining their business goals (Shehzad et al., 2022c). On the other hand, businesses that invest in imparting knowledge on environmental sustainability are more likely to foster GEO because they recognise the benefits of doing so (Wang et al., 2023). Researchers have also investigated various factors that mediate the link between GEO and CSP, such as green process innovation (Frare and Beuren, 2022) and green product innovation (Majali et al., 2022). Despite the recent appearance of GKA, little attention has been paid to GKA's mediating mechanism in the linkages between GEO and CSP.

By proposing the second research topic, this study seeks to bridge this theoretical gap and evaluate how GKA affects the GEO-CSP correlation.

RQ2. Does GKA mediate the relationship between GEO and CSP?

Third, existing research indicates that a variety of factors, including institutional pressure (Lin and Ho, 2016), environmental regulations (Zhang et al., 2018), environmental ethics (El-Kassar and Singh, 2019), and green intellectual capital (Yusliza et al., 2020), affect how sustainably a company performs. Because CSP is a challenging and costly technological frontier, it requires a wider range of expertise (Pacheco et al., 2018), particularly complex technical knowledge and skills for reducing environmental contamination (Liao and Tsai, 2019). However, because internal knowledge resources are limited, businesses must seek external information to boost CSP (Shahzad et al., 2020). Moreover, firms require the capacity to orchestrate resources to successfully evaluate and utilise external knowledge resources (Sirmon et al., 2007). Resource efficiency and internal conflict reduction depend heavily on resource orchestration, a dynamic competence that helps businesses translate new information to allow CSP (Teece, 2007). Drawing on the work of Wang et al. (2020b), Sirmon et al. (2011)Sirmon et al. (2011), and Shehzad et al. (2023), we define ROC as the in-house capacity of an organization to integrate, configure, and deploy knowledge resources to improve CSP. Moreover, the role of various forms of organizational capabilities, such as firms' agility (Shahzad et al., 2020), combinative capability (Sheng, 2017), and knowledge transfer and integration capability (Jiang et al., 2018), in nurturing CSP has been extensively investigated. However, the researcher highlighted that ROC, a firm's internal capacity that gathers, customises, and executes knowledge resources to boost performance, is undeveloped and necessitates further investigation (Wang et al., 2020b; Shehzad et al., 2023). ROC, which is a critical corporate capability, may moderate CSP. This research, therefore, examines to what extent ROC strengthens or weakens the link between GEO, GKA, and CSP.

RQ3. Does ROC moderate the relationship between GEO, GKA, and CSP?

This study used structural equation modelling (SEM) and moderated mediation to test the relationship between the constructs based on the data of 388 participants from 195 UAE manufacturing firms. Our research is expected to provide theoretical initiatives on GEO, GKA, and ROC, and practical implications to improve sustainable performance for firms.

The remainder of this paper is organised as follows. An initial examination of the RBV theory and related current literature is carried out to better understand the links among the

constructs inside the theoretical research model. The research approach used to evaluate the suggested model was assessed. The empirical findings are presented after examining the data gathered. Finally, the research concludes with discussions, implications, limitations, and conclusions.

2. Literature review

The research is grounded in RBV theory, and it proposes that GEO is linked significantly with three measures of CSP (environmental, economic, and social performance). GKA mediates the association between GEO and CSP and is subject to the moderating effect of ROC. Figure 1 illustrates the proposed model.

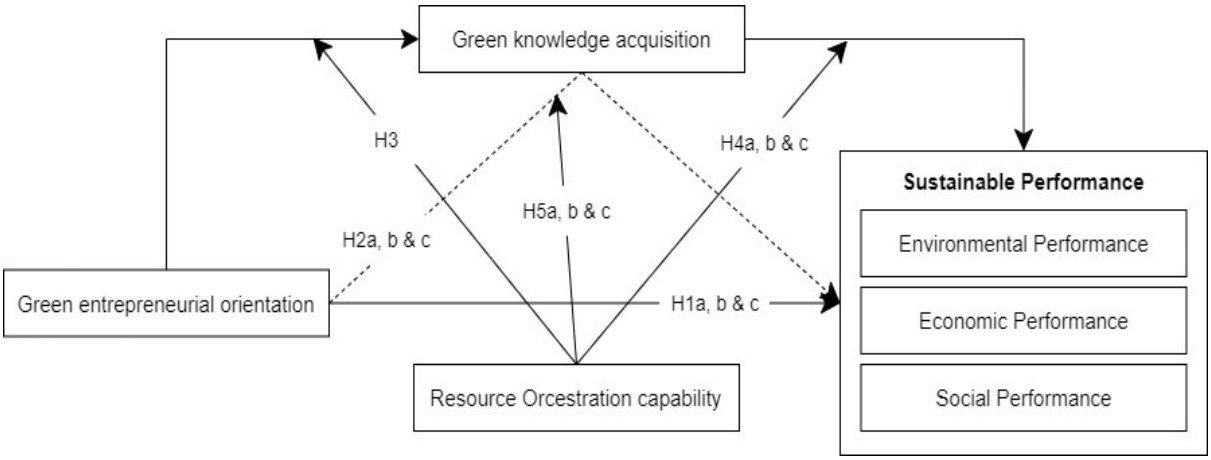

Figure 1. Research Model
Source: Authors own creation

The RBV theory serves as a strategic management framework highlighting the pivotal role of distinctive and valuable resources in establishing enduring competitive advantages for organizations (Shahzad et al., 2020). Within the interconnection of GEO, GKA, and CSP, encompassing environmental, economic, and social aspects, RBV theory offers an insightful perspective to comprehend the underlying dynamics. The RBV posits that organisations can gain a competitive edge by possessing resources characterised as valuable, rare, inimitable, and non-substitutable (Barney, 1991; Peteraf, 1993). In the realm of GEO, which strategically centres on environmental sustainability, organisations can cultivate distinctive capabilities and resources linked to eco-friendly technologies, practices, and products (Wang et al., 2020b; Shehzad et al., 2023). These resources pose challenges for competitors attempting replication because of their specificity and requisite specialised knowledge. This aligns with the concepts

of resource heterogeneity and immobility, as organisations with robust GEO can leverage their unique resources to acquire knowledge and elevate their sustainable performance. In the GEO context, firms actively seeking and acquiring knowledge regarding sustainable practices, environmental regulations, and emerging green technologies are likely to accumulate valuable knowledge (Wang et al., 2023). This knowledge, deeply embedded within the organisation, transforms into a strategic resource propelling innovation, operational efficiency, and the creation of environmentally friendly products and services (Zameer et al., 2021; Abbas and Sağsan, 2019). Consequently, such knowledge becomes an integral component contributing to an organisation's competitive advantage.

The RBV suggests that a firm's resource endowment influences its performance outcomes. In the case of green entrepreneurial orientation, the knowledge acquired regarding sustainable practices and technologies can lead to improved environmental, economic, and social performance. For example, the knowledge gained can facilitate the adoption of cleaner production processes, reduce resource consumption, and decrease emissions, resulting in improved environmental performance (Wang and Juo, 2021). Moreover, Green innovations and efficiency gains can lead to cost savings, improved operational efficiency, and increased market share, as eco-conscious consumers prefer environmentally friendly products (Shahzad et al., 2020). Similarly, engaging in socially responsible practices, such as fair labour conditions and community engagement, enhances a firm's reputation and can lead to stronger stakeholder relationships (Abbas and Sağsan, 2019).

Furthermore, the RBV underscores the importance of dynamic capabilities, which involve a firm's ability to adapt, learn, and reconfigure resources in response to changing external conditions. GEO requires firms to proactively seek new knowledge and adapt to evolving environmental and societal demands (Jiang et al., 2018). The knowledge acquisition process enables firms to continually update their practices and technologies, aligning them with the latest sustainability trends and regulations (Wang et al., 2020a; Idrees et al., 2023b).

2.1. Green entrepreneurial orientation

GEO denotes a company's strategic emphasis on proactively discovering and pursuing environmentally sustainable business prospects by incorporating environmental concerns into all aspects of its entrepreneurial activities (Chao Wang et al., 2022). GEO refers to a company's dedication to environmentally friendly practices, such as creating and promoting environmentally friendly goods, applying sustainable manufacturing techniques, and pursuing

environmental stewardship in all operations (Shehzad et al., 2023). Kraus et al. (2018) state that GEO entails incorporating environmental considerations into a firm's strategic decision-making processes and using proactive and creative measures to solve environmental issues and achieve sustainable competitive advantages. GEO is differentiated using environmentally friendly materials and procedures (Demirel et al., 2019). A Green entrepreneurial orientation's primary job is to satisfy the demands of ecological community stakeholders, such as environmentally aware consumers, government and society regulators, and stakeholders concerned with the economy and the environment (Chen and Chang, 2013). York (2016) emphasizes GEO's contribution to encouraging the adoption of cutting-edge technology to maximize the effectiveness of our planet's energy and material reserves. Green entrepreneurship, as described by Zahoor and Gerged (2021), is a proactive strategy that encourages businesses to look for methods to improve and take advantage of novel opportunities to boost performance. This deters companies from engaging in unsustainable activities and motivates them, via partnerships and alliances, to create environmentally friendly and efficient products and processes. In line with previous research by Jiang et al. (2018) and Shehzad et al. (2023), we defined GEO as the structures, processes, and behaviours of organisations exhibiting green innovation, proactivity, and risk-taking, which leads to the adoption of sustainable strategies and activities to improve a firm's environmental performance.

2.2. Green knowledge acquisition

Knowledge management has gained significant traction in contemporary times (Darroch, 2005) owing to its crucial role in the global business environment (Shams et al., 2019) and its potential to impact firms' innovation capabilities through knowledge (Ferraris et al., 2021). The knowledge-based approach asserts that information is a company's most valuable asset for driving innovation and gaining a competitive edge in the marketplace (Grant, 1996). According to Ahuja and Katila (2001), an organisation's knowledge base provides the opportunity and capacity to comprehend and apply novel knowledge for problem solving, decision-making, and innovation. In addition, companies must obtain diverse forms of knowledge (Martínez-Ros and Kunapatarawong, 2019) encompassing green knowledge about green technology and environmental requirements (Chen et al., 2019). The acquisition of green knowledge is the central focus of research in this field (Chen et al., 2014) and significantly affects green innovation development (Liao, 2018). Following Wang et al. (2020a), we define GKA as acquiring and disseminating knowledge centring on environmentally sustainable practices,

principles, and technologies. The field of study encompasses investigating, comprehending, and implementing information about ecological concerns, resource preservation, sustainable energy, and additional environmentally conscious methodologies.

2.3. Corporate Sustainable Performance

Sustainable Performance pertains to the capacity of an individual, group, or system to consistently attain intended results and uphold elevated levels of productivity, efficiency, and efficacy over an extended period. The concept entails harmonising economic, social, and environmental considerations to guarantee sustained prosperity while safeguarding the capacity of future generations to fulfil their requirements. Within commerce, sustainable performance pertains to an organisation's ability to produce enduring value while considering ecological and societal ramifications, as Shahzad et al. (2020) posited. The process entails incorporating sustainable practices into fundamental business operations, including, but not limited to, resource efficiency, responsible supply chain management, and stakeholder engagement, aiming to achieve long-term success. Furthermore, the industrial sector has made significant strides to enhance the utilisation of natural and green resources during industrial expansion (Abbas and Sağsan, 2019). In particular, this condition strained the availability of natural resources, resulting in environmental deprivation. Rising demand has contributed to this challenge even more (Shahzad et al., 2020). Ecologists and naturalists have praised organisations for using advanced knowledge and green thinking in their manufacturing processes to achieve benefits that would improve business sustainability (Sarkis et al., 2011).

We focused on ecological, economic, and social sustainability as the three components of CSP. First, environmental sustainability is primarily dependent on the responsible handling of industrial waste, the reduction of toxic waste and carbon emissions, the reduction of the likelihood of hazardous accidents in a manufacturing plant, the production of eco-friendly products, and so on (Shahzad et al., 2020; Tseng et al., 2016). Second, according to Tseng et al. (2016), economic sustainability is closely linked to factors such as cost-effectiveness, revenue generation, energy efficiency, and waste-to-revenue conversion. Focusing on reducing negative industrial byproducts is one way to improve environmental sustainability, which in turn helps businesses' bottom lines (Kemp and Pearson, 2007). Tseng et al. (2016), Bansal (2005), and Shahzad et al. (2020) all agree that ensuring and increasing the health safety, and well-being of society is essential to social sustainability. According to recent research, CSP plays a critical role in attaining sustainable development via many strategic combinations, such as GI, corporate social responsibility, overall quality management, and absorptive ability

(Abbas, 2020). In conclusion, CSP may be defined as an advancement that integrates environmental, economic, and social dimensions.

2.4. Resource orchestration capability

According to the resource orchestration view, firms may maximise the value of their resources by properly organising, bundling, and exploiting them (Sirmon et al., 2011; Shehzad et al., 2023). These include the internal resources held by a company and external resources belonging to customers, vendors, and stakeholders that the company may use (Wong et al., 2018). According to Chadwick et al. (2015), the resource orchestration notion broadens the RBV by coining the phrase "resource orchestration", a combination of asset orchestration and resource management. Resource orchestration, in particular, encompasses managerial activities related to the development and realisation of strategic resources across the firm (Chadwick et al., 2015) and has emerged as a critical way for firms to create value, improve organizational performance, and achieve green innovation (Shehzad et al., 2023; Wang et al., 2020b). Manufacturing firms often depend on ROC to respond to shifting market conditions, evolving customer needs, and technological development. By using it, firms may better control their supply and demand of resources, speed up their manufacturing, and boost their overall efficiency (Shehzad et al., 2023). Previous research defines ROC as a manufacturing firm's capacity to effectively and efficiently allocate and coordinate resources to fulfil its production goals (Sirmon et al., 2011; Wang et al., 2020b). It entails coordinating diverse resources, such as raw materials, equipment, labour, and technology, to maximise production, reduce costs, and fulfil consumer needs.

2.5 Green entrepreneurial orientation and Corporate sustainable performance

Entrepreneurial activity may mitigate environmental degradation and capture economic value by increasing market efficiency and reducing market failure (Jiang et al., 2018; Shehzad et al., 2024). To address this market failure, GEO may assist in capturing the potential market using new technology and manufacturing processes. GEO provides increased energy efficiency and better utilisation of natural resources (York et al., 2016). Teece (2014) contends that dynamic capacities involve the creation, renewal, and reconfiguration of internal and external resources. This propensity emphasises grabbing chances and capturing value. GEO has encouraged the emergence of innovative product processes (Woldesenbet et al., 2012; Baquero, 2024a). Furthermore, a company using GEO can improve the efficiency of resource conversion. The green technology used in manufacturing processes may reduce the use of water, energy, coal,

or oil (Triguero et al., 2013). GEO is concerned with modifying a structure to react to rapidly changing settings (Teece, 2016). This implies that GEO allows enterprises to comply with environmental regulations and address public environmental concerns. If GEO is implemented, the company will be motivated to create solar-energy goods rather than fossil energy products. Thus, GEO helps achieve the criteria of occupational health and safety management standards, such as ISO 14000 (Jiang et al., 2018).

Furthermore, GEO leads to improved financial performance via various processes linked to three aspects of entrepreneurial orientation: innovativeness, proactiveness, and risk-taking (Covin and Lumpkin, 2011). Innovativeness refers to the propensity to capitalise on new ideas, participate in experiments, and foster creative processes. Using dynamic capabilities theory, enterprises using GEO may recombine resources to develop new goods or processes (Teece, 2016). In particular, new clean technologies are being developed to better use resources while reducing water and fossil fuel usage (Xie et al., 2019). However, institutional and societal norms support GEO adoption by many enterprises. The adoption of eco-friendly products and processes may comply with rules and avoid government fines (Demirel et al., 2019). When combined, GEO may assist organisations in improving process efficiency, minimising waste, and lowering costs by using innovative ideas. Second, proactiveness is the willingness to surpass rivals by seizing new possibilities faster than competitors (Woldesenbet et al., 2012). Consequently, GEO may improve customer reaction times for green practices, resulting in a first-mover advantage. Finally, risk-taking is predisposed to take an active stance when investing in uncertain initiatives. Although implementing green innovation is often accompanied by challenging conditions and uncertainties, it can bring in new customers and income (Wong, 2013). According to dynamic capabilities theory, organisations that use GEO are more prone to pursue hazardous strategies when confronted with fundamentally changing circumstances (Shirokova et al., 2016). Firms that use GEO improve their capacity to respond to customers in a changing environment. Consequently, keeping the system active and innovative may mitigate risks and produce superior performance. Consequently, the following theories are proposed in this study:

Despite considerable advances in the present research to explain the major impacts of GEO on environmental performance (Jiang et al., 2018), the specific processes behind GEO-CSP (environmental, economic, and social performance) interactions remain unexplained. Thus, we propose the following hypotheses:

Hypothesis 1. GEO is positively and significantly associated with (**a**) environmental, (b) economic, and (c) social performance.

2.6. Mediating role of green knowledge acquisition

By bridging the gap between GEO and sustainable performance, the GKA facilitates the implementation of sustainable practices and the realisation of good sustainability results. This assumes a pivotal function in several respects. According to Wang et al. (2020a), GKA helps entrepreneurs acquire a comprehensive understanding of environmental challenges, opportunities, and sustainable practices by augmenting their environmental awareness. The consciousness of environmental issues empowers individuals to make well-informed choices and incorporates ecological factors into their entrepreneurial pursuits. Green entrepreneurship can effectively address environmental concerns by promoting innovation and acquiring knowledge about sustainable practices, leading to innovative solutions, technologies, and business models (Sahoo et al., 2022). This facilitates the advancement of ecologically viable commodities, amenities, and procedures, resulting in enhanced sustainability. Additionally, the GKA provides entrepreneurs with knowledge to adjust to evolving environmental regulations, consumer inclinations, and market dynamics. The ability to adapt allows individuals or organisations to address sustainability challenges and capitalise on emerging opportunities effectively. Jiang et al. (2018) assert that GKA offers pragmatic perspectives and optimal methodologies for integrating ecologically sustainable approaches into entrepreneurial practices. The guidance facilitates the integration of renewable energy, waste management, eco-design, and other sustainable practices, positively impacting sustainable performance.

Additionally, GKA allows business owners to acquire scientific, technical, and applied knowledge about environmental concerns, sustainable practices, and technology (Shehzad et al., 2022c). This improves environmental performance because they can better judge eco-design, pollution avoidance, waste management, and other environmentally friendly techniques (Jiang et al., 2018). Besides Sustainable business models, possibilities to save costs via resource efficiency and new green markets are just some of the things that may be uncovered by an entrepreneur who invests in green education (Chao Wang et al., 2022; Alam et al., 2022b). According to Jiang et al. (2018), possessing this knowledge enables individuals to recognise and capitalise on the economic benefits linked to sustainable practices, resulting in enhanced economic performance and a competitive edge. According to Shehzad et al. (2023), green knowledge management helps business owners to comprehend the moral and ethical aspects of sustainability, including stakeholder involvement, employee happiness, and community

growth. The acquisition of this knowledge enables entrepreneurs to cultivate socially responsible practices, favourable relationships with stakeholders, and contributions to the welfare of employees and neighbouring communities, thereby augmenting social performance. Drawing from the considerations mentioned above, this study posits the following hypotheses:

Hypothesis 2. GKA significantly mediates GEO effects on (a) environmental, (b) economic, and (c) social performance.

2.7. Moderating effects of resource orchestration capability

ROC analysis may moderate the link between GEO and GKA. Recent research has highlighted the importance of effectively managing resources to innovate, indicating that possessing resources is a step in the right direction (Sirmon et al., 2011; Carnes et al., 2017). Organisations may be encouraged or aided in pursuing a variety of resources via participation in the innovation ecosystem, including material, human, intellectual, technological, and market assets (Corsaro et al., 2012). ROC empowers firms to strategically allocate resources such as financial, technological, and human resources to support green initiatives. Firms with a higher ROC can invest in GKA, which includes training programs, R&D activities, and partnerships with environmental experts or institutions (Baquero, 2024b). ROC provides an opportunity to enhance a firm's existing knowledge base with valuable green knowledge. This approach empowers a firm to leverage knowledge from diverse internal and external sources and apply it effectively to improve its green practices (Shehzad et al., 2023). Integrating knowledge is essential for successfully transforming green entrepreneurial orientation into actionable initiatives and practices. ROC provides opportunities for collaboration and networking with external stakeholders, including suppliers, customers, and regulatory bodies, who have valuable green knowledge and expertise (Asiaei et al., 2022; Alam et al., 2023). By collaborating and partnering with others, firms can gain valuable green knowledge and improve their green knowledge acquisition efforts by using external resources. Based on the above arguments, it can be concluded that ROC allows firms to accumulate external and internal resources, divest unproductive resources, stabilize and extend current capabilities, and pioneer new capabilities. These capabilities can be effectively employed to perform GKA. Therefore, the following hypothesis is proposed:

Hypothesis 3. ROC moderates the relationship between GEO and GKA.

ROC's moderating influence shows that green knowledge acquisition's efficacy in generating sustainable performance depends on an organisation’s capacity to arrange its resources in a

manner that effectively utilises and integrates the information gained (Wang et al., 2020b). Therefore, resource orchestration competence facilitates or enhances the link between acquiring green knowledge and achieving sustainable performance. When an organisation has a high ROC level, it has the potential to effectively utilise the acquired green knowledge and incorporate it into its operations and strategies, as noted by Wang et al. (2020b). It has the potential to allocate resources efficiently, bring together different functions and departments, and collaborate to achieve sustainable outcomes (Asiaei et al., 2022). This capability empowers the organisation to transform acquired knowledge into concrete actions and outcomes that positively impact the environmental, economic, and social dimensions. By implementing an appropriate ROC, organisations can maximise the utility of the green knowledge they have acquired (Sahoo et al., 2022). However, this knowledge may be concentrated within specific groups or individuals, which can impede its dissemination and application throughout the organisation (Alam et al., 2022a). This presents a significant opportunity for organisations to achieve substantial improvements in their sustainable performance.

ROC assists in converting green information into environmental performance results. It empowers organisations to adopt sustainable practices, decrease resource usage, limit waste production, manage environmental hazards, and enhance environmental performance (Yusliza et al., 2020). The ROC plays a crucial role in translating green knowledge into positive economic performance outcomes. By integrating sustainable practices into their operations and effectively allocating resources, companies can achieve significant cost savings through energy efficiency, waste reduction, and improved resource utilisation. This can ultimately enhance their economic performance, as demonstrated by (Abbas and Sağsan, 2019; Alam et al., 2022a). Organisations have the opportunity to positively impact society by aligning their resources and capabilities with sustainable practices. This can improve employee well-being, community engagement, and responsible supply chain management, ultimately enhancing social performance (Shahzad et al., 2020). ROC emphasises the potential to effectively manage and utilise resources to leverage green knowledge acquisition, ultimately leading to sustainable performance. Implementing sustainable practices can improve environmental, economic, and social performance outcomes, particularly when supported by a strong ROC. As a result, the following hypothesis is proposed:

Hypotheses 4. ROC positively moderates the relationship between GKA and (a) environmental, (b) economic, and (c) social performance.

2.8. Moderated mediating effects

The earlier explanation posits that GKA acts as an intermediary between GEO and CSP, whereas ROC can potentially reinforce connections among GEO, GKA, and various facets of CSP. Based on this reasoning, it can be inferred that a higher ROC corresponds to a more pronounced positive impact of GEO on various facets of CSP via GKA. GKA facilitates the efficient allocation of resources required for CSP. The mediation of the relationship between GEO and CSP is facilitated through the development of a mutual comprehension of green initiatives and strategies (Shehzad et al., 2023), the dispensation of optimal guidance and advice on resource utilisation, and the guarantee of the efficient and effective implementation of green initiatives (Wang et al., 2023). The greater the availability of resources for CSP, the more leadership and management can facilitate their environmentally sustainable endeavours. A high ROC can enable organisations to optimise their utilisation of GEO to efficiently extract pertinent environmental data from various external knowledge sources for CSP. According to (Wales et al., 2013), businesses can enhance their CSP by effectively organising, integrating, and utilising strategically valuable knowledge to generate distinctive ideas and concepts. Drawing from the analysis mentioned above, it is posited that GKA serves as a mediator in the linkage between GEO and CSP, while the presence of ROC may enhance the associations between GEO, GKA, and the diverse dimensions of CSP, namely, environmental, economic, and social performance. Based on this line of reasoning, it can be inferred that the impact of GEO on CSP via GKA is likely to be favourable when there is a high degree of capability for orchestrating resources. A higher ROC will lead to larger mediating effects of GKA on GEO and CSP. Consequently, this prompts us to propose subsequent hypotheses.

Hypotheses 5. The indirect effect of GEO on (a) environmental, (b) economic, and (c) social performance through GKA is stronger at higher levels of ROC

3. Research Method

3.1. Samples and procedures

Deductive methodology is used in this research because the main objective is to evaluate hypotheses derived from established theories (Bryman, 2007). To gather data, we employed a questionnaire for surveys on GEO, GKA, CSP, and ROC, and the population of interest for this study consisted of small and medium-sized enterprises (SMEs) manufacturing in the UAE. The definition of SMEs in the manufacturing sector was based on the United Arab Emirates (UAE) Cabinet Resolution No. 22 of 2016. According to this resolution, small enterprises employ between 10 and 100 individuals and have an annual revenue of less than or equal to 50 million

AEDs. On the other hand, medium-sized enterprises employ between 101 and 250 individuals and have an annual revenue of less than or equal to 250 million AEDs (Singh et al., 2022). The manufacturing sector was chosen because it significantly affects social and ecological systems, uses resources quickly, and causes significant environmental harm. In the present era of economic transformation, it is imperative for the manufacturing sector, distinguished by its substantial energy usage and environmental pollution (Li and Zhang, 2014), to participate in CSP. Consequently, this study's research sample comprises manufacturing firms in the UAE.

To find UAE small and medium-sized enterprises (SMEs) in the manufacturing sector that meet the requirements laid forth in UAE Cabinet Resolution No. 22 (2016), we utilized the Yellow Pages search engine "https://www.yellowpages.ae/." From April to June 2023, we randomly solicited 280 manufacturing enterprises from this list for data collection, but only 195 were granted permission to participate in our research. Individuals in managerial roles were chosen for this research using a non-probabilistic convenience sample because they can decide on a strategy. They are better able to acquire essential information and simultaneously make a major contribution to information sharing across several departments (Shehzad et al., 2023). Following the past research of Abbas and Sağsan (2019) and Ooi (2014), we distributed 627 questionnaires with official authorisation to top-, mid-, and lower-level management individuals. We asked them to participate in the data collection because they were informed about the organisation's policy and practices. Data were collected using various methods, including online surveys and self-administered procedures. As a result, 430 questionnaires were returned, of which 42 were incomplete or lacked information. After removing invalid questionnaires, 388 legitimate ones were obtained, yielding a response rate of 61.88 percent. Table 1 displays extensive demographic information for the responders.

3.2 Measurements

The following three procedures proposed by Christmann (2000) were used to formulate the final survey for this study. First, we developed scales for each variable after extensively reviewing the relevant literature. Second, we consulted three academic experts and updated the measurement scale to make it more transparent and easier to follow. Additionally, experts were requested to ensure that the correct academic language was used. In addition, it was ensured that the questionnaire did not contain any discrepancies. Finally, the final questionnaire was separated into five sections based on the measurements employed to explain the concepts. The first part defines the purpose of this study and the demographic profile of the respondents.

In this study, the independent variable examined was the GEO towards sustainable development, assessed using five indicators from Jiang et al. (2018). The dependent variable, CSP, was evaluated using a 15-item scale measuring environmental, economic, and social performance, derived from the works of Zhu et al. (2013) and Yusliza et al. (2020), with each dimension assessed using five items. The mediating variable, GKA, was analyzed based on three items from Wang et al. (2020a), while the moderating variable, ROC, was measured using a three-question scale from Wang et al. (2020b) and Shehzad et al. (2023), as detailed in the questionnaire presented in Table 2.

Moreover, previous studies have shown that contextual variables, such as firm size and age, impact KM and CSP Abbas and Sağsan (2019). Consequently, organizational parameters, such as company age and size, were utilised as controlled variables to account for differences in CSP among organisations.

Table 1. Demographic profile of respondents

Characteristics		Frequency	Percent
Gender			
	Male	239	61.757%
	Female	148	38.243%
Job Experience			
	<5 Years	88	22.739%
	5-10 Years	120	31.008%
	11-15 Years	104	26.873%
	>15 Years	75	19.380%
Organization Age			
	< 5 Years	76	19.638%
	6-10 Years	71	18.346%
	11-20Years	93	24.031%
	21-40years	76	19.638%
	>40Years	71	18.346%
Organization Size			
	<100	88	22.739%
	100-200	68	17.571%
	201-500	77	19.897%
	501-1000	61	15.762%
	>1000	93	24.031%

Source: Authors own creation

Table 2. Measurement model results

Constructs	Items	Loadings	VIF	Ca	CR	AVE
Green entrepreneurial orientation				0.837	0.885	0.607
GEO1	When facing with uncertainty, we have an aggressive attitude towards green projects.	0.783	2.060			
GEO2	We attach great importance to green research and development and green technology innovation.	0.815	2.352			
GEO3	Our company has a tendency to become market leader and always takes the lead in introducing green products, services or technologies.	0.783	1.984			
GEO4	We usually start green initiatives before our competitors.	0.808	1.929			
GEO5	Our company has the attitude to “beat their competitors.	0.700	1.393			
Green knowledge acquisition				0.795	0.880	0.710
GKA1	Our firm obtains a lot of technical knowledge related to environmental protection	0.867	1.887			
GKA2	Our firm obtains a lot of market knowledge related to environmental protection.	0.875	1.919			
GKA3	Our firm obtains a lot of product and service knowledge related to environmental protection.	0.782	1.476			
Environmental peformance				0.865	0.908	0.713
ENP1	Improved compliance with environmental standards.	Removed				
ENP2	Reduction in air emissions.	0.802	1.815			
ENP3	Reduction in energy consumption.	0.841	2.043			
ENP4	Reduction in material usage.	0.865	2.302			
ENP5	Reduction in the consumption of hazardous materials.	0.868	2.376			
Economic performance				0.899	0.930	0.768
ECP1	Decrease in costs for materials purchasing.	0.877	2.426			
ECP2	Decrease in costs for energy consumption.	0.856	2.258			
ECP3	Decrease in fees for waste treatment.	0.909	3.118			
ECP4	Decrease in fees for waste discharge.	0.862	2.749			
ECP5	Decrease in fines for environmental accidents	Removed				
Social performance				0.807	0.873	0.634
SOP1	Improved overall stakeholder welfare.	0.813	1.578			
SOP2	Improvement in community health and safety.	0.827	2.060			
SOP3	Reduction in environmental impacts and risks to the general public.	0.822	2.074			
SOP4	Improved occupational health and safety of employees.	0.717	1.444			
SOP5	Improved awareness and protection ofthe claim and rights of people in the community served.	Removed				
Resource orchestration capability				0.808	0.885	0.721
ROC1	our firm has capability to absorb all kinds of knowledge resources.	0.798	1.744			
ROC2	our firm has capability to integrate all kinds of knowledge resources	0.847	1.657			
ROC3	our firm has capability to utilize all kinds of knowledge resources.	0.899	2.085			

Source: Authors own creation

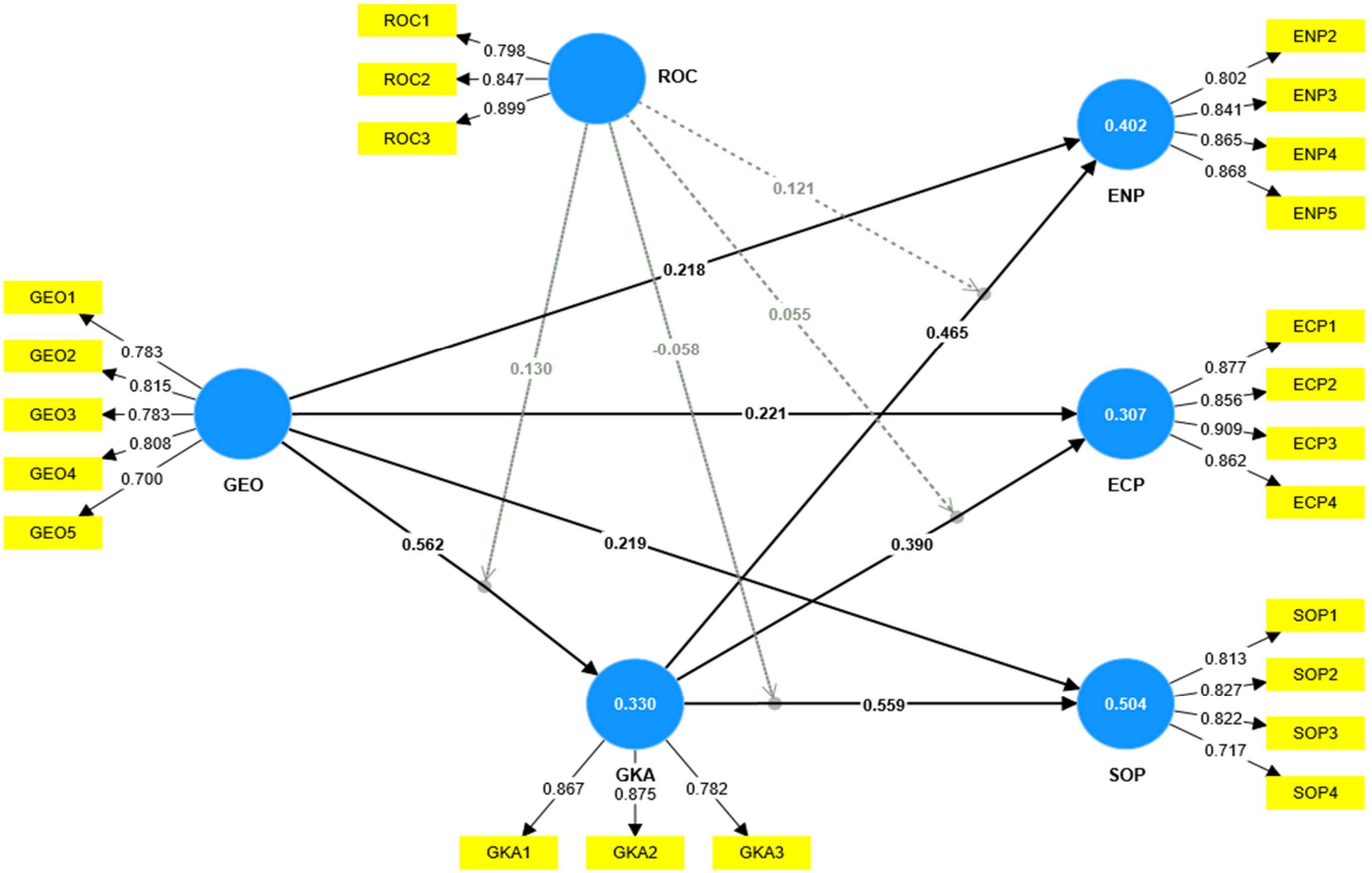

Figure 2. Measurement model. Source: Authors own creation

Additionally, a pilot test was conducted to assess the validity and reliability of the chosen items. The results from the pilot survey showed that all indicators were internally consistent, with values between 0.722 and 0.818, above the 0.700 criteria proposed by Hair et al. (2010). In light of this, the researchers conducted an ongoing investigation.

3.3. Common method biases

This study conducted many tests to check for sample biases throughout the early data screening procedure. The first step in detecting non-response bias was documenting variations in demographic features and model variables between early and late respondents. The t-test results indicated no statistically significant difference between the two groups ($p<0.05$), confirming that discrepancies in the means of the two respondent groups were not caused by non-response bias. Second, Levene's test was used to assess homogeneity of variance. The findings were not statistically significant ($p > 0.05$), indicating that the variation in the study variables was equal. Furthermore, the t-test for mean equality yielded nonstatistically significant findings ($p > 0.05$), indicating equal means in the responder groups. Moreover, we thoroughly assessed collinearity using advanced features in Smart-PLS. This approach is known for its enhanced precision owing to the latest technology, as highlighted by Kock (2015). Furthermore, it is underpinned by a contemporary and dependable foundation, a perspective endorsed by various experts in the field of social sciences, as indicated by Shehzad et al. (2022a); (2022b). Table 2 shows that the average variance inflation factor (VIF) values were less than 3.30, indicating no common method bias in the data.

Data analysis

A statistical approach called structural equation modelling (SEM) was used to assess the theoretical model's structural connection using the partial least squares (PLS) method (Hair et al., 2017). PLS-SEM is commonly regarded as a causal estimation approach using SEM (Hair et al., 2014) and has previously been employed in research of a similar nature (Yusliza et al., 2020). The amended instructions provided by (Cepeda-Carrion et al., 2019) provide further rationale for employing PLS-SEM in this investigation. They are as follows: First, PLS-SEM offers the chance to explore novel phenomena (Richter et al., 2016) since it is more appropriate for advanced exploration of connections in structural relationships or for research that is in the early stages of theory creation (Henseler et al., 2016). Second, PLS-SEM is an excellent technique for analysing moderately complicated structural interactions, including latent variable correlations in large systems (Shehzad et al., 2022d). PLS-SEM is an advantageous

approach for studies that aim to estimate and clarify variations in key target variables, as it is prediction-oriented (Hair et al., 2014). Finally, owing to the availability of modern statistical measures in PLS path modelling and robustness tests in structural models, PLS-SEM has recently gained widespread acceptance among editors, reviewers, and scholars (Usman Shehzad et al., 2022; Jamil et al., 2022).

4.1. Measurement model

The estimation of the measurement model was conducted according to the guidelines proposed by Hair et al. (2017). The following thresholds were used in the assessment of the measurement model:

4.1.1. Reliability

Individual item reliability is assessed by analysing the factor loading (FL) index equal to or greater than 0.50 or 0.70 (Hair et al., 2017), while the significance of each FL is confirmed by examining a t-statistic of 1.96 with a 5% level of significance and a two-tailed test approach (Roldán and Sánchez-Franco, 2012). The findings indicated that all FL values fell within the range of 0.700 to 0.909 and were statistically significant at a p-value of less than 0.001. This finding suggests that the measurement model exhibits satisfactory reliability for each item. In addition, the assessment of internal consistency for each variable was conducted using Cronbach's alpha (Cα) and composite reliability (CR) with a minimum threshold of 0.70, as recommended by Hair et al. (2017). The construct reliability results revealed that the Cα values ranged from 0.795 to 0.899, while the CR values ranged from 0.873 to 0.930. These findings suggest that the measurement model exhibits satisfactory construct reliability. The findings are presented in Table 2 and Figure 2.

4.1.2. Convergent validity

According to Hair et al. (2017) and Fornell and Larcker (1981), convergent validity is assessed by looking at an average variance extracted (AVE) value equal to or greater than 0.50. Table 2 presents evidence of the AVE assessment, indicating that the AVE values for all five latent constructs fell within the range of 0.607–0.768. Hence, the measurement model exhibited satisfactory convergent validity.

4.1.3. Discriminant validity

Discriminant validity assessment involves the analysis of various measures, such as the Fornell-Larcker criterion, which proposes that the correlation among latent variables should be less than the square root of AVE (Hair et al., 2017). Another method is the heterotrait–monotrait

(HTMT) ratio of correlations, which implies that the HTMT index should not exceed 0.85 or 0.90, as Henseler et al. (2015) suggested. Based on the Fornell-Larcker criterion, Table 3 indicates that the square root of the AVE score for each variable is higher than the interconstruct correlation between those variables and other variables in the structural model. The results are shown in the lower left half of the table. According to Franke and Sarstedt (2019), the HTMT ratio of the correlation criterion is more accurate in estimating unattenuated (perfectly reliable) correlations between variables than other methods. In Table 3, the HTMT values are much lower than the recommended standard, indicating that the measurement model has good discriminant validity. The results are presented in the upper-right section of Table 3.

4.2. Predictive relevance

We first analysed the coefficient of determination (R2), predictive relevance (Q2), and effect size (f2) before testing the hypotheses.

For interpreting the R2, the following rules are followed: R2 values of ≥ 0.25, ≥0.50, and ≥ 0.75 are considered weak, moderate, and substantial, respectively. The R2 values for GKA (0.330), ECP (0.307), ENP (0.402), and SOP (0.504) were satisfactory, indicating the predictive power of the model. To examine Q2 through blindfolding, the Q2 value should be greater than zero (Hair et al., 2016). All five latent variables had Q2 values significantly greater than zero, indicating the model's significance. Table 4 summarises the R2 and Q2 results. Similarly, the effect size determines whether exogenous factors significantly affect endogenous variables (Götz et al., 2010). Cohen (2013) categorized f2 into small (0.02–0.15), medium (0.15–0.35), and large (>0.35) effect sizes. The effect size of the present study's variables ranged from small to medium, as shown in Table 5.

Table 3. Descriptive statistics and discriminant validity results.

Constructs	Mean	Std	VIF	ECP	ENP	GEO	GKA	ROC	SOP
ECP	4.248	0.695	4.248	**0.876**	0.684	0.506	0.597	0.079	0.726
ENP	4.072	0.702	4.072	0.603	**0.844**	0.571	0.696	0.095	0.665
GEO	4.132	0.764	4.132	0.445	0.491	**0.779**	0.677	0.045	0.622
GKA	3.870	0.843	3.870	0.509	0.579	0.558	**0.842**	0.082	0.840
ROC	4.109	0.826	4.109	-0.073	-0.078	0.006	0.017	**0.849**	0.116
SOP	3.858	0.805	3.858	0.623	0.563	0.523	0.682	-0.059	**0.796**

Note(s): Std=standard deviation, VIF = variance inflation factor

- ECP=Economic performance; ENP=Environmental performance; GEO=Green entrepreneurial orientation; GKA=Green knowledge acquisition; ROC=Resource orchestration capability; SOP=Social performance
- Diagonal and bold values are the square roots of the AVE
- Below the diagonal elements are the correlations between the construct's values;
- Above the diagonal elements are the HTMT values

Source: Authors own creation

Table 4. Coefficient of determination (R-square) and predictive relevance (Q^2)

Constructs	R-square	SSO	SSE	Q^2 (=1-SSE/SSO)
ECP	0.307	1548.000	1194.616	0.228
ENP	0.402	1548.000	1111.943	0.282
GKA	0.330	1161.000	895.533	0.229
SOP	0.504	1548.000	1073.182	0.307

Source: Authors own creation

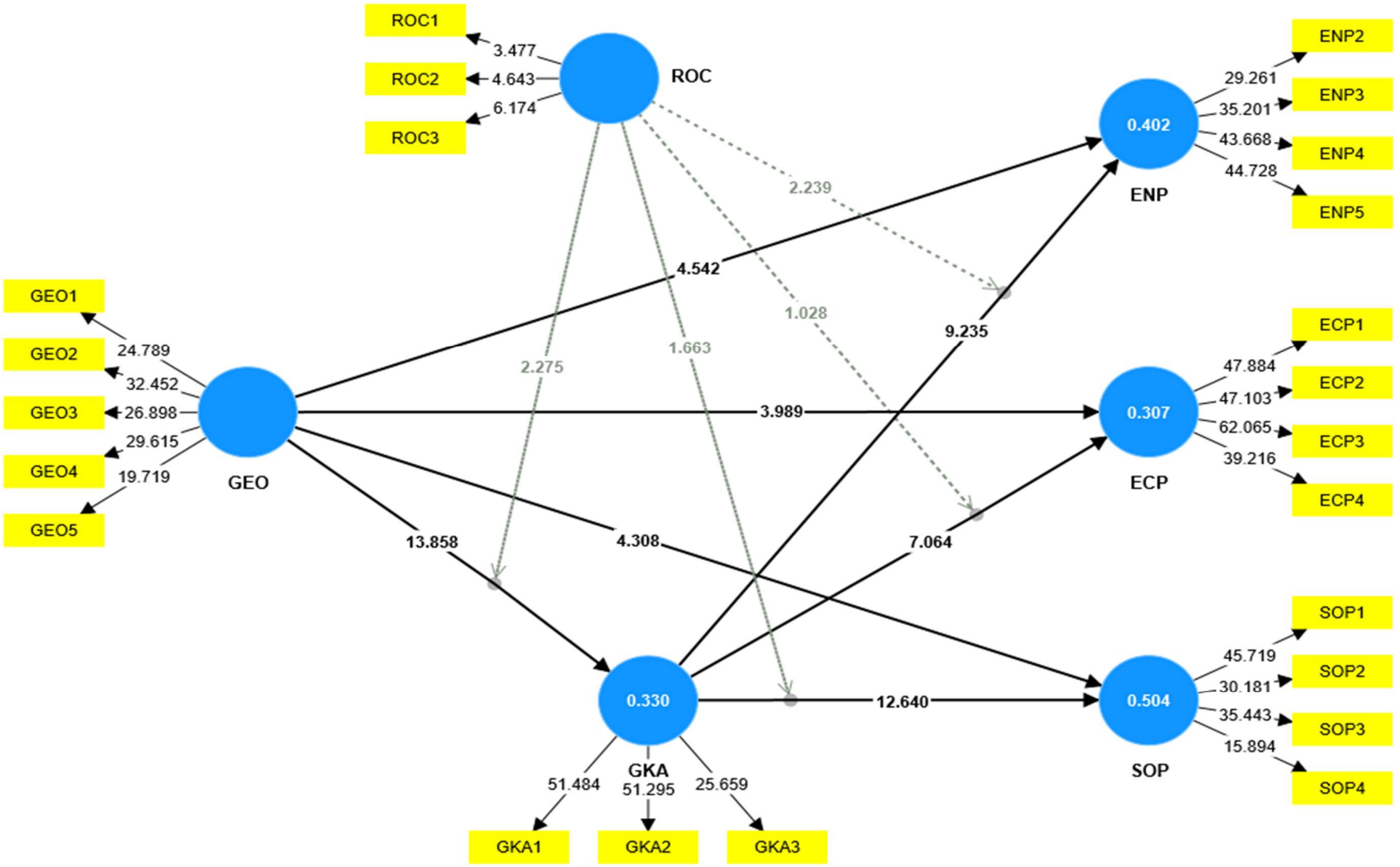

Figure 3. Structural model. Source: Authors own creation

Table 5. Hypotheses results

Hypotheses	Statistical paths			Beta values	STDEV	T statistics	P values	2.5%	97.5%	F-square	Conclusion
Control effects											
+Ve	Organization Age	→	ENP	-0.001	0.037	-0.023	0.982	-0.074	0.072		Not Supported
+Ve	Organization Size	→	ENP	0.007	0.035	0.212	0.832	-0.061	0.075		Not Supported
+Ve	Organization Age	→	ECP	-0.041	0.037	-1.111	0.267	-0.114	0.032		Not Supported
+Ve	Organization Size	→	ECP	0.019	0.034	0.543	0.587	-0.049	0.087		Not Supported
+Ve	Organization Age	→	SOP	-0.030	0.037	-0.810	0.419	-0.103	0.043		Not Supported
+Ve	Organization Size	→	SOP	0.041	0.034	1.179	0.239	-0.027	0.108		Not Supported
Direct effects											
Hypothesis 1a	GEO	→	ENP	0.218	0.048	4.542	0.000	0.122	0.313	0.053	Supported
Hypothesis 1b	GEO	→	ECP	0.221	0.055	3.989	0.000	0.115	0.335	0.047	Supported
Hypothesis 1c	GEO	→	SOP	0.219	0.051	4.308	0.000	0.123	0.320	0.165	Supported
Moderating effects											
Hypothesis 3	ROC x GEO	→	GKA	0.130	0.057	2.275	0.023	0.003	0.228	0.027	Supported
Hypothesis 4a	ROC x GKA	→	ENP	0.121	0.054	2.239	0.025	-0.034	0.183	0.030	Supported
Hypothesis 4b	ROC x GKA	→	ECP	0.055	0.054	1.028	0.304	-0.081	0.138	0.005	Not Supported
Hypothesis 4c	ROC x GKA	→	SOP	-0.058	0.035	1.663	0.096	-0.116	0.024	0.008	Not Supported

Source: Authors own creation

Table 6. Mediating effects

		Direct effects			Indirect effects			Total effects			
Hypothesis	Statistical Paths	β	T statistics	P values	B	T statistics	P values	β	T statistics	P values	Conclusion
Hypothesis 2a	GEO → GKA → ENP	0.218	4.542	0.000	0.261	7.159	0.000	0.479	12.216	0.000	Partial mediation
	BCI LL	0.122			0.198			0.404			
	BCI UL	0.313			0.340			0.560			
Hypothesis 2b	GEO → GKA → ECP	0.221	3.989	0.000	0.219	5.994	0.000	0.440	9.001	0.000	Partial mediation
	BCI LL	0.115			0.153			0.347			
	BCI UL	0.335			0.295			0.542			
Hypothesis 2c	GEO → GKA → SOP	0.219	4.308	0.000	0.314	9.187	0.000	0.533	12.763	0.000	Partial mediation
	BCI LL	0.123			0.250			0.453			
	BCI UL	0.320			0.383			0.615			

Source: Authors own creation

4.3. Structural model

In this study, there are a total of 13 hypotheses: 3 direct, 3 mediating, 4 moderating, and 3 moderated mediating. To validate these hypotheses, we analysed the path coefficient and statistical significance. To assess the structural model, we followed the recommendation of (Hair et al., 2019) and used a bootstrapping approach with 5,000 resamples. The results of these hypotheses are shown in Figure 3 and Table 6.

4.3.1 Direct effects

First, we examined the direct relationships; the results in Table 5 reveal that GEO has a positive correlation with ENP (β=0.218, $p < 0.001$), ECP (β=0.221, $p < 0.001$), and SOP (β=0.219, $p < 0.001$). Interestingly, the impact of GEO on the ECP is more significant than that on the ENP and SOP. Therefore, the results support hypotheses H1a, H1b, and H1c.

Additionally, we examine the control role of a firm's age and size on CSP. Firm age and size did not significantly impact ENP, ECP, or SOP. This is consistent with previous studies (Shehzad et al., 2022d), indicating that these variables did not affect structural relationships. These findings suggest that these structural characteristics may not be as crucial as a firm's strategic orientation towards sustainability. Despite larger and older firms having more resources, their potential bureaucratic inertia could negate advantages in adapting environmental and social governance practices. This indicates that the strategic focus on sustainability and the external pressures like market conditions and regulations could play more pivotal roles in determining CSP than merely the age or size of the firm.

4.3.2 Direct, indirect, and total effects

We used mediation analysis in Smart-PLS to test the mediating relationship for Hypotheses H2a, H2b, and H2c. Following the suggestion of (Preacher and Hayes, 2008), this study used the bootstrap confidence intervals method with 5,000 iterations to test the significance of indirect effects. Table 6 shows that the indirect effects of GEO on ENP ($\beta = 0.261$; $p < 0.001$), ECP ($\beta = 0.219$; $p < 0.001$), and SOP ($\beta = 0.314$; $p < 0.001$) were within the confidence intervals. Moreover, as discussed earlier, GEO significantly influences different aspects of CSP (ENP, ECP, and SOP). Therefore, based on the significant direct and indirect effects, the results indicate that GKA partially mediates GEO's influences on ENP, ECP, and SOP. Thus, hypotheses H2a, H2b, and H2c are supported.

4.3.3. Moderating effects.

In Table 5, the moderating results are presented; for H3, the study proposed the moderating effects of ROC in the relationship between GEO and GKA. The results confirm that ROC significantly moderates the relationship between GEO and GKA (β=0.130, p=0.023). Moreover, for H4a, H4b, and H4c, the results revealed that ROC significantly moderates the relationship between GKA and ENP (β=0.121, p=0.025) but insignificantly moderates the relationship between GKA and ECP (β=0.055, p=0.304) and SOP (β=-0.058, p=0.096). Hence, H4a was accepted, but H4b and H4c were not supported. As shown in Figure 4, the relationship between GEO and GKA strengthens when the ROC is high. Moreover, Figure 5 demonstrates that GKA has a stronger positive relationship with ENP when the ROC is high. Therefore, H3 and H4a were further supported.

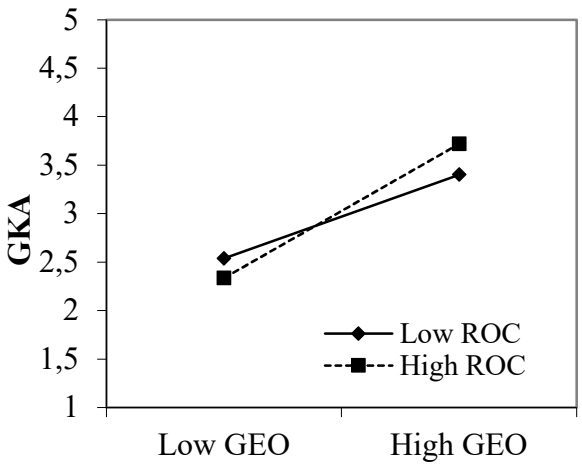

Figure 4. GEO*ROC on GKA
Source: Authors own creation

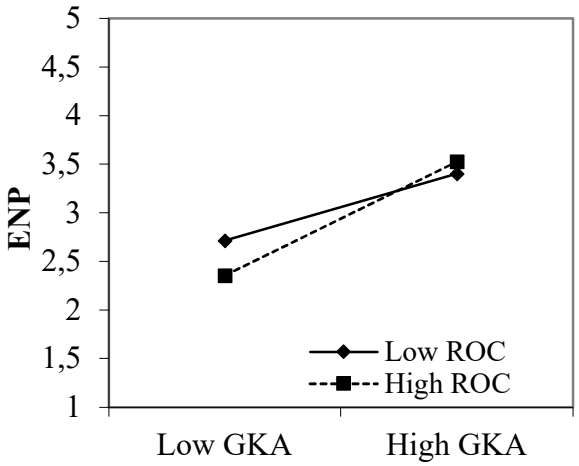

Figure 5. GKA*ROC on ENP

Source: Authors own creation

Table 7. Moderated mediation results

Hypotheses	Statistical paths	Estimate	S.E.	T-value	P-Value
Hypothesis 5a	GEO → GKA→ENP				
	At a low level of ROC	0.149	0.041	3.663	0.000
	At a high level of ROC	0.416	0.071	5.853	0.000
	Difference	0.267	0.079	3.379	0.001
Hypothesis 5b	GEO → GKA→ECP				
	At a low level of ROC	0.145	0.038	3.755	0.000
	At a high level of ROC	0.307	0.069	4.419	0.000
	Difference	0.162	0.075	2.165	0.030
Hypothesis 5c	GEO → GKA→ SOP				
	At a low level of ROC	0.266	0.055	4.850	0.000
	At a high level of ROC	0.339	0.056	6.068	0.000
	Difference	0.073	0.077	0.943	0.346

Source: Authors own creation

4.3.4. Moderated mediation effects

In the research model, the mediating effect was significant; therefore, we analysed the moderated mediation effect of ROC (Preacher et al., 2007). We evaluated the coefficient estimates and effects of GEO and GKA under various degrees of ROC (-1 standard deviation, mean, +1 standard deviation) from 5000 bootstrap samples. Subsequently, we conducted a conditional indirect effect analysis of GEO and analysed the simple effects of the research model suggested by Edwards and Lambert (2007). As shown in Table 7, the indirect impact of GEO on ENP through GKA was stronger at higher ROC levels (β=0.416, $p<0.001$) than at lower ROC levels (β=0.149, $p<0.001$). The two influence coefficients differed significantly (β=0.267, $p<0.01$). This study supports hypothesis H5a. It also shows that GEO has an indirect impact on ECP through GKA, which is significant both when the ROC is high (β=0.307, $p<0.001$) and when it is low (β=0.145, $p<0.001$). The difference between the two influence coefficients was also significant (β=0.162, $p<0.05$), supporting hypothesis H5b. However, the indirect impact of GEO on SOP through GKA was stronger at a higher ROC level (β=0.339, $p<0.001$) than at a low ROC level (β=0.266, $p<0.001$), and the two influence coefficients were not significantly different (β=0.073, $p>0.05$). Therefore, Hypothesis H5c is not supported.

5. Discussion

Strengthening CSP is widely acknowledged as a critical and ideal approach for organisations seeking long-term competitiveness and sustainability (Shahzad et al., 2020; Yusliza et al., 2020). Therefore, the following three important research questions are addressed in this research to clarify and address theoretical gaps: Does GEO facilitate firm stimulation of CSP in the manufacturing sector? Does GKA mediate the relationship between GEO and CSP? Do the relationships between GEO, GKA, and different aspects of CSP weaken/strengthen at different ROC levels? This study aimed to evaluate the effectiveness of GEO in enhancing the mediating mechanism of GKA and to elucidate its role in facilitating different aspects of CSP after RBV in the manufacturing industry. By investigating the effects of GEO on GKA and different aspects of CSP (i.e. ENP, ECP, and SOP) with the moderating effects of ROC, the hypotheses developed in this study significantly contribute to expanding the theoretical and practical insights of green entrepreneurship, GKA, and CSP in the following ways.

First, the research showed that GEO significantly impacts various aspects of CSP, including ENP, ECP, and SOP. These findings support previous studies conducted by Jiang et al. (2018) and Dean and McMullen (2007), emphasizing the crucial role of RBV in entrepreneurship.

GEO is characterised by its green innovation, proactivity, and willingness to take risks. By utilising the RBV concept, GEO can assist companies in enhancing their current capabilities (Jiang et al., 2018). Additionally, implementing new advanced process technologies can reduce environmental impacts and prioritise the health and safety of individuals (Feng et al., 2016). These findings corroborate the perspectives of Jiang et al. (2018), Idrees et al. (2023a) and Wang et al. (2023), which assert that GEO significantly bolsters corporate sustainable performance across environmental, economic, and social dimensions by integrating innovative practices and sustainable strategies. This is supported by theoretical frameworks such as the RBV, Stakeholder Theory, and the Triple Bottom Line framework. GEO encourages companies to adopt green technologies, engage with stakeholders proactively, and balance profitability with environmental stewardship and social responsibility. This orientation not only enhances regulatory compliance and risk management but also fosters competitive advantages through differentiation, efficiency gains, and access to new markets. Ultimately, GEO positions companies at the forefront of sustainability, empowering them to address the evolving demands of consumers, regulators, and society in a comprehensive and integrated manner.

Second, Previous studies have primarily investigated how GEO boosts green innovation and environmental understanding (Chao Wang et al., 2022; Ben Arfi et al., 2018; Shehzad et al., 2023), yet empirical insights into GEO's interaction with GKA for enhancing CSP are limited. Research indicates that a firm's sustainability is tightly linked to its proficiency in leveraging environmental knowledge (Sahoo et al., 2022; S. Wang et al., 2022). Our analysis highlights GKA's pivotal role in bridging GEO with CSP dimensions (ENP, ECP, and SOP), evidencing GKA's significant mediation effect. From the RBV perspective, this underscores GKA as a vital conduit for assimilating environmental knowledge into unique, inimitable resources (Barney, 1991), enabling firms with robust GEO to excel in ENP, ECP, and SOP by harnessing green knowledge (Shehzad et al., 2023). Aligning with Shehzad et al. (2022c), our findings affirm the intermediary role of green knowledge in translating GEO into tangible sustainable outcomes by bolstering environmental consciousness, strategic decision-making, and innovation. This process not only amplifies environmental and sustainability performance but also positions firms to better implement eco-friendly practices, manage resources efficiently, and achieve socio-economic gains.

Third, recognising the potential of a firm's resources, Shehzad et al. (2023) highlighted the importance of ROC in achieving critical organizational outcomes. The literature highlights the necessity to investigate potential ROC moderating mechanisms on the link between

organizational characteristics and sustainable performance (Wang et al., 2020b). The findings show that ROC moderates GEO and GKA, and GKA and ENP. In response, our study delves into the moderating role of ROC in the relationship between GEO and GKA, and subsequently, how GKA influenced by ROC impacts CSP aspects, namely, Environmental, Economic, and Social Performance. Initially, we found that ROC significantly moderates the GEO-GKA link. This suggests that firms with a higher ROC are more adept at allocating and coordinating resources effectively for green knowledge enhancement, thanks to their superior capability in managing resources towards green initiatives (Xin et al., 2023). This moderation implies that the strength and efficiency of GKA as a mediator in the GEO-CSP relationship are contingent on a firm's ROC. Essentially, a firm's resource orientation amplifies its ability to transform green orientation into actionable knowledge.

In contrast, while ROC positively influences the GKA-ENP relationship, indicating that firms with robust ROC can better translate green knowledge into environmental improvements, it does not significantly affect the GKA's impact on ECP or SOP. This differential impact suggests that while ROC helps in leveraging GKA for ENP, its role is less pronounced in translating GKA into ECP or SOP improvements. Moreover, ROC's moderating effect on the relationship between GKA and Environmental performance could be explained by the role of ROC in translating acquired knowledge into tangible environmental improvements (Choi et al., 2020). The moderated mediation analysis further reveals that high ROC enhances the indirect effects of GKA on GEO's influence on ENP and ECP, but not on SOP. This indicates that firms with a high ROC can more effectively utilise green knowledge to enhance environmental and economic outcomes, but this synergy does not extend to social performance improvements. The lack of significant enhancement in SOP might be due to firms prioritising the application of green knowledge to areas with direct environmental and economic benefits, potentially overlooking aspects crucial for social performance enhancement.

5.1. Theoretical implications

This research adds to the body of knowledge in different ways. First, it contributes significantly to the RBV theory. A substantial amount of empirical research on the RBV has concentrated on developing countries, and little is known about this environment (Kamasak, 2017). First, the study makes a valuable theoretical contribution by synthesising the RBV and Dynamic Capability Theory perspectives to elucidate how GEO influences CSP, encompassing environmental, economic, and social dimensions. By examining the mediated mechanism of Green GKA and the moderating role of ROC, this study sheds light on the dynamic processes

within firms. This underscores the strategic significance of GEO as a precursor to GKA, thus emphasising the role of unique, firm-specific resources in fostering environmentally conscious knowledge. Additionally, by introducing ROC as a moderator, the study advances how firms can effectively manage and orchestrate resources to capitalise on their green initiatives, aligning with the essence of Dynamic Capability Theory (Teece, 2007; Helfat et al., 2009). Additionally, the incorporation of the RBV theory in the development of the research model contributes to the advancement of theoretical understanding in the field of green entrepreneurship research, which has been relatively lacking in the literature so far. To better understand what drives employees, the behavioural perspective is heavily weighted in the current literature on green entrepreneurship. However, Jiang et al. (2018) point out that this viewpoint does not provide a full picture of how an organisation's internal dynamics relate to its strategic attempts to improve its CSP. For a different perspective on how all of your organisation's assets are linked, consider the RBV concept. It addresses the growing importance of sustainability in today's business climate by providing a nuanced perspective on how companies might leverage their spirit of entrepreneurship to improve their sustainable performance.

Second, according to existing research, organisations are under pressure to develop business strategies that improve their economic and environmental sustainability (El-Kassar and Singh, 2019). Previous research has explored knowledge management as a mediator in the relationship between organizational intangible resources and various elements of firms' outcomes (Wang et al., 2020b; Chao Wang et al., 2022). To the best of the researcher's knowledge, there have been few studies on the role of GKA as a mediating mechanism in the link between green entrepreneurship and various facets of CSP (that is, ENP, ECP, and SOP). The present research analyses the roles of GKA as a mediator in the relationship between GEO and three characteristics of CSP, namely ENP, ECP, and SOP, to explain the confusion and offer better knowledge about the specific role of GKA. Using the notion of leveraging CSP through ENP, ECP, and SOP, this study emphasises the mediating role of GKA in strengthening different elements of firm CSP, thereby extending the work of (Yusliza et al., 2020; Shehzad et al., 2023; Chao Wang et al., 2022).

Finally, in response to Shehzad et al. (2023) and Wang et al. (2020b), both internal and external factors may affect the strength or weakness of a firm's long-term performance. GEO forces firms to pay attention to external green information, but ROC determines how that knowledge is integrated into internal knowledge. ROC is defined as a firm's internal capacity to integrate,

configure, and deploy knowledge to use a resource portfolio (Wang et al., 2020b; Sirmon et al., 2007), which encourages organisations to acquire green knowledge. Consequently, the present study contributes to the ongoing discussion on the connection between GEO, GKA, and CSP by examining the moderating effect of a firm's ability to orchestrate resources. By including the moderating impact of ROC in the empirical examination of the interaction between GEO, GKA, and various components of CSP (ENP, ECP, and SOP), the results provide deeper insights and extend the existing studies of Shehzad et al. (2023), Shahzad et al. (2020) and Abbas and Sağsan (2019). The study framework provides a comprehensive understanding of the moderating impact of ROC with respect to the relationship between GEO, GKA, and different components of CSP (ENP, ECP, and SOP).

5.2. Practical implications

This research offers some useful, practical implications that demonstrate the relevance of GEO as the underlying mechanism for realising the potential benefits of GKA in becoming more sustainable. First, from the organisation's perspective, the findings highlight the significance of developing firms' intangible resources in manufacturing industries to accomplish sustainability goals, and management interested in implementing an environmental strategy should use green practices as an incorporation mechanism. Second, the results imply that GKA partially mediates the link between GEO and CSP. These findings suggest that businesses ought to overhaul internal resources and find new methods to combine them to boost their ability to manage green information at the company level. They must address the entrepreneurship-stunting knowledge gap regarding environmental challenges. The marketplace is an important resource for understanding customer preferences and desires. Business undertakings to acquire eco-friendly skills through GKA can be instrumental in addressing customer demand. The acquisition of green skills via GEO can be a valuable strategy for businesses to meet customer expectations (Chao Wang et al., 2022). By emphasising environmentally friendly practices, adopting GEO may help managers in manufacturing organisations stand out from competition and obtain a competitive edge. By actively gaining green information, businesses can make well-informed choices, encourage teamwork, and include staff in sustainability initiatives. This improves a firm's reputation, stakeholder connections, risk management, and long-term financial success, which adds to CSP. Using GEO, GKA, and CSP mechanisms promotes environmental stewardship while providing useful advantages, including innovation, resource efficiency, regulatory compliance, and flexibility to react to changing market needs.

Third, research has shown that ROC is important for boosting GKA and CSP. Practically, these findings have important implications for manufacturing firms. Fostering ROC can enable firms to maximise the benefits of their GEO efforts. Firms should focus on cultivating their entrepreneurial orientation and developing the capability to orchestrate resources effectively toward green initiatives. By doing so, manufacturing firms can harness the full potential of their green knowledge acquisition, resulting in improved environmental, economic, and social performance and a more sustainable competitive advantage (Helfat et al., 2009; Kraaijenbrink et al., 2010). This allows businesses to distinguish themselves, attract environmentally sensitive clients, comply with laws, and save on expenses, resulting in long-term profitability and a competitive edge in the marketplace. Consequently, enterprises should examine and increase their ROC to accelerate CSP.

The study's findings also suggest that policies should prioritize fostering GEO and enhancing ROC within organizations, as these factors significantly influence CSP across environmental, social, and economic dimensions. Incentives for adopting green technologies, recognition for exemplary practices, and support for green knowledge acquisition and capability development can amplify the benefits of green initiatives. Furthermore, given the non-significant impact of firm size and age on CSP, policies should also focus on enabling smaller and younger firms to adopt sustainable practices, rather than disproportionately favoring larger or older firms based on structural attributes. This strategic shift could lead to more effective and inclusive sustainability practices.

5.3. Study limitations

This study has some limitations that should be considered in future research. First, the constructs were evaluated using one source of self-reported data for each company. Several critics have argued that bias may have emerged (Kraus et al., 2020; Shehzad et al., 2022d). Although many preventive measures (i.e., common method bias test) were implemented and CMV was not shown to be a concern in this study, it likely remains. Consequently, future research should include data from other sources, such as annual financial reports, to test the present study model. Second, the study was limited to UAE manufacturing enterprises and used a cross-sectional design. Further data collection may be carried out in future research in emerging economies and diverse industries, such as manufacturing and services, to further understand the study model's generalisability and limiting circumstances. Moreover, green absorptive capacity (Pacheco et al., 2018), green culture (Wang et al., 2020a) and green capability (Huang et al., 2016) have been demonstrated to have strong moderating effects on

organizational factors and green innovation links (Shehzad et al., 2023). However, empirical information on the function of GKA as a mediator and the moderating impact of green capability, green culture or green absorptive capacity on the link between green entrepreneurial attitude and ambidextrous green innovation is lacking. Therefore, in future studies, these characteristics must be recognised and objectively explored.

5.4. Conclusion

The importance of green entrepreneurship in achieving sustainability has increased significantly in recent years owing to industrial companies' growing environmental consciousness. In particular, the study has significantly expanded the RBV theory by presenting a unified approach that links GEO and certain facets of CSP via the mediating role of GKA and the moderating effects of ROC. The findings from this research provide credence to the premise that green entrepreneurship is the best and most efficient strategy for manufacturing businesses to significantly increase CSP. This study is unique because it aims to shed light on a new mechanism that produces certain features of CSP in terms of ENP, ECP, and SOP, and to do so from an integrated viewpoint. Furthermore, the beneficial benefits of GEO on businesses' CSP with the aid of GKA in Pakistani manufacturing firms imply that if firms construct green intangible resources and capabilities in their true nature, it would boost CSP, even in developing nations.

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