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Green entrepreneurial orientation for enhancing SMEs financial and environmental performance: Synergetic moderation of green technology dynamism and knowledge transfer and integration

Muzaffar Asad^{1*}, Tha'er Majali², Mazin Aledeinat³, Dmaithan Abdelkarim Almajali² and Abdel Hakim O. Akhorrshaidh⁴

Abstract: Currently SMEs in the developing countries like Pakistan are struggling for their survival, however, because of increasing consumer awareness, SMEs have to focus over the environmental concerns as well. For SMEs green entrepreneurial orientation is taking significant importance. Moreover, based on the catalytic effects of green technology dynamism and knowledge transfer and integration, this study evaluated their moderating roles over the relationship between green entrepreneurial orientation and two performance measures which are environmental performance and financial performance. For the said purpose, the data has been collected from 384 SMEs operating in Pakistan involved in green practices, using simple random sampling. The results drawn from structural equation modelling revealed that green entrepreneurial orientation has a significant impact over environmental as well as financial performance, moreover, the moderating role of green technology dynamism as well as knowledge transfer and integration are also significant. The overall model has been validated and the blindfolding technique confirmed the predictive validity of the model as well. The research contributed to the body of knowledge by adding to the dynamic capability theory and guided the importance of green practices to the practitioners as well as policy makers.

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Subjects: Environmental Management; Entrepreneurship; Sustainability;

Keywords: green entrepreneurial orientation; Green Technology Dynamism; Knowledge Transfer and Integration; Environmental performance; Financial Performance; Sustainability; Green Practices; Entrepreneurship

1. Introduction

Businesses view health and living conditions as essential components of their main business activities as environmental challenges pose growing dangers to economic growth (Agbim et al., 2014; Domańska et al., 2018; Tze San et al., 2022; Umar et al., 2020). Government, innovators, and academics are also focusing on the solution to environmental problems and paying more attention to environmental degradation (Majali et al., 2022; Makhloufi et al., 2021; Sulaiman et al., 2023). Recent studies, in particular, have indicated that Green Entrepreneurial Orientation (GEO) is essential for maximising financial performance (Ameer & Khan, 2022; Hamdoun, 2020) and minimising environmental consequences (Ameer & Khan, 2022; Yang & Liu, 2021; Zahoor & Gerged, 2021, 2021). Similarly, GEO significantly improve environmental performance (Wang & Zhang, 2023).

Green practices refer to a propensity to pursue possibilities that result in both commercial and environmental advantages by the inauguration of eco-friendly practices (Jum'a et al., 2022; Khan et al., 2021; Mao et al., 2021). Despite the primary driver of green entrepreneurship and the advantages of GEO (such as economic, environmental, and social value) have been studied in the past (Shafique et al., 2021; Zuhaib et al., 2022), but it is still unknown how GEO affects environmental as well as financial performance both. Furthermore, despite majority of the studies identifying that entrepreneurial orientation or green entrepreneurial orientation has a significant positive impact (Majali et al., 2022; Zhang et al., 2023), yet some authors have refuted the claim and identified no impact over the financial performance (Afum et al., 2023). Similarly, authors have refuted the direct effect of entrepreneurial orientation over environmental performance (Tang & Tang, 2018).

Moreover, some researchers suggested an inverse link between green entrepreneurial orientation in the form of providing green products and services and SMEs performance (Majali et al., 2022; Shrivastava & Tamvada, 2019), however, recently authors have demonstrated an optimistic effect of GEO on financial performance of SMEs (Majali et al., 2022). Whereas, some even claim that the promotion of green entrepreneurship is not properly linked to financial advantages (Chen, 2018; Demirel et al., 2019) and business expansion (Lotfi et al., 2018). In addition to that dynamic capabilities helps organizations to transfer to sustainable organizations leading them to superior financial and especially environmental performance (Chen & Chang, 2013) and SMEs have no exception to it. Dynamic capabilities helps businesses to develop such models which focus over tiple bottom approach focusing over society, business and the consumers, thus by improving financial as well as environmental performance of the firms (Alcalde Calonge et al., 2022). Moreover, Mubeen et al. (2023) discussed more about sustainable business performance and identified a significant impact of green practices and value co-creation i.e. environment and business profits. Similarly Forés et al. (2023) confirmed that dynamic capabilities influence environmental performance but suggested to identify the new intervening variables as well.

Above discussion shows that identifying exactly the circumstances where GEO impacts financial and environmental performance collectively needs to be further researched to confirm the relationship while identifying and analysing the intervening variables causing these controversial findings (Baron & Kenny, 1986; Preacher et al., 2016). Hence, it was necessary to identify the cause or the missing element considering the contradictory outcomes for environmental and financial performance through GEO. Hence, in order to clarify the impact of green entrepreneurial orientation on financial as well as environmental performance the current study uses the

theoretical support of dynamic capability viewpoint to understand the connections between GEO and two different forms of performances of SMEs.

SMEs that adopt GEO may do so through a variety of strategies to improve environmental performance. First, GEO develops environment friendly goods and services to address environmental problems (Ameer & Khan, 2022). Second, the improvement of workplace safety and health results from reducing harmful emissions or poisonous compounds (Jiang et al., 2018). Third, emphasising consumer health and safety raises societal welfare (Asad et al., 2021; Habib et al., 2020).

Likewise, GEO gives three ways to improve performance. First, Energy or resource costs are addressed by advancements in green products and processes (Demirel et al., 2019). Additionally, taking a proactive stance in the search for green business opportunities may result in first-mover advantage (Lin et al., 2021; Ta'amnha et al., 2023). Third, a readiness to devote significant resources to initiatives that show extraordinary profits or losses (Zhang et al., 2020). Hence, GEO may enhance both financial and environmental performance (Ha et al., 2023), however, it has hardly been examined in the context of developing countries like Pakistan, because in such countries instead of giving importance to environment, priority is given to financial aspects (Asad et al., 2021).

Another important aspect which should not be ignored is that under various environmental conditions, the impact of GEO over SMEs performance may be varied (Agbim et al., 2014; Habib et al., 2020; Yang & Liu, 2021). SMEs can successfully execute their entrepreneurial orientation by managing knowledge well (Asad et al., 2022; Lotfi et al., 2018; Ta'amnha et al., 2023). The effects of knowledge managing capabilities on the interaction between GEO and SMEs are the main subject of this study. Exchange of knowledge is recognised as better markers of knowledge creating skills, and modifications in a highly volatile environment may assist knowledge generation, search, and spread (Asif et al., 2021; Jiang et al., 2018).

On the other hand, Green Technology Dynamism (GTD) is the term used in this study to describe a quickly evolving technological environment, while Knowledge Transfer and Integration (KTI) is the process of learning, recognising, absorbing, and integrating internal knowledge into new organisational activities (Jiang et al., 2018; Wamba et al., 2020). By strengthening their capacity to absorb eco-knowledge, SMEs adopting a strong GEO will gain competitive advantages (Domańska et al., 2018; Muangmee et al., 2021). Similar to how SMEs that implement GEO will get a competitive edge by using internal information to generate new knowledge and become an anchor for creativity (Pratono et al., 2019). Considering the inconsistencies in the literature over GEO impact on financial and environmental performance, this study suggests that GTD and KTI may function as a moderator over the relationship between GEO and two different types of performances.

This study is done in the setting of Pakistan keeping in view the country's current economic state and need for moving towards green practices. Environmental issues are hardly considered by SMEs operating in Pakistan. Instead of using modern technology, outdated technology is being used (Asif et al., 2021), which pollutes the environment. Therefore, there is an increased need to carry out research on environmental concerns in Pakistani SMEs' manufacturing sector. This study selected characteristics that are relevant to the environment in order to close these gaps and created a model that is supposed to help SMEs operating in Pakistan perform better based on GEO. The green product innovation is influenced by the GEO, and SMEs owners are more focused on green product innovation in their operations than they are on process innovation for protecting the environment (Le et al., 2020; Majali et al., 2022).

The literature suggests that SMEs operating in Pakistan should adopt GEO behavior when developing new products in order to obtain competitive advantage and improve their performance environmental performance because of market reputation for adopting green practices. GI is crucial for SMEs, especially those doing business in Pakistan, as it enables them to perform better and get

CA. Pakistan is a developing nation this research study concentrates on perspective of Pakistani SMEs performance based on the significance of the greening concept in the current business environment (Ahmed et al., 2019). The performance of Pakistani SMEs lags behind, and this is because they do not implement the green concept into their daily operations. The study's main focus is to protect the environment from the harmful effects of SMEs. Therefore, SMEs have stronger need for GEO adoption.

The Pakistani government has recently implemented a number of regulations and environmental issues are addressed by regulators. Thus, the two important issues are covered in this paper. We first look at the impact of GEO on financial and environmental performance from the dynamic capabilities standpoint. We then evaluate the mild impact of GTD and KTI on the association between GEO and two different types of SMEs performance. Our research demonstrates how a SME's strategic orientation, or GEO, acts as a dynamic capability by swiftly and successfully launching green initiatives, being proactive in seizing new possibilities, and taking calculated risks in system transformation. This research will offer managers a practical strategy for gaining competitive advantages in the market complex conditions.

2. Theoretical foundations and hypotheses development

This study shows that there are two types of SMEs performance that GEO is associated with which are supported by Dynamic Capability Theory (DCT). The first one over which the researchers have focused already because of the concerns of the SMEs owners is financial performance. The second one in this regard deals with environmental performance which is under researched especially in the context of developing country like Pakistan. Furthermore, considering the theoretical development the current research added the moderating role of GTDI and KTI on these associations, as the relationships may be influenced by the moderating effect of GTDI and KTI, and it has not been studied before collectively in the economic settings of a developing country like Pakistan.

The reason behind choosing dynamic capability view is that SMEs intended to follow green practices requires innovativeness, pro-activeness, and risk taking behaviour because investing in green practices is risky. It may influence environmental performance positively but, financial performance may suffer, therefore organizations need to have dynamic capabilities, for catering any kind of challenging situation. Ordinary capabilities and dynamic capabilities are the two distinct dimensions that make up a SMEs' capabilities (Teece, 2018). Dynamic capabilities are about perceiving, grabbing, and changing; however, simple capabilities entail the operating performance of SMEs processes which are connected to task performances.

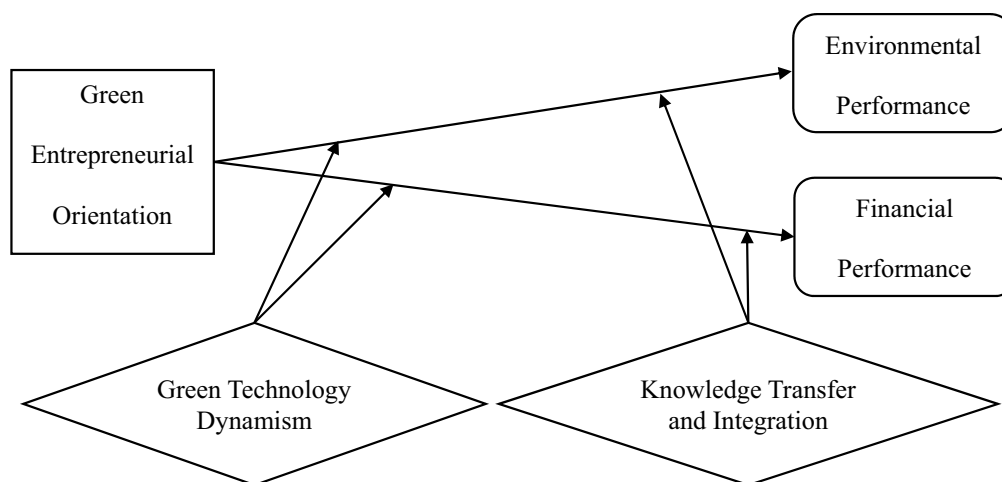
According to Dynamic Capability Theory (DCT), these capabilities are higher-order capabilities that can be used to choose, create, and coordinate regular capabilities (Teece, 2019) utilising the concepts from Arranz et al. (2020), dynamic abilities are about discovering new information, fostering experimentation, merging resources to produce new goods, and changing the current system. Three types of organisational processes serve as the foundation for GEO: pro-activeness, risk taking, and innovativeness. GEO thus, seems to be linked to ideas of dynamic capabilities (Jiang et al., 2018).

The research framework for this study is shown in Figure 1.

2.1. Green entrepreneurial orientation

The earliest example of green business dates back to 1960, when the effects of environmental degradation and industrialization prompted industrialised countries to enact laws protecting the environment (Dhrifi et al., 2020). The topic of green entrepreneurship and concepts generated from it has been the focus of the work of many researchers and academicians (Sulaiman et al., 2023; Trapp & Kanbach, 2021). The words ecopreneur ship, eco-entrepreneurship, environmental entrepreneurship, and enviropreneurship are frequently used (Santini, 2017). Green entrepreneurship used in this study drawn from Demirel et al. (2019) and Haldar (2019) is as follows: an inclination to start green

Figure 1. Theoretical framework.



operations in order to pursue prospective prospects that result in both economic and ecological benefits. In line with this viewpoint, green entrepreneurship demonstrates environmentally friendly innovation, market awareness, and risk-taking in business practises.

There are three major categories into which empirical research on green entrepreneurship may be divided. This study begins by reviewing the body of knowledge on the genuine motives necessary for green entrepreneurial orientation. Some of these, like sensitive embeddedness, market orientation, and social orientation, can be summed up (Domańska et al., 2018). Second, it is understandable that factors such as institutional framework, societal norms, and laws may have an impact on green entrepreneurship (Volkman et al., 2021). A literature review is then conducted to assess the performance effects of green entrepreneurship. It is apparent that green entrepreneurship is costly but the development and conception of market prospects as well as the prevention of environmental deterioration nullify the expenses of environmentally friendly practices. Moreover, exploitation and creation of market opportunities as well as the avoidance of environmental deterioration are examples of how entrepreneurial action could concurrently promote economic (Habib et al., 2020) and ecological benefits for society (Domańska et al., 2018).

The significance of green entrepreneurship has been covered in the context of different nations or industries. Carlos et al. (2018), for instance, looked at how social movement organisations foster green entrepreneurial orientation in the U.S. wind energy industry. Perrot and Subiantoro (2018) concentrated on New Zealand's waste recycling industry and highlighted a number of elements that either help or hinder green entrepreneurship. In Kingdom of Saudi Arabia, cases of green entrepreneurial orientation were undertaken by Alwakid et al. (2020).

2.2. Green Entrepreneurial Orientation and financial performance

Through three methods that are linked to three aspects of entrepreneurial orientation, including innovation, proactivity, and risk-taking, GEO helps to increase financial performance (Zhang et al., 2023). First, being innovative means having a propensity to explore, seeking advantage from innovative ideas, and persuading the creative process. SMEs embracing GEO are able to reassemble resources to throw new goods or processes by drawing from DCT (Tece, 2018). In particular, new clean technologies are created to conserve resources and consume less water and fossil fuels (Bhandari et al., 2019).

Additionally, recycled and composite stuff are typically used throughout the manufacturing or service provision (Krauklis et al., 2021). Before beginning a project, engineers may also think if the creation is simple to use again, salvage, and recourse manufacturing process (Feng et al., 2018). On

the other hand, institutional and social norms support many SMEs that implement GEO. The development of environmentally friendly products and procedures may not only abide by legislation but also avoid government penalties (Tu & Wu, 2021). Together, GEO can assist SMEs in increasing process effectiveness, reducing waste, and lowering costs through the use of fresh concepts.

Second, being proactive demonstrates a drive to beat rivals and seize new opportunities before rival enterprises (Akgunduz et al., 2018; Asad et al., 2022). According to DCT, being proactive means tending to satisfy customer requirements by launching green goods, services, or technology first. Due to the expanding awareness of environmental issues, SMEs are under increasing customer pressure (Adomako & Nguyen, 2020). Proactive enterprises are likely to react to customer needs more swiftly than their rivals. SMEs earn profits by leading the way in green innovation techniques as the trend of customers' attitudes toward green marketing continues (Singh et al., 2020). As a result, GEO might improve customers' ability to respond quickly to green practices, resulting in first-mover advantage.

Third, the desire to take a proactive stance when investing in initiatives with high degrees of uncertainty is reflected in risk-taking. Even if bringing a green idea to life is frequently accompanied by challenging circumstances and unknowns, it might also result in more customers and income (Bikker & Vervliet, 2018). DCT asserts that businesses using GEO are more prone to pursue excessively risky tactics when they become caught in the face of fundamentally altered conditions (Kraus et al., 2018).

In short, general competencies can also cause an enterprise to become complacent. When there is market instability, a trap could be set. The ongoing renewal of standard capabilities might be addressed via dynamic capabilities. Companies using GEO will improve their ability to respond to customers' needs in a changing environment (Ameer & Khan, 2022). Therefore, avoiding the risks and achieving greater financial performance we suggest:

H1: Green entrepreneurial orientation has a significant impact over financial performance.

2.3. Green Environmental Orientation and Environmental performance

GEO uses a number of techniques to support social progress and environmental sustainability. First, by improving market efficiency and reducing market failure, entrepreneurial activity may lessen environmental damage and capture economic value. According to Teece (2019) language, having a dynamic capability and being entrepreneurial are closely related concepts. For locating, investigating, and evaluating prospective opportunities in environmentally relevant market failures, dynamic capability is helpful (Ahmad et al., 2021). There may be opportunities for entrepreneurial activity because some market failures can lead to environmental deterioration. For instance, monopoly is regarded as a market failure because companies with monopoly power can generate wastefulness in the financial system. The electric utility sector is criticised for not adopting green technologies as broadly as other industries, which results in insufficient use of wind power (Johari et al., 2018).

By implementing innovative technology and production techniques, GEO may assist in securing the potential market and eradicating this market failure. GEO makes it possible to increase energy efficiency and make better use of natural resources (Hasan et al., 2019). To achieve greater sustainability requirements in its product line than rivals, Toyota exclusively creates hybrid machinery or the DM pharmacy chain in Germany (Kotler et al., 2019). Additionally, the use of innovative technologies in the telecommunications sector, such mobile phones and microwave towers, increases resource efficiency and decreases dependency on resource-intensive ones, like copper transmission lines (Akpan et al., 2021). Consequently, using new green technologies may protect the environment and stop pollution.

Second, by consuming fewer poisonous substances and reducing harmful emissions, the impact to employees' health and safety at work can be minimised (Cui et al., 2020; Ullah et al., 2021; Xie et al., 2023). According to Teece (2018), developing, updating, and reconfiguring internal and external resources is the main focus of dynamic capabilities. This propensity promotes taking advantage of opportunities and demands that values be captured. GEO helps a new generation of new product processes (Muangmee, Dacko-Pikiewicz, Meekaewkunchorn, Kassakorn, & Khalid, Green entrepreneurial orientation and green innovation in small and medium-sized enterprises (SMEs) (Muangmee et al., 2021)., A strategy to decrease toxic waste at manufacture is tending to be prioritised on upcoming invention of production, specifically if a company develops a strong GEO. As a result, production-related emissions that are poisonous and dangerous can be minimised. Additionally, a company with GEO will improve efficiency converts resources. Utilizing green technology in the manufacturing process could result in lower usage of water, energy, coal, or oil (Guo et al., 2018; Trapp & Kanbach, 2021). As a result, GEO makes it easier to comply with the criteria of standards like ISO 14,000 for managing occupational health and safety.

Third, GEO addresses adapting the building to quickly changing environments (Domańska et al., 2018). This shows that GEO addresses public environmental concerns in addition to helping businesses comply with environmental requirements. If SMEs implement GEO, the enterprises will have an incentive to create solar energy items instead of products using fossil fuels. Utilizing solar energy, the cleanest residential energy source currently accessible, may increase risks to people's health and safety (Shahsavari & Akbari, 2018). Hence, using GEO may improve the environmental performance which has still some gaps while establishing its link with the environmental performance. These gaps lead us to the following hypothesis:

H₂: Green entrepreneurial orientation has a significant impact over environmental performance.

2.4. The moderating role of green technology dynamism

The definition of GTD is the pace and ambiguity of the external environment's green technology paradigm change (Luo et al., 2019). DCT asserts that businesses must match their resources and capabilities to the shifting market conditions (Teece, 2018). Enterprises will be more inclined to learn about emerging technologies if they experience fast technological change (Qalati et al., 2022). Consequently, GTD encourages a skill that can obtain technology, patents, and information from outside sources (Du & Li, 2019). The ability to absorb eco-knowledge may be more important while dealing with GTD than when dealing with stable surroundings, despite the fact that changing technical conditions are connected with uncertainty. This is so that enterprises can acquire specific expertise that promotes green operations, such as R&D, technical invention (Khan et al., 2021), and leadership (Ghobakhloo et al., 2021). Enterprises following GEO focus on developing the capacity to assimilate new green knowledge if the level of GTD rises. Utilizing GEO could help develop eco-friendly technologies by using its capacity for knowledge absorption. In turn, these technologies improve SMEs performance. In contrast, enterprises embracing GEO are unlikely to improve their capacity for absorbing eco-knowledge if the level of GTD declines (Jiang et al., 2018). Their performance suffers in these circumstances, primarily due to a lack of desire and eco-knowledge. According to Ojha et al. (2020), environmental turbulence suggests improved new product development performance by positively moderating the impact of dynamic capabilities on operational new product development capabilities.

Given that GEO is associated with risk-taking, businesses may thrive in circumstances with rapid market change or even uncertainty (Ameer & Khan, 2022). The inclination to be pre-emptive in adjusting to ambiguity is reflected in risk-taking. According to this claim, there would be a larger tendency to deal with uncertainty the more dynamic the environment is. In other words, whether or not a condition is uncertain may have a significant impact on a person's readiness to make financial decisions. Enterprises implementing GEO achieve competitive edge in unstable settings

through risky investments in green practices (Muangmee, Dacko-Pikiewicz, Meekaewkunchorn, Kassakorn, & Khalid, Green entrepreneurial orientation and green innovation in small and medium-sized enterprises (SMEs) (Muangmee et al., 2021)., A stable climate, however, offers assurance for continuing to invest in entrepreneurial activity. Enterprises would not be really motivated to actively take risks (Hasan et al., 2019; Hock-Doepgen et al., 2021). When used in conjunction, adopting GEO might result in better performance under higher levels of GTD than under lower levels of GTD. Abbas et al. (2019) hypothesised Dynamic capabilities enhance new venture performance by providing a quick response to client needs in the face of shifting market uncertainties and opportunities, thus having a positive effect over the relationship. Hence, we suggest the following hypotheses in light of the aforementioned arguments:

H3: Green technology dynamism positively moderates the relationship between green entrepreneurial orientation and financial performance.

H4: Green technology dynamism positively moderates the relationship between green entrepreneurial orientation and environmental performance.

2.5. The moderating role of knowledge transfer and integration

According to Allameh (2018) KTI describes the cross-functional transfer of knowledge within the company as well as the pooling of internal resources and coordination of abilities to promote innovation. Technology and market knowledge are emphasised as key enablers of competitive advantage (Saeidi et al., 2019). Since entrepreneurial operations may result in knowledge gaps, it is crucial for the development of new ideas to combine knowledge from many sources. Therefore, to close these knowledge gaps, new knowledge development is necessary. It is suggested that a SME's knowledge-based resources have a major role in determining how entrepreneurial action turns out (Hughes et al., 2022). Successful knowledge integration and transfer will improve a company's performance by fostering the creation and dissemination of new knowledge within the SMEs (Allam et al., 2021; Arfi et al., 2018). On the other hand, organisational capacities like learning and innovation capacity are constrained if there are obstacles to the transmission and integration of knowledge. Due to their inadequate knowledge of markets and technology, businesses are unable to continue to profit from their green entrepreneurial efforts (Alwakid et al., 2020). According to Jiang et al. (2018) contention, the relationship between entrepreneurial orientation and performance can be strengthened by a greater ability involved in the appreciation, recombination, and application of information to a highly central organisation through its intra-industry links.

For businesses to continue the exploitation of new opportunities, they also need to be able to refresh or repurpose their current knowledge resources (Asif et al., 2021). Customer wants, preferences, and concerns are all part of market knowledge. There is a claim that A company with market understanding can estimate the worth of newly identified prospects. The optimal way to serve a new market can also be determined by market knowledge. Therefore, maintaining a competitive advantage depends on cultivating specific knowledge sets. Access to fresh knowledge resources is made possible by KTI's facilitation of widely dispersed valued knowledge assets. In such a setting, businesses that use GEO may improve their capacity to identify and assess new green business prospects, gaining competitive advantages (Majali et al., 2022). On the other hand, if there are significant obstacles to internal knowledge transfer and integration, businesses may exhibit an extremely limited capacity for proactive opportunity recognition. They might not be able to better address customer needs in such circumstances. GEO will not be able to get a competitive advantage as a result. Therefore, if knowledge transfer and integration acts as an influencer, it can positively add the strength to the relationship, showing a positive effect of the moderating variable. Accordingly, We put out the following theories:

H₅: Knowledge Transfer and integration positively moderates the relationship between green entrepreneurial orientation and financial performance.

H₅: Knowledge Transfer and integration positively moderates the relationship between green entrepreneurial orientation and environmental performance.

3. Research methodology

Data for this study were gathered from Sialkot, Karachi and Faisalabad cities of Pakistan. These three cities reflect various geographic locations, ecological states, and economic development levels. From a total of about 400,000 SMEs operating in Pakistan, we first chose 500 at random from the local business directories in each city. However, a final sample of 384 questionnaires was chosen for final analysis and the respondents were chosen using simple random sampling. The firms are chosen from a diverse variety of industry areas, including, textile, fabrics, leather, sports goods, surgical instruments, and beauty instruments. Informants in sample SMEs are Owners, CEOs, or managers. Emails or phone calls were made to ask for consent. These respondents received questionnaires. To help the respondents understand our goals, a description of this survey was included with each questionnaire. Follow-up calls were made two weeks later to remind them, thank them for their involvement, and address any issues they faced while answering the questions. To maintain the anonymity of the survey, employees forwarded the completed form straight to us, without their identity.

A survey was initially created in English. The measuring items were examined and revised by three academicians and four executives. Managers and owners from the 30 businesses that were arbitrarily chosen took part in the pilot study. The questionnaire was altered to make it clearer based on feedback. A total 384 valid questionnaires were returned that were complete and usable. In this study, businesses had an average tenure of 5.6 years, while there are 23 employees on average at each SME. Each item was evaluated using a 7-point Likert scale, with a range of 1 (strongly agree) to 7.

Five items for GEO measurement were adopted from Majali et al. (2022). Five items for Financial performance measurement were adopted from Asad et al. (2022). Four items for environmental performance were adopted from Jiang et al. (2018). A four-item scale for measuring GTD was adopted from Jiang et al. (2018). Items for KTI were taken from Jiang et al. (2018). Furthermore, SMEs demographics are likely to have an impact on a SMEs performance (Ahmed et al., 2019; Habib et al., 2020; Pang & Lu, 2018) that is why the study has been analysed in the contextual settings of Pakistan. A description of items of the variables that have been used is mentioned in Table 1.

For the descriptive Analysis of variables SPSS 24 has been used. For evaluating the hypothesis SMART PLS 3 has been used (Hair et al., 2013). A similar study in the past has adopted the same model, but the current research is different from the past one in several aspects, initially, the authors have conducted the study in an entirely different environment where the environmental laws are very weak. Second, methodologically the study is different because in past the researchers used multiple hierarchical regression analysis, whereas, in the current study the researchers used PLS SEM. Reason for using PLS SEM is that it is third-generation test and is highly recommended for theory building or theory testing. The method has been used as the same analysis technique has been applied by the prior researchers conducting research in the SME sector (Hammami et al., 2021; Qalati et al., 2022; Rehman et al., 2022).

4. Analysis

The normality of the data is critical in order to be sure that the data is fit for generalization of the findings as the study used multiple sectors. Therefore initially, the descriptive analysis of the variables was conducted which is mentioned in Table 2.

Table 1. Description of items

Environmental Performance	Our firm focus on reduced pollution
	Our firm focus on reduced emissions
	Our firm focus on reduced energy and materials consumption
	Our firm focus on reduced consumption for hazardous/harmful/toxic materials
	Our firm focus on reduced frequency for environmental accidents
Financial Performance	Our firm has experienced increase in sales
	Our firm has experienced increase in profitability
	Our firm has experienced reduction in costs
	Our firm has experienced increase in assets
	Our firm has experienced increase in employment
Green Entrepreneurial Orientation	In general, our firm favors a strong emphasis on green practices, such as R&D, technological leadership, and innovation
	When facing uncertainty, we typically adopt a proactive posture in order to catch potential green opportunities
	In dealing with competitors, we typically initiate green actions that competitors respond to
	Our firm favors a tendency to be a leader, and always introduce green products, service, or technology first
	In dealing with competitors, we typically adopt a competitive 'undo-the competitors' posture
Green Technology Dynamism	The green technology in our industry is changing rapidly
	It is very difficult to forecast the green technology development direction in our industry
	Most green technological innovations in our industry are radical changes on existing techniques
	The green technological changes in our industry can bring many opportunities for firms
Knowledge Transfer and Integration	Errors and failures are always discussed and analyzed in this firm, on all levels
	Employees have the chance to talk among themselves about new ideas, programs, and activities that might be used to the firm
	Our firm has instruments (manuals, databases, files, organizational routines, etc.) that allow what has been learned in past situations to remain valid, although the employees are no longer the same

Table 2. Descriptive analysis

Construct	Mean	Standard Deviation	Skewness	Kurtosis
Green entrepreneurial orientation (GEO)	1.92	1.54	1.271	3.43
Financial performance (FP)	5.23	1.28	1.545	2.65
Environmental performance (EP)	4.78	1.30	1.524	3.48
Green technology dynamism (GTD)	4.83	1.43	1.349	3.25
Knowledge transfer and integration (KTI)	4.71	1.58	1.516	3.57

As the calculated values for Skewness and Kurtosis revealed that the data is free from any Biasness as the evaluated values fall under the threshold levels.

To be sure that the instrument and the items used in the instrument are valid for the context of Pakistan, after calculating the descriptive analysis of the variables item loadings, reliability and

validity and discriminant validity has been evaluated. The findings for item loadings and reliability and validity are mentioned in Table 3.

Cronbach’s coefficient alpha was used to evaluate the reliability of the constructs. All five Cronbach’s alpha values in Table 3 reach the required level of 0.70, indicating adequate dependability (Carmines & Zeller, 1979). No item was deleted since all items were kept in the model. The determination of composite reliability helped to confirm scale dependability. This study’s dependability was ensured by the fact that all of the Composite Reliability (CR) values were higher than 0.8 (Claes & Larcker, 1981) as mentioned in table 3. All constructs’ average variance extracted values (AVE) are higher than the suggested value of 0.5, indicating a sufficient degree of convergent validity (Claes & Larcker, 1981).

In order to be sure that the items used in one variable discriminate from the items used in the other variables discriminant validity has been conducted as shown in Table 4.

The findings in Table 4 simply that each construct’s square root of AVE is stronger than its connection with other constructs. However, it has been observed that the calculated value for financial performance and environmental performance is slightly higher for environmental performance, but yet it is below 0.85, however in order to remove any doubts HTMT criteria has been adopted as well. Mostly Fornell-Larcker criterion is only used, but we also analysed Heterotrait Monotrait Ratio (HTMT) for confirming discriminant validity as there were some doubts (Rönkkö & Cho, 2020). HTMT close to 1 shows lack of discriminant validity. The threshold for HTMT is that the estimated value should be below 0.85 (Henseler et al., 2015). The findings for HTMT criteria are mentioned in Table 5.

Table 3. Item loadings, reliability, and validity of the constructs

Constructs	Items	Item Loadings	Cronbach’s Alpha	Composite Reliability	Average Variance Extracted (AVE)
Environmental Performance	EP1	0.757	0.871	0.907	0.661
	EP2	0.831			
	EP3	0.817			
	EP4	0.788			
	EP5	0.868			
Financial Performance	FP1	0.831	0.875	0.909	0.667
	FP2	0.820			
	FP3	0.979			
	FP4	0.783			
	FP5	0.851			
Green Entrepreneurial Orientation	GEO1	0.791	0.883	0.914	0.682
	GEO2	0.844			
	GEO3	0.877			
	GEO4	0.831			
	GEO5	0.873			
Green Technology Dynamism	GTD1	0.829	0.870	0.911	0.719
	GTD2	0.831			
	GTD3	0.881			
	GTD4	0.851			
Knowledge Transfer and Integration	KTI1	0.883	0.836	0.895	0.739
	KTI2	0.851			
	KTI3	0.844			

Table 4. Discriminant validity

	EP	FP	GEO	GTD	KTI
EP	0.843				
FP	0.833	0.817			
GEO	0.553	0.607	0.826		
GTD	0.434	0.850	0.510	0.848	
KTI	0.434	0.570	0.521	0.721	0.860

Table 5. Discriminant validity

	EP	FP	GEO	GTD	KTI
EP					
FP	0.849				
GEO	0.615	0.674			
GTD	0.496	0.658	0.587		
KTI	0.462	0.634	0.590	0.829	

From the HTMT criteria it is confirmed that the issue of discriminant validity does not hold as all the calculated values are below 0.85 which confirmed the absence of issue of discriminant validity.

After ensuring that her instrument is reliable and valid and holds sufficient discriminant validity, structural equation modelling has been applied. At the first level direct effect of GEO over financial performance and environmental performance have been evaluated. The results of the direct effects are mentioned in Table 6.

Afterwards moderating variable as suggested by the literature has been introduced in the model and the findings are mentioned in Table 7.

The moderating effects of green technology dynamism as well as knowledge transfer and integration have shown significant moderating effects over both the dependent variables that are environmental performance and financial performance. Furthermore, the importance of moderators can also be identified from the observation that the value of r^2 without moderators for financial performance was 0.369 and for environmental performance was 0.306 and after adding

Table 6. Direct effects

Relationships	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
GEO -> EP	0.554	0.570	0.096	5.756	0.00
GEO -> FP	0.607	0.619	0.115	5.300	0.00

Table 7. Moderating effects

Relationships	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
GEO*GTD -> EP	0.377	0.387	0.139	2.712	0.01
GEO*KTI -> EP	0.394	0.399	0.152	2.592	0.02
GEO*GTD -> FP	0.800	0.813	0.170	4.71	0.00
GEO*KTI -> FP	0.417	0.423	0.154	2.708	0.01

moderators the value of r^2 for financial performance was increased to 0.506 whereas for environmental performance it was increased to 0.355. Afterwards to further strengthen the study findings, blindfolding technique has been applied to ensure the predictive relevance of the model. The findings of construct cross validated redundancy are mentioned in Table 8.

The findings of construct cross validated redundancy revealed that the calculated values for Q^2 are higher than zero which confirms the substantial predictive relevance of the model (Henseler et al., 2015).

5. Discussion and contributions

5.1. Discussions

This investigation tries to respond to six significant hunches which covers the six hypothesis raised in the study. Our findings show a favourable relationship between GEO and environmental performance, supporting earlier research Roscoe et al. (2019). The profitability and market share of an enterprise that deals with natural environmental challenges are strongly correlated. Additionally, the results show a strong relationship between GEO and financial performance, which is in line with viewpoint Habib et al. (2020). Entrepreneurship in the environmental sector can help both the improvement of economic value and the mitigation of environmental deterioration. This emphasises how vitally critical dynamic qualities are to entrepreneurial action. Green innovativeness, proactivity, and risk-taking are traits that define GEO. First, GEO modifies current substantive capabilities by leveraging dynamic capacities (i.e., the ability to launch new products or processes). For instance, improving eco-design practises can lower harmful or hazardous emissions. Utilizing modern, innovative process technologies can reduce negative environmental effects and address issues related to people’s health and safety (Boukid et al., 2022). Second, a strong GEO enables businesses to create, find, and take advantage of new possibilities and to profit from doing so. In order to satisfy rising client demand for GEO is essential to play a dynamic capability role in exploiting chances for eco-friendly goods and services. Building a strong dynamic capability enables businesses to spot a chance to gain more market share. Adopting GEO represents risk-taking, third. Risk also exists for dynamic capabilities that strive to change organisational structures and business models. Businesses that rely on an inherent selectivity of capabilities may introduce a structural risk when established patterns are applied to the new jobs. The risk will increase as the environment becomes more volatile. In order to mitigate the inherent risk, it is necessary to keep track on organisational skills and their development.

The link between GEO and EP and the moderation impact of GTD on this relationship, the claims made by GTD about the connection between GEO and FP are also strongly supported. Our research supports Tze San et al. (2022) results’ that GTD has a positive moderating effect on the association between GEO and environmental performance. This argument is relevant to our findings.

There are three potential explanations for these intriguing observations. First, the absorption cost is unable to outweigh the advantages of innovative knowledge and technology as GTD rises (Sulaiman & Asad, 2023). Implementing GEO demands a commitment to environmental ethics, businesses typically start green initiatives with the intention of boosting their returns (Ameer & Khan, 2022). When transforming innovative information and technology into useful inventions, the company is, nevertheless, severely hampered by the costs of absorption (Damer et al., 2021). Therefore, some GTD may be harmful to the outcomes of GEO.

Table 8. Construct cross validated redundancy

Latent Constructs	SSO	SSE	$Q^2(=1-SSE/SSO)$
Environmental Performance	500.000	392.406	0.215
Financial Performance	500.000	344.017	0.312

Secondly, consumers that have a great propensity to buy green products are greatly influenced more by societal status than practical considerations like cost, quality, or state-of-the-art technology (Kim & Seock, 2019; Zahid et al., 2022). Consumers will be encouraged to engage in sustainable consumption practises if they show good social responsibility. Peer opinion is also likely to have an impact on consumers' green purchasing decisions. People are anticipated to gain favour with peer groups if they demonstrate a willingness to pay more for eco-friendly goods. Therefore, with the appropriate implementation of GEO, businesses' financial performance will improve even better in a technologically dynamic environment.

Third, it is possible that consumers have limited knowledge of what goes into entrepreneurial activity. Despite the advantages of using green products and services have been attracted, consumers may be price sensitive when making green purchases (Nadeem et al., 2020). Frequently, this leaves an attitude-behaviour. environmental awareness of consumers and their real purchasing habits. Consumers will be highly inclined towards the adoption of green products or services and reap the benefits of innovation as the overall level of public environmental understanding rises. As a result, the benefits of GEO are improved as a result of the technologically dynamic environment, which also results in inadequate marketing communication between the SMEs and its consumers.

The results imply that KTI significantly modifies the association between GEO and financial and environmental performance. The results reveals that the strength of the positive associations between GEO and two types of business performance improves as KTI rises. These results back up the research done by (Pham & Hoang, 2019). When current knowledge is transferred and new knowledge production activities take place, organisations adopting GEO are encouraged to engage in organisational learning from the perspective of dynamic capability. Businesses embracing GEO are more likely to seize chances under wider market knowledge, giving them an advantage. According to the findings, businesses should support KTI for maximizing financial returns and minimizing environmental effects through green entrepreneurial orientation.

5.2. Theoretical contribution

This work adds to a number of fields of knowledge. The strategic orientation of a corporation (i.e., GEO) is identified in this study as a key dynamic capability from the standpoint of dynamic capabilities. This study reveals how subtle connections exist between GEO and dynamic capabilities. through the following three unique routines and processes: the urge for green innovations, the proactiveness to seize chances, and the openness for risk taking in reforming the economy. Moreover, even though the significance of green entrepreneurial orientation has been acknowledged, it is still unknown how GEO affects both financial and environmental performance. Additionally, whether dynamic or stable environmental conditions exist may affect how well entrepreneurial tactics operate. The current research shows that GEO has favourable effects on both financial and environmental performance. The benefits of GEO may be diminished by dealing with GTD, and as a result, GEO's environmental performance may be less effective in a volatile situation compared to stagnant environment. A company's pursuit of improved performance through entrepreneurial endeavours is facilitated and supported by an efficient knowledge transfer process. action. Together, they show how important roles, GTD and KTI have for the execution of green entrepreneurial orientation. Finally, advanced economies have hosted significant number of studies on GEO. However, in Pakistan, concerns over GEO adoption and how these adoptions are perceived in terms of performance become even more important. In the current study, we offer new data to the body of literature regarding the advantages of adopting GEO in developing countries.

5.3. Managerial implications

This research provides the following consequences for the practitioners. First, businesses can use GEO being a dynamic capability for seeking advantage of market opportunities. Dynamic capacities, including technological advancements, will boost entrepreneurial activities and will create self-awareness. Managers must close the informational space necessary for green entrepreneurial activities. The market is a key source for understanding consumer preferences and demands. Thus,

intra-firm information transfer procedures can offer suggestions for improving customer satisfaction. To quickly respond to client requests and achieve long-term competitive advantages, developing dynamic capabilities is helpful.

Managers must not forget a steady environment with a gradual technological advancement (Makhloufi et al., 2021) due to some overuse of technologies. It is impossible to foresee the effects that emerging technologies may have. These impacts of selecting a strategy on performance outcomes are mostly consistent with uncertainty. Therefore, managers need to deal with uncertainty and create a backup plan for any problems. Before taking entrepreneurial action, those with higher technology knowledge will be better equipped to assess the worth of new technical advancements (Ta'arnha et al., 2023). Managers are given access to training reference resources so they can consider knowledge development.

Third, managers ought to promote employee discussion and analysis of mistakes and failures among cross-functional teams within the company. Employees are inspired to share novel concepts, initiatives, and actions in the context of organisational learning. These student types will support the enhancement of the firm's knowledge capital and the transmission of tacit knowledge from peers. Managers need to use tools intelligently, like papers, databases, and procedures, to create the right knowledge combinations. A broad knowledge foundation allows for the efficient and effective translation of entrepreneurial activities into enhanced corporate performance.

6. Conclusion and limitations

The need to undertake research on firms operating in Pakistan was driven by the significance of environmental preservation and the adoption of green technology along with the promotion of GEO world. Wide Adopting GEO offers businesses a vital strategy for gaining a competitive edge and improving performance. The result of the current research guides that GEO has beneficial effects over environmental as well as financial performance, drawing on a perspective of dynamic capacities. This research broadens our knowledge of GEO. In order to transition the social economy into the social-ecological economy, it highlights GEO as the dynamic capability for exploitation of new ideas, fostering innovation, seizing potential possibilities, and taking risks. The development of GTD and KTI also comes from the same dimension but from two opposing factors. While KTI is acknowledged as a facilitator to develop knowledge management capabilities, GTD is seen as a constraint to those capabilities. The results indicate that GTD weakens the link between

Environmental performance and GEO. The link between GEO, environmental performance, and financial performance is positively moderated by KTI. More environmental advantages from GEO can be facilitated in a stagnant environment than by a turbulent technological environment. The effective and efficient enhancement of two types of performance can be achieved by enterprises adopting GEO through a process of intra-firm information transfer and internal knowledge integration.

Future research need to make note of a number of limitations. First, each firm's self-reported data was used to assess GEO by a single informant. Some detractors think that prejudice might be created. Additional research could assess the extent of GEO by relating multiple employee responses to managers.

Secondly, a major limitation that was observed while analysing the data was related to the discriminant validity issue. While using Fornell-Larcker criterion the issue of discriminant validity arose, however, after incorporating the HTMT criterion, no such issue was observed, and as per Rönkkö and Cho (2020) several alternative methods are available which can be used to confirm the discriminant validity, however, an improved scale is recommended to researchers that intends to measure environmental performance as well as financial performance in a single model.

Third, the research solely looked at the positive moderating effects of GTD and KTI in the relationship between GEO and SMEs performance. Future researchers may consider the probable moderation impacts of other constructs, such as managerial dedication and leadership support, as an extension. This may produce insightful information about how GEO and SMEs performance are linked in various contexts.

Fourth, the sample SMEs were gathered specifically in the setting of Pakistan. But the environment of our study might have certain limitations. Different effects and boundaries might result from SMEs' experiences in other emerging or transitional economies. Future research will, therefore, try to derive findings in many environments, including other regions.

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