

# GEO and sustainable performance: the moderating role of GTD and environmental consciousness

Ong Tze San

*School of Business and Economics, Universiti Putra Malaysia,  
Serdang, Malaysia and*

*Department of Business Administration, Daffodil International University,  
Dhaka, Bangladesh*

Badar Latif

*School of Business and Economics, Universiti Putra Malaysia,  
Serdang, Malaysia, and*

Assunta Di Vaio

*Department of Law, University of Naples "Parthenope", Naples, Italy*

## Abstract

**Purpose** – Congruent with the world-wide call to combat global warming concerns and advance intellectual capital (IC), organisations are being pressured to ensure that IC is managed effectively to encourage green initiatives. In this regard, green entrepreneurial orientation (GEO) is emerged as a relevant IC. GEO is recognised as a mitigating factor of environmental degradation in the literature. Although prior literature has observed the nexus between GEO and firm performance, the role of GEO in leveraging sustainable performance has been limitedly explored. This study explored the relationship between IC as a GEO and enterprises' sustainable performance through the moderating roles of environmental consciousness and green technology dynamism (GTD) in the context of two developing countries (Pakistan and Malaysia).

**Design/methodology/approach** – Data provided by 296 respondents from 264 manufacturing small and medium-sized enterprises (SMEs) in Pakistan and Malaysia were analysed through a three-wave research design. AMOS 23 software was used to perform covariance-based structural equation modelling (CB-SEM), while hierarchical regression analysis was applied using the SPSS 25 software to examine the causal relationships in the model.

**Findings** – IC as a GEO significantly influences sustainable performance, akin to environmental consciousness and GTD. Besides, GTD has a significant moderating effect between GEO and financial and environmental performance in Pakistan and Malaysia but not between GEO and social performance. Environmental consciousness has a significant moderating role in the impact of GEO on financial performance in Pakistan and Malaysia, but not on social and environmental performance.

**Practical implications** – The study's findings are useful for managers of Pakistani and Malaysian manufacturing SMEs to identify ways to encourage GEO to improve sustainable performance in their firms. The findings suggest that managers should effectively implement GTD and environmental consciousness to strengthen the GEO and sustainable performance relationship. Managers can use GEO concretely as a reference for the companies that intend to support the United Nation SDG-2030 agenda and to find new business opportunities for the implementation of sustainable development.

**Originality/value** – To the best of the authors' knowledge, this study is the first to examine the link between GEO and sustainable performance in developing countries such as Pakistan and Malaysia. Although the



---

influence of various intangible assets or IC on sustainable performance has been widely examined in the literature, the role of GEO as IC has been limitedly explored. This study extends the literature by adding to the knowledge of GEO as a form of firms' IC that enhances boundary conditions in developing countries.

**Keywords** Intellectual capital (IC), Green entrepreneurial orientation (GEO), Green technology dynamism (GTD), Environmental consciousness, Sustainable performance, Intellectual capital-based view

**Paper type** Research paper

## 1. Introduction

Within the world of modern knowledge (Guthrie *et al.*, 1999; Oliveira *et al.*, 2010), intellectual capital (IC) marks as a sign of transition towards innovation, competitive advantage and sustainable development (SD) (Carrillo *et al.*, 2009). According to Latif *et al.* (2020), stakeholders heavily pressure firms to minimise environmental issues arising from production activities (Singh *et al.*, 2021). While firms worldwide have adapted rapidly to the dynamic changes in the competitive business environment to sustain their profits and gain competitive advantages, implementing IC to address environmental impacts is also essential (Singh *et al.*, 2020). In order to address stakeholders' and environmental protection agencies' concerns and engage in green entrepreneurial actions, organisations must rely on their IC, such as green entrepreneurial orientation (GEO) (Guo *et al.*, 2020). Researchers have empirically established the connection between GEO and financial performance (Fatoki, 2019; Jiang *et al.*, 2018). In this study, GEO is proposed as a type of intellectual capital contributing to the long-term performance of small and medium-sized enterprises (SMEs) in developing nations (such as Pakistan and Malaysia).

IC is an essential intangible resource for entrepreneurial success (Crupi *et al.*, 2020; Bamel *et al.*, 2020) that firms have to develop to effectively implement corporate strategy, acquire and maintain sustainable competitive advantage, and improve sustainable performance (Alvino *et al.*, 2020). In line with this, recent calls have been made for GEO to emerge as IC, as GEO can be a feasible solution for SMEs to attain SD under growing environmental threats (Crupi *et al.*, 2020). The term "GEO" is defined as the combination of organisational strategies that captures a firm's strategic orientation, managerial policies, and entrepreneurial behaviours towards achieving sustainable competitive advantage (Jiang *et al.*, 2018; Melay *et al.*, 2017). The manufacturing industry has recently observed a comparatively higher adoption of IC practices which help GEO preserve the environment, conserve nature, foster green innovations, and facilitate entrepreneurial initiatives. Greater IC demonstrates higher knowledge concealment and higher employee skills and training to ensure business success (Hormiga *et al.*, 2011), aligning with the manufacturing sector's nature that requires knowledge linkages, managerial skills, and employee training (Carayannis *et al.*, 2021). The notion of GEO acts as a bridge for sustainability-driven innovation for businesses and has been committed to an important role in providing opportunities for green innovation, retention of CSR policies and increased competitive advantage. However, GEO initiatives carried out by companies in terms of SD must be in line with the expectations of the 17 Sustainable Development Goals (SDGs), which encourage them to contribute to creating a competitive advantage aimed at preserving environmental sustainability and well-being collective. According to (Camarano *et al.*, 2022), achievement of the SDGs requires a collective effort and cooperation between actors. In doing so, GEO is particularly affected by such changes towards new and sustainable ways of doing business. Consequently, nexus of GEO with SDG-oriented practices creates different opportunities within the procurement and distribution processes, and also solves business and sustainability issues. Thus, the link of GEO with the SDG-oriented practices may allow it to emerge and suggest a new path for environmental sustainability.

In the present study, manufacturing firms are considered as high-growth enterprises (HGFs) that experience rapid growth and develop new ideas and production methods to nurture IC (Segarra and Teruel, 2014). HGFs are believed to undergo greater change in a short time due to their ability to use greater IC to make entrepreneurial initiatives successful (Temouri *et al.*, 2020). Thus, HGFs exhibit outstanding entrepreneurial success, enabling their IC to experience more rapid expansion (Davidsson and Henrekson, 2002). Recent studies have revealed that GEO as IC can foster high-growth manufacturing companies to reduce deforestation and environmental problems (ozone layer depletion, rapid climate change, degradation of biodiversity) to preserve the ecosystem and potentially achieve sustainable development goals (Dean and McMullen, 2007; Youssef *et al.*, 2018). Moreover, greater usage of IC can promote more physical or non-physical changes in the firms such as innovation opportunities, innovation adoption, socioeconomic productivity, and self-reliance, especially in developing countries. In addition, the manufacturing industry may be more vulnerable to IC practices that are more salient for entrepreneurial initiatives to maintain competitive advantage. Resultantly, this study sought to explain the role of GEO as IC in sustainable performance via the moderation of environmental consciousness and technology dynamism in the Pakistani and Malaysian manufacturing SME context. Despite scholars' growing attention towards the GEO concept (Gast *et al.*, 2017; Gray *et al.*, 2014) and its relationship with firm performance (Jiang *et al.*, 2018), how GEO influences sustainable performance remains unclear. Several prior works proposed the effect of GEO in the form of green products and services and green innovation (Guo *et al.*, 2020), while others have theorised the positive impact of GEO on environmental performance (Shafique *et al.*, 2021). Conversely, some studies suggested that GEO does not significantly affect financial benefits and competitive advantage (Pratono *et al.*, 2019) or low carbon-based innovations (Xianjiang, 2012). In IC literature, most of the research did not explore any moderator in the relationship between GEO and sustainable performance. The present study adds to the body of knowledge by using environmental consciousness and green technology dynamism (GTD) as moderators that strengthen the relationship between GEO and sustainable performance. Nevertheless, very little attention has been drawn to explore the moderating role of GTD and environmental consciousness as IC in fostering GEO-sustainable performance link.

This study attempted to fill these research gaps by addressing GEO as SMEs' IC and examining its effect on sustainable performance, considering the inconsistent and insufficient findings on the performance outcomes of GEO. The study's aims were threefold. First, this study investigated the role of IC as GEO in SMEs' sustainable performance in developing countries by drawing on the intellectual capital-based view (ICV). Second, the moderating role of GTD between GEO and sustainable performance was assessed. Third, the moderating role of environmental consciousness between GEO and sustainable performance was evaluated. Accordingly, the researchers aimed to address the following research questions:

- (1) Does GEO influence sustainable performance?
- (2) Does GTD moderate the association between GEO and sustainable performance?
- (3) Does environmental consciousness moderate the association between GEO and sustainable performance?

In order to test the hypotheses, a data survey was conducted in the manufacturing sectors of Pakistan and Malaysia. The non-probability convenience sampling technique was utilised to collect data from 296 respondents from 264 manufacturing SMEs in these countries. The manufacturing sector was chosen because manufacturing firms' management systems effectively deal with entrepreneurial and environmental goals. The manufacturing sector is undoubtedly considered an important sector for the natural environment (Rehman *et al.*,

2016). Nevertheless, manufacturers in developing countries are still grappling with severe environmental challenges and are looking for green entrepreneurial initiatives that could significantly provide solutions to this anthropogenic effect. Hence, green entrepreneurship appears to be a resilient factor for the developing countries' manufacturing sector (Trapp and Kanbach, 2021), which adds value to green technological advancement in the production process. Hence, the current study focused on the Pakistani and Malaysian manufacturing sectors. Consequently, Pakistani and Malaysian manufacturers must rethink their existing business models and promote green entrepreneurial initiatives to conserve the natural environment. Manufacturers can adopt GEO as intangible assets, the foreseeable choice to gain sustainable development and achieve natural environment conservation.

Based on the previously discussed literature gaps, the present study is significantly original in three distinct ways. First, the present study proposes a change of perspective on the intellectual capital subject through the application of GEO and identifies how GEO enables different green entrepreneurial initiatives. In this study, GEO is identified as critical IC in managing and corresponding to green entrepreneurial initiatives that can foster sustainable performance and create value for a firm (Jiang *et al.*, 2018). Several previous studies (Jiang *et al.*, 2018; Fatoki, 2019) have explored the nexus between GEO and firm performance yet have paid limited attention to the link between GEO and sustainable performance. To the best of the authors' knowledge, this study is the first to explore GEO as firms' intellectual capital in fostering sustainable performance. Second, the current study explores the moderating roles of GTD and environmental consciousness between GEO and sustainable performance. Hence, the study hypothesises that firms with a higher level of GTD and environmental consciousness can encourage IC practices which foster superior sustainable performance. Finally, the present study explores the under-investigated GEO context of manufacturing SMEs in developing countries (Pakistan and Malaysia), wherein an untapped GEO-sustainable performance research framework was empirically tested. The study also attempted to gain deep insights into the role of GEO as a valuable intangible asset in shaping superior sustainable performance. The remainder of this paper is organised as follows. Section 2 justifies the study's conceptual framework and hypothesis development. Section 3 discusses the research methodology and data collection procedure, while Section 4 presents the data analysis results. Finally, Section 5 concludes the paper with a discussion of the findings, implications, and suggestions for future research.

## 2. Literature review and hypotheses development

### 2.1 Intellectual capital-based view (ICV)

The present study applied the intellectual capital-based view (ICV), which many influential authors have used in different works (Edvinsson, 1997; Luthy, 1998; Sveiby, 1997). According to Reed *et al.* (2006), ICV and the knowledge-based view (KBV) are counterparts with different scholarly foci. The KBV emphasises the effectiveness of organisational knowledge and knowledge generation streams (information system, information technology) and their influence on firm performance (Leonard-Barton, 1992). On the other hand, the ICV emphasises specific aspects, such as intangible assets, which foster the achievement of competitive advantage (Muhamad *et al.*, 2016; Bamel *et al.*, 2020). In this study, GEO is modelled as firms' intangible asset linked to sustainable performance. Thus, GEO refers to a firm's crucial IC which protects the natural environment and promotes sustainable development for economic growth through social and environmental objectives (Caputo *et al.*, 2016; Bamel *et al.*, 2020). As an IC, GEO can foster the detection, training, and exploitation of entrepreneurial initiatives, which sets up a mechanism for entrepreneurial potential to create and achieve a competitive advantage (Dean and McMullen, 2007; Hockerts and Wüstenhagen, 2010). According to Fichter and Tiemann (2018), traditional entrepreneurship theory implements an

amnesty mechanism along with a string of relief measures to promote economic benefits and self-employment. Unfortunately, the growing concern of environmental issues has been overlooked. Consequently, the concept of GEO, which strengthens a firm's intellectual capital, is merely employed to resolve environmental issues but adversely impacts firms' sustainable performance (Shahzad *et al.*, 2020). Additionally, Reed *et al.* (2006) argued that the resource-based view (RBV) is inappropriate for clarifying GEO's relationship with a competitive advantage. Thus, considering the theoretical shortcomings of the RBV, the present study drew upon the ICV to test the impact of GEO on firms' sustainable performance.

## 2.2 Green entrepreneurial orientation (GEO) as intellectual capital

In the competitive and uncertain contemporary business environment, companies must effectively utilise available tangible and intangible resources (Barney, 2001). Effective GEO, as a subset of intangible assets (Mačerinskienė and Aleknavičiūtė, 2011; Rao, 2012), is a crucial attribute of successful HGFs. High productivity and the related rapid growth of a company can be generated through investing, developing, and effectively utilising intangible assets (Mayo, 2000). Researchers have paid significant attention to the green entrepreneurship concept as an intangible asset, making GEO a considerable and prominent scholarly debate topic in the IC literature (Mačerinskienė and Aleknavičiūtė, 2011; Dwianika and Gunawan, 2020; Popescu, 2020). In addition to theoretical perspectives, firms have become increasingly vibrant in engaging in green entrepreneurship practice (Dean and McMullen, 2007; Hockerts and Wüstenhagen, 2010; Kibler *et al.*, 2015). Indeed, GEO is crucial not only for green entrepreneurial initiatives, sustainable development, and training investments (Carayannis *et al.*, 2014) but also for the protection of intellectual property (Yusoff *et al.*, 2019). Increasingly environmentally sensitive consumers are the driving force behind green entrepreneurship and demand environment-friendly products (Del Giudice *et al.*, 2021a). Consequently, green entrepreneurship encourages IC practices that mitigate organisations' environmental issues. According to Schaltegger and Wagner (2011), GEO is a progressive societal reform that contributes to intellectual capital practices that earn long-term business growth and unlock doors that had constrained them (Carayannis *et al.*, 2021; Fait *et al.*, 2021). Thus, businesses are adopting IC practices to foster green entrepreneurship to stay afloat while heading towards an ecosystem crisis (Hall *et al.*, 2010; Shet *et al.*, 2021). Hence, GEO as IC and its relationship with firm performance has been examined in various literature (Jiang *et al.*, 2018; Fatoki, 2019; Habib *et al.*, 2020) under different environmental conditions. Nevertheless, few studies examined GEO as an IC to foster green innovation (Guo *et al.*, 2020; Muangmee *et al.*, 2021), whose combined effects determine the success of a firm's eco-innovation. The changing global environment emphasises firms' need to consider the nexus of GEO-sustainable performance for a wide range of societal reforms and long-term competitive advantage. In achieving the sustainable development agenda, whether GEO plays an influential intangible asset role in shaping manufacturing SMEs' sustainable performance, particularly in developing countries, has rarely been examined.

The GEO-performance relationship literature is summarised in Table 1. Most existing studies on the relationship between GEO and performance were undertaken in developed countries, such as the European Union (EU) member countries (Criado-Gomis *et al.*, 2017, 2018; Hernández-Perlines and Rung-Hoch, 2017). Research in developing countries primarily focused on China (Jiang *et al.*, 2018; Guo *et al.*, 2020; Guo *et al.*, 2018; Li, 2013; Xianjiang, 2012; Xiue and Qing, 2021), Bangladesh (Habib *et al.*, 2020), Indonesia (Pratono *et al.*, 2019), Thailand (Muangmee *et al.*, 2021), South Africa (Fatoki, 2019), and Iran (Golsefid-Alavi *et al.*, 2021). Other developing countries, including Pakistan and Malaysia, have been mainly ignored. Furthermore, existing GEO-related literature has been found primarily in the contexts of hospitality and tourism (Fatoki, 2019; Luu, 2021), educational institutions (Guo *et al.*, 2020), and the service sector (Xianjiang, 2012). Whether GEO plays an influential IC role

Author(s)	Country	Major findings	Theoretical perspective	Intellectual capital
Jiang <i>et al.</i> (2018)	China	This study provides a deep understanding on the concept of GEO that exploits and transforms the social economy into the social-ecological economy	Dynamic capability theory	GEO, knowledge transfer and integration and technology dynamism
Habib <i>et al.</i> (2020)	Bangladesh	This study's finding indicates that organisations must encourage GEO to reap higher firm performance	Resource advantage theory	GEO, market orientation, green supply chain management
Fatoki (2019)	South Africa	The findings of this study provide an understanding about how the hospitality sector must exploit GEO for better sustainability initiatives	Natural-Resource Based View and Stakeholder theory	GEO
Guo <i>et al.</i> (2020)	China	This study encourages green innovation and supply chain learning, and is of great significance for managers to understand how to implement GEO in the process of achieving green innovation development	Entrepreneurial Orientation Theory	GEO and supply chain learning
Pratono <i>et al.</i> (2019)	Indonesia	The findings state that firm inter-organisational learning plays a critical role as an intervening variable that is fostered by GEO and market orientation, for achieving greater sustainable competitive advantage	Dynamic capability theory	GEO, market orientation and inter-organisational learning
Luu (2021)	Asia-Pacific Emerging Market	The current study encourages firms to create sustainable tourism services in the tourism industry and promote employees' green creativity via cultivating GEO.	Conservation of resources theory	GEO, Quality of green communication, Green creative self-efficacy, Harmonious environmental passion
Xianjiang (2012)	China	The finding shows that GEO has a distinct positive effect on low carbon-based innovation and short-term organisational performance	Natural resource-based theory	GEO, low carbon-based incremental innovation, technology low carbon-based breakthrough innovation and market low carbon-based breakthrough innovation
Muangmee <i>et al.</i> (2021)	Thailand	The current study suggests that GEO and green innovation can assist firm managers in understanding the factors that lead to superior sustainable performance	Resource-based view	GEO and green innovation

(continued)

**Table 1.**  
An overview of the empirical literature on the GEO–performance relationship



Author(s)	Country	Major findings	Theoretical perspective	Intellectual capital
Muangmee <i>et al.</i> (2021)	Iran	The recognition of the current research in relation to the GEO concept can largely contribute to the theoretical development in entrepreneurship and environmental science	NA	GEO and green innovation
Guo <i>et al.</i> (2018)	China	The findings of this research imply that a strong GEO can effort to enhance the level of supply chain learning capability and developed green innovation	Resource-based view and Dynamic capability theory	GEO, green innovation, supply chain learning capability
Li (2013)	China	The findings of the current study indicate that organisations should emphasise GEO practices to reap sustainability performance	NA	GEO, incremental marketing innovation and radical marketing innovation
Xiue and Qing (2021)	China	The current study indicates that GEO is the key element to achieve financial performance goals	Resource-based view and Contingency theory	GEO, green process innovation, green product innovation, green technological turbulence
Criado-Gomis <i>et al.</i> (2017)	China	The current study is conceptualised using a categorisation scheme and several research lines are proposed, all based on relational models with GEO as the key concept for the sustainable development	Dynamic capabilities theory	NA
Criado-Gomis <i>et al.</i> (2018)	Spain	Green entrepreneurship is integral part for business triple bottom line approach	Dynamic capabilities theory	GEO, entrepreneurial orientation and sustainability orientation
Hernández-Perlines and Rung-Hoch (2017)	Spain	Green entrepreneurship is considered a strong predictor of business success in family firms	Stakeholder theory	GEO and CSR

Table 1.

in shaping manufacturing firms' performance has rarely been investigated, particularly in developing countries such as Pakistan and Malaysia. Moreover, extant research has failed to highlight any moderator in the GEO–performance relationship, despite some inconsistent findings. Nonetheless, previous scholars have examined mediators between this link, including green supply chain management (Habib *et al.*, 2020), inter-organisational learning (Pratono *et al.*, 2019), green creative self-efficacy (Luu, 2021), and green innovation (Muangmee *et al.*, 2021). Adding to the body of knowledge, the present study utilised environmental consciousness and GTD as moderators that strengthen the GEO–performance relationship, which has rarely been considered in the literature.

### 2.3 Hypothesis development

**2.3.1 Relationship between GEO and social performance.** The social dimension of performance concerns the strategic goals related to a corporate mission, which are difficult to define and

measure (Bagnoli and Megali, 2011; Ebrahim *et al.*, 2014). This dimension can be measured by assessing the degree to which social needs are satisfied. Hence, GEO can play a strategic role for an organisation to achieve the mission for which it was established and satisfy the interests of local communities, individuals, or social groups (Caputo *et al.*, 2016). Organisations use GEO as an intellectual capital input to support business activities or processes to produce or supply goods or services (Ebrahim and Kasturi Rangan, 2014). Based on the ICV, GEO contributes to social welfare from multiple perspectives. First, a supplier's unethical behaviour impacts the public's perception of a firm, eventually diminishing social performance (Hajmohammad and Vachon, 2016). Nevertheless, consistent knowledge sharing with business partners through GEO enables firms to monitor and mitigate potential unethical practices (Casali and Perano, 2021). Second, socially responsible practices are more likely to be costly in the short run, exerting a financial burden on firms. Third, firms face financial constraints when investing in the latest technologies to achieve innovation in response to rapid environmental changes (Schaltegger and Wagner, 2011). On the other hand, large investments in the latest technologies may not produce large-scale benefits due to uncertainty in external market dynamism. Proactive (green entrepreneurial) firms can prevent such negative consequences in advance and forge better connections with business partners. In this regard, green entrepreneurial firms that proactively and strategically plan for long-term sustainable changes can potentially overcome the challenges of costly social responsibility and technological innovation to achieve superior social performance. Therefore, the following hypothesis was proposed:

*H1a.* GEO positively influences social performance.

*2.3.2 Relationship between GEO and environmental performance.* As an intangible firm asset, GEO is strongly embedded in entrepreneurial initiatives. By offering greater value to an organisation and being difficult for competing firms to imitate, GEO provides a basis for sustainable competitive advantage, which is solely derived from a pool of entrepreneurial mindsets and not from a tangible resource that can be easily bought or copied (Wright *et al.*, 1994). Increased dynamism in the industry requires a core strategic resource, which provides a competitive advantage. In this way, GEO acts as an intangible asset that enhances competitive advantage and environmental performance. Acquiring new entrepreneurial initiatives and innovative skills helps a company perform efficiently (Shen *et al.*, 2020). Consequently, entrepreneurial initiatives lead towards organisational sustainability (Morrish *et al.*, 2011). Organisations cannot neglect environmental issues and aspects in today's highly competitive business environment. As a firm's intangible asset, GEO reduces environmental degradation and increases economic value by encouraging firms to avoid market failure and enhance market efficiency.

Based on the ICV, firms adopt GEO to explore sustainable business opportunities, new technologies, and production methods, thus ensuring their survival and avoiding market failure (Temouri *et al.*, 2020). For instance, a firm is likely to reduce its pollution levels through new manufacturing processes that minimise the hazardous and toxic materials used in its production if it has a strongly developed GEO (Kaur *et al.*, 2019). Moreover, GEO mandates the conservation of resources to advance firm efficiency. In this manner, green technologies aid water, coal, and oil wastage reduction throughout the production process (Graham and Mcadam, 2016). Besides, GEO also helps a firm comply with stringent international environmental standards, generates value for the organisation, and meets consumers' high environmental demands (Pratono *et al.*, 2019). Therefore, GEO enables organisations to effectively implement their green agenda while concurrently meeting occupational health and safety management standards (such as ISO14000) (Popa *et al.*, 2021). Ultimately, GEO does not just provide firms with a new mechanism to attract customers but also places firms as leading entrepreneurs and technical experts in global sustainability solutions. Therefore,



exploring the impact of GEO on firms' environmental performance is essential (Kaur *et al.*, 2019). In this regard, Habib *et al.* (2020) found a positive relationship between GEO and organisations' financial performance. Similarly, Guo *et al.* (2020) revealed a positive link between GEO and green innovative performance. In the light of these arguments, the study hypothesised that:

*H1b.* GEO positively influences environmental performance.

*2.3.3 Relationship between GEO and financial performance.* Intangible assets are recognised as critical factors in generating the sustainable competitive advantage necessary to achieve superior financial performance (Barney, 1991). Bontis (2001) argued that leveraging knowledge assets is the key to a firm's prosperity. This pivotal role of intellectual capital in value creation must be assessed by estimating the extent to which firms' conventional financial performance measures intrinsically capture the contribution of intellectual capital resources such as human resources, customer reputation and relationships, and innovative ideas. The present study explored this issue empirically by analysing the relationship between a relevant measure of IC, that is GEO, and commonly used measures of a company's financial performance, representing profitability and productivity. Drawing from the ICV, implementing IC in the form of GEO strengthens a firm's capability to leverage its resources and knowledge for new products and processes (Covin and Miller, 2014). New innovative technologies specifically guide the better utilisation of resources, reducing water and fossil fuel consumption. Moreover, the use of recyclable materials is encouraged in production and delivery processes. For instance, firms should prioritise materials that are easy to reuse, recycle, and recover in manufacturing activities. Firms implement GEO due to institutional and social norms, as eco-friendly products and processes comply with environmental regulations and avoid government penalties (Dean and McMullen, 2007). Considering the arguments above, GEO reshapes production efficiency, minimises wastage, and reduces costs by exploiting innovative ideas, which improves firms' financial performance. Based on this discussion, the following hypothesis was suggested:

*H1c.* GEO positively influences financial performance.

*2.3.4 The moderating effect of green technology dynamism (GTD).* Environmental problems have triggered global economies to achieve sustainable development goals. Concurrently, globalisation has given rise to environmental problems that emanate adverse climate change (Awan, 2013). On the whole, environmental problems are difficult to tackle due to their complexity, which only becomes more complicated for manufacturing firms. Moreover, green practices have been evidently neglected in developing economies, such as Pakistan and Malaysia (Malik *et al.*, 2017). Businesses need to capture dynamic factors such as GTD, which can play a significant role in environmental management and sustainable performance to secure the foremost benefits. The dominance of the dynamic green technology domain has grown significantly among manufacturing firms (De Lange, 2016). In a changing environment, GTD has emerged as a "sign of certainty" for green technologies. Firms assimilate new technologies quicker than their competitors if they undergo and align with rapid technological changes. Thus, GTD fosters technology and knowledge capabilities.

Drawing upon the ICV, the present study has provided a theoretical foundation to explore the moderating role of GTD in the relationship between GEO and sustainable performance. From the perspective of the ICV, increasing environmental uncertainty raises firms' need to manage their intangible assets for better technological advancement (Widyaningdyah, 2020). Firms have a greater acceptance of GEO in introducing eco-friendly technologies and gaining superior sustainable performance if they adapt to GTD. When triggered by an uncertain business environment, GEO acts as an intangible asset that enhances the tendency to be proactive. Since GEO is tagged as risk-taking, firms with GEO perform better in a

fast-changing or uncertain environment, especially when they have high environmental dynamism. Moreover, investment decisions are significantly associated with environmental uncertainty, whereby firms adopting GEO are willing to make risky investments for sustainable performance. Additionally, GTD provides a stable business environment for continued investment in entrepreneurial projects. According to [Truong and Nagy \(2021\)](#), GTD has a significant moderating effect on the relationship between a firm's intellectual capital and new product development performance. Therefore, a strong GTD may help firms achieve greater sustainable performance when their GEO is high. Based on the above arguments, the following hypotheses were postulated:

*H2a.* GTD strengthens the relationship between GEO and social performance.

*H2b.* GTD strengthens the relationship between GEO and environmental performance.

*H2c.* GTD strengthens the relationship between GEO and financial performance.

*2.3.5 The moderating effect of environmental consciousness.* Environmental consciousness is rooted in the argument that the natural environment faces diverse environmental issues due to human actions, particularly pertinent to the manufacturing sector ([Yucedag et al., 2018](#)). Anchored in the ICV as its theoretical foundation, the present study postulates the moderating effect of environmental consciousness on the relationship between GEO and sustainable performance. According to [Yucedag et al. \(2018\)](#), employees' consciousness about environmental issues would engage them in specific behaviours that could protect the environment, including green entrepreneurial initiatives. Employees who are passionate and aware about environmental issues (climate change, environmental degradation, resource depletion, global warming, pollution and noise, waste and hazard reduction) tend to undertake necessary actions related to environmental conservation ([Cheema et al., 2020](#); [Testa et al., 2016](#)). Thus, employees' consciousness about environmental issues has become essential to stimulating employee engagement in GEO. In turn, employees' environmental consciousness would increase if they adopt green entrepreneurial values in their behaviours. The ICV further suggests that employees engaging in green entrepreneurial activities would support IC practices, such as new environmental initiatives and social responsibility activities, to achieve firm performance ([Shafique et al., 2021](#)). The employees may also promote green behaviours and GEO practices among one another. Moreover, employees' higher environmental consciousness level is likely to enhance the effect of their GEO engagement on sustainable performance since manufacturing sector employees' self-perceptions are deeply related to the environment. Based on the above arguments, the study hypothesised that:

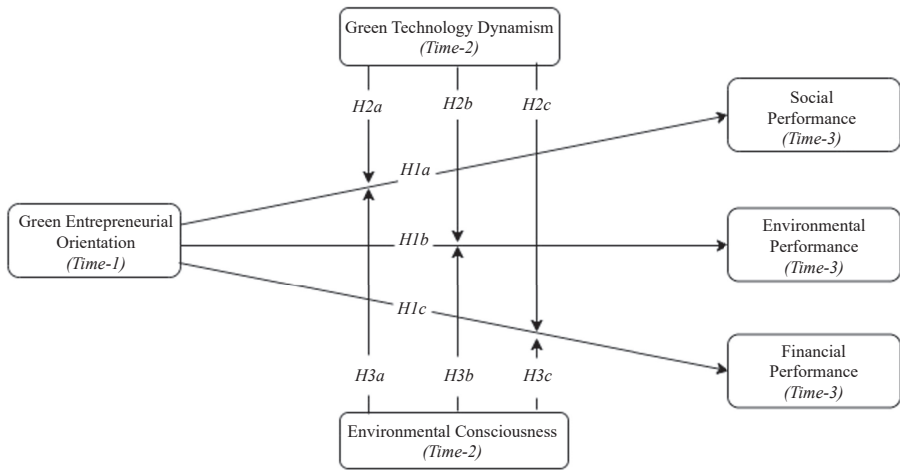
*H3a.* Environmental consciousness strengthens the relationship between GEO and social performance.

*H3b.* Environmental consciousness strengthens the relationship between GEO and environmental performance.

*H3c.* Environmental consciousness strengthens the relationship between GEO and financial performance.

## *2.4 Research framework*

The study's primary objective was to investigate the positive effect of GEO on sustainable performance among Pakistani and Malaysian SMEs. The study further aimed to ascertain the moderating role of GTD and environmental consciousness in the relationship between GEO and sustainable performance. Sustainable performance was measured as social, environmental, and financial performance. [Figure 1](#) presents the framework of this research.



**Figure 1.**  
Theoretical framework

### 3. Methodology and sampling

#### 3.1 Pakistani and Malaysian manufacturing SMEs

The manufacturing sector has the potential to lead global economies towards green transformation, given their substantial harmful contribution to environmental pollution and waste. In developed economies (such as EU nations), manufacturing firms contribute about 60%–70% of gross domestic product (GDP) growth and manage their industrial environmental pollution (air pollution, waste management, energy and resource consumption, and hazardous materials) to enhance sustainable performance (Hall and Oriani, 2006). Nevertheless, in developing economies (such as Asian countries), manufacturing firms are the major polluters of the atmosphere and create sustainability problems such as climate change, chemical waste, hazardous material, natural resources depletion, and noise and air pollution (de Sousa Jabbour *et al.*, 2020). According to Khan and Khalique (2014), manufacturing firms' waste and pollution can threaten living species' survival on Earth. In Pakistan and Malaysia, more than 6% of carbon dioxide (CO<sub>2</sub>) emissions have been documented explicitly on an annual basis. The disposal of used products, waste prevention, and emissions control are less-structured and lack effective mechanisms are practised in these developing economies. Cleaner productions and closed-loop mechanisms are acknowledged as under-developed and less-proactive in these countries, notably Malaysia and Pakistan. In previous studies, the paucity of green entrepreneurial practices has been noted to badly affect sustainability policies, worsening environmental degradation (Arend, 2014; Soomro *et al.*, 2020) and creating numerous environmental problems such as illegal dumping, growing landfills, and human and environmental health issues. Based on the explanations mentioned above, the present study chose GEO as an antecedent and sustainable performance as an outcome for this study. Besides, the current study uses GTD and environmental consciousness as moderators, which strengthens the link between GEO and sustainable performances.

#### 3.2 Sampling

The present study selected Malaysian and Pakistani SMEs as the study population to assess green entrepreneurship and sustainable performance in developing economies. The sample of SMEs in Malaysia was chosen from two major states, namely Selangor and Kuala Lumpur,

which have the highest contribution to national GDP at 6.8% and 6.7%, respectively. According to the Malaysian SME Annual Report 2018, Selangor has 179,271 operating SMEs, comprising 19.8% of the total SMEs in Malaysia. On the other hand, Kuala Lumpur is home to 14.7% (133,703) of the total SMEs operating in Malaysia. GDP contribution of Selangor and Kuala Lumpur were RM 321,069 million (23.5%) and RM 217,818 million (15.95%), respectively. Likewise, the sample of Pakistani SMEs was from two major provinces with the highest contribution to Pakistan's national GDP, namely Punjab and Sindh. Punjab is considered the largest province in terms of GDP contribution with approximately 173 billion rupees in 2019 and is rapidly increasing, while Sindh's GDP contribution stood at 83 billion rupees. The G\*Power 3.1.9.2 software was utilised to determine the minimum sample size for this study. The software is considered reliable and recommended for sample size calculation (Cohen, 1992). Based on the parameters proposed by Cohen (1992), with an effect size of 0.17, error probability of 0.05, and power of 0.90, the software reported that this study required a minimum of 120 respondents.

### 3.3 Three-wave research design

The current study applied a three-wave research design, which permitted time-based segregations of each variable. In particular, the independent variable (GEO) was measured at Time 1, the moderator variables (GTD and environmental consciousness) were measured at Time 2, and the dependent variable (sustainable performance) was measured at Time 3. The time lag between every measurement was at least three to four weeks. This design mitigated the potential issues from exclusively using self-reported or single-source data at one point in time. Finance managers, chief executive officers (CEOs), and presidents of the SMEs were targeted as proxies of the sample firms. A structured closed-ended questionnaire was sent to these target respondents at the aforementioned three separate time points to obtain the required data.

A total of 620 questionnaires were distributed to 122 manufacturing SMEs in Pakistan using the non-probability convenience sampling technique. Finally, 160 questionnaires were completed and returned, yielding a 25.80% response rate for the respondents at Time 1, Time 2, and Time 3. Similarly, 700 questionnaires were distributed to 142 manufacturing SMEs in Malaysia. After several follow-ups by email and phone, 136 completed questionnaires were collected, yielding a 9.42% response rate for the respondents at Time 1, Time 2, and Time 3.

### 3.4 Common method bias (CMB)

Common method bias (CMB) is a potential concern when data is collected on endogenous and exogenous constructs across different time periods through the questionnaire survey method (Kraus *et al.*, 2020). CMB can diminish a study's results (Podsakoff *et al.*, 2003; Spector, 2006) and over-report the existing association between the study's measured variables (Conway and Lance, 2010). Hence, the current study applied Harman's single factor test for CMB, where the highest variance explained by a single factor should be less than 50%. Table 2 shows that the highest variance explained was 21.047%, indicating no CMB in the present study.

### 3.5 Measures

The present study adapted all the measurement items from previous research, rated on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). First, the scale for GEO was adapted from Jiang *et al.* (2018). The GEO measures expressed it as an intangible asset that can exploit the firm's overall intangible assets to respond to the rapidly changing environment and address environmental concerns. Second, the scale for GTD was

Component	Total	Initial eigenvalues		Extraction sums of squared loadings		
		% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.156	21.047	21.047	7.156	21.047	21.047
2	5.208	15.317	36.364	5.208	15.317	36.364
3	3.259	9.584	45.948	3.259	9.584	45.948
4	2.353	6.921	52.869	2.353	6.921	52.869
5	2.325	6.838	59.707	2.325	6.838	59.707
6	1.773	5.215	64.922	1.773	5.215	64.922
7	1.529	4.497	69.419	1.529	4.497	69.419
8	1.172	3.446	72.865	1.172	3.446	72.865
9	1.116	3.281	76.146	1.116	3.281	76.146
10	1.027	3.021	79.167	1.027	3.021	79.167
11	0.857	2.522	81.689	0.857	2.522	81.689
12	0.811	2.386	84.075	0.811	2.386	84.075
13	0.560	1.648	85.722	0.560	1.648	85.722
14	0.508	1.494	87.216	0.508	1.494	87.216
15	0.426	1.253	88.469	0.426	1.253	88.469
16	0.404	1.188	89.657	0.404	1.188	89.657
17	0.367	1.081	90.738	0.367	1.081	90.738
18	0.351	1.033	91.771	0.351	1.033	91.771
19	0.338	0.995	92.766	0.338	0.995	92.766
20	0.313	0.922	93.688	0.313	0.922	93.688
21	0.269	0.790	94.478	0.269	0.790	94.478
22	0.227	0.667	95.145	0.227	0.667	95.145
23	0.219	0.644	95.789	0.219	0.644	95.789
24	0.211	0.622	96.411	0.211	0.622	96.411
25	0.181	0.533	96.944	0.181	0.533	96.944
26	0.170	0.501	97.445	0.170	0.501	97.445
27	0.152	0.446	97.890	0.152	0.446	97.890
28	0.137	0.403	98.293	0.137	0.403	98.293
29	0.131	0.385	98.678	0.131	0.385	98.678
30	0.118	0.348	99.027	0.118	0.348	99.027
31	0.098	0.290	99.316	0.098	0.290	99.316
32	0.087	0.257	99.573	0.087	0.257	99.573
33	0.081	0.238	99.812	0.081	0.238	99.812
34	0.064	0.188	100.000	0.064	0.188	100.000

**Table 2.**  
Common method  
bias test

adapted from [Sheng et al. \(2011\)](#). The items in the scale referred to the uncertainty of the green technological perspective and external environmental changes. Third, the items for environmental consciousness were measured using the scale by [Huang et al. \(2014\)](#). Environmental consciousness is referred to as an employee's consciousness about environmental issues, which is an essential characteristic that encourages them to engage in GEO. Next, social performance items were adapted from [Zailani et al. \(2015\)](#). Social performance was operationalised as an organisation's effective mechanism that converts its mission into actions in line with accepted social mores. Subsequently, environmental performance items were adapted from [Zailani et al. \(2015\)](#). Environmental performance was defined as the stakeholders' expectations and firm principles that an organisation achieves in fulfilling environmental-related requirements. Finally, financial performance items were also adapted from [Zailani et al. \(2015\)](#). Financial performance was operationalised as the subjective measures that a firm utilises to achieve its economic and financial objectives. The present study also incorporated four control variables (firm age, industry type, firm size, and ownership structure) that are commonly used to assess firm performance ([Li et al., 2018](#)) (see [Table 3](#)).

Total sample	Pakistan (160)		Malaysia (136)	
	Frequency	Percentage %	Frequency	Percentage %
<i>Firm Age (Year)</i>				
1–10	13	8.1%	9	6.6%
11–20	13	8.1%	10	7.4%
21–30	56	35%	48	35.3%
above 30	78	49%	69	51%
<i>Industry type</i>				
Textile	40	25.0	47	34.6
Chemical	58	36.3	32	23.5
Food and Beverage	35	21.9	32	23.5
Rubber and Plastic	3	1.9	10	7.4
Metal Product	11	6.9	5	3.7
Pharmaceutical	6	3.8	3	2.2
Communication and computer-related equipment	2	1.3	3	2.2
Electrical equipment	2	1.3	2	1.5
Machinery and engineering	3	1.9	2	1.5
<i>Firm size (no of employees)</i>				
Less than 50	9	5.6	7	5.1
50–99	25	16	23	16.9
100–299	56	35.0	49	36.0
300–999	43	26.9	34	25.0
1,000–1,999	15	9.4	13	9.6
2,000–4,999	7	4.4	6	4.4
5,000 or more	5	3.1	4	3.0
<i>Ownership structure</i>				
State-owned firms	78	48.8	94	69.1
Private-owned firms	30	18.8	6	4.4
Foreign-invested firms	52	32.5	36	26.5

**Table 3.**  
Profile of sample firms  
(Pakistan and  
Malaysia)

## 4. Results

### 4.1 Reliability and validity

An exploratory factor analysis (EFA) was applied using the varimax rotation and an eigenvalue cut-off above 1.0 to evaluate whether the item loadings for each construct were valid in Pakistan and Malaysia (Hair *et al.*, 2010). The factor analysis comprised six factors with eigenvalues above or close to 1.0 for all items, indicating the unidimensional characteristics of the constructs. Cronbach's alpha was subsequently used to assess the reliability of the constructs. As shown in Table 4, the Cronbach's alpha values for all the six constructs were greater than 0.70 in Pakistan and Malaysia, fulfilling the acceptance criterion for reliability (Carmines and Zeller, 1979). Furthermore, the computations of composite reliability (CR) confirmed the reliability of the scales with values greater than 0.80 in Pakistan and Malaysia. Next, convergent and discriminant validity were evaluated using confirmatory factor analysis (CFA). As shown in Table 4, the average variance extracted (AVE) value of each construct was greater than the threshold of 0.50, confirming convergent validity. Table 4 also shows that the square root of the AVE for each construct was higher than its correlations with other constructs (Fornell and Larcker, 1981). Therefore, discriminant validity was also verified for the data from Pakistan and Malaysia. Table 5 shows the means, standard deviations, and Pearson correlation results for the variables. The square roots of the AVE (for



**Table 4.**  
Pakistani and  
Malaysian SMEs'  
confirmatory factor  
analysis results

Construct	Items	Factor loading ( $\lambda$ )		Cronbach's alpha ( $\alpha$ )		Composite reliability		Average variance extracted	
		Pakistan	Malaysia	Pakistan	Malaysia	Pakistan	Malaysia	Pakistan	Malaysia
Green entrepreneurial orientation	GEO1	0.724	0.765	0.797	0.808	0.863	0.868	0.560	0.568
	GEO2	0.794	0.773						
	GEO3	0.811	0.682						
	GEO4	0.770	0.752						
Green technology dynamism	GEO5	0.629	0.792						
	GTD1	0.888	0.899	0.733	0.894	0.913	0.932	0.727	0.774
	GTD2	0.941	0.848						
	GTD3	0.878	0.860						
Environmental consciousness	GTD4	0.681	0.910						
	EC1	0.720	0.823	0.898	0.915	0.937	0.933	0.650	0.636
	EC2	0.821	0.813						
	EC3	0.845	0.820						
	EC4	0.829	0.863						
	EC5	0.762	0.863						
	EC6	0.823	0.689						
	EC7	0.851	0.767						
Environmental performance	EC8	0.792	0.723						
	EP1	0.764	0.848	0.747	0.869	0.883	0.904	0.557	0.611
	EP2	0.736	0.809						
	EP3	0.774	0.818						
	EP4	0.767	0.693						
	EP5	0.728	0.703						
	EP6	0.706	0.807						
	FP1	0.761	0.843	0.891	0.840	0.917	0.896	0.650	0.593
Financial performance	FP2	0.822	0.842						
	FP3	0.871	0.820						
	FP4	0.864	0.783						
	FP5	0.797	0.696						
	FP6	0.710	0.609						
Social performance	SP1	0.787	0.845	0.861	0.892	0.922	0.923	0.704	0.708
	SP2	0.845	0.738						
	SP3	0.804	0.795						
	SP4	0.888	0.903						
	SP5	0.866	0.912						

Constructs (Pakistani)	Mean	SD	1	2	3	4	5	6
1. Green Entrepreneurial Orientation	3.908	0.388	0.748					
2. Green Technology Dynamism	4.180	0.439	0.202*	0.852				
3. Environmental Consciousness	3.447	0.880	0.320**	0.209*	0.806			
4. Environmental Performance	4.183	0.393	0.350**	0.318**	0.316**	0.746		
5. Financial Performance	4.254	0.485	0.436**	0.278**	0.341**	0.329**	0.806	
6. Social Performance	3.778	0.776	0.465**	0.301**	0.416**	0.411**	0.462**	0.839
Constructs (Malaysian)	Mean	SD	1	2	3	4	5	6
1. Green Entrepreneurial Orientation	5.190	0.765	0.754					
2. Green Technology Dynamism	5.147	0.899	0.548***	0.879				
3. Environmental Consciousness	4.728	0.898	0.503***	0.533***	0.797			
4. Environmental Performance	5.208	1.000	0.529***	0.525***	0.489***	0.782		
5. Financial Performance	5.098	0.892	0.376***	0.485***	0.588***	0.578***	0.770	
6. Social Performance	5.024	0.916	0.451***	0.518***	0.539***	0.479***	0.351***	0.841

**Note(s):** \*\*\* Correlation is significant at the 0.01 level (2-tailed), \*\* Correlation is significant at the 0.01 level (2-tailed), \* Correlation is significant at the 0.05 level (2-tailed)

**Table 5.** Pakistani and Malaysian SMEs' discriminant validity results

all latent factors) are presented on the diagonal of the correlation matrix in Table 5. For all factors, this value exceeds any correlation with another factor, indicating satisfactory discriminant validity.

#### 4.2 Hierarchical regression analysis

The results of the hierarchical regression analysis for Pakistan are presented in Table 6. In Pakistan, H1a was rejected as GEO was found to negatively and insignificantly influence social performance ( $\beta = -0.085$ , n.s., Model 2). Nevertheless, H1b and H1c were supported as GEO positively influenced environmental performance ( $\beta = 0.299$ ,  $p < 0.001$ , Model 5) and financial performance ( $\beta = 0.391$ ,  $p < 0.001$ , Model 8). Moreover, GTD was found to positively moderate the relationship between GEO and environmental performance among Pakistani SMEs. The effect of the interaction coefficient of GEO and GTD on social performance was insignificant and negative ( $\beta = -0.089$ , n.s., Model 3). Hence, H2a was rejected. Table 6 illustrates that the interaction coefficient of GEO and GTD was significant and negative for environmental performance ( $\beta = -0.139$ ,  $p < 0.05$ , Model 6), supporting H2b. In addition, H2c was also rejected as GTD failed to moderate the relationship between GEO and financial performance, with an insignificant and negative interaction coefficient ( $\beta = -0.040$ , n.s., Model 9). Next, H3a failed to be supported as the interaction coefficient of GEO and environmental consciousness had an insignificant and negative effect on social performance ( $\beta = -0.095$ , n.s., Model 3). Similarly, H3b was also rejected as Table 6 illustrates that the interaction coefficient of GEO and environmental consciousness was insignificant and negative for environmental performance ( $\beta = -0.034$ , n.s., Model 9). Nonetheless, the interaction coefficient of GEO and environmental consciousness was significant and negative ( $\beta = -0.132$ ,  $p < 0.05$ , Model 9), proving the moderating effect of environmental consciousness between GEO and financial performance. Hence, H3c was accepted.

As shown in Table 7, GEO was found to positively influence social performance ( $\beta = 0.204$ ,  $p < 0.01$ , Model 2), environmental performance ( $\beta = 0.280$ ,  $p < 0.001$ , Model 5), and financial performance ( $\beta = 0.159$ ,  $p < 0.01$ , Model 8) in Malaysia. Therefore, H1a, H1b, and H1c were all supported. Nevertheless, GTD failed to moderate the effect of GEO on social

**Table 6.**  
Pakistani SMEs'  
hierarchical regression  
analysis results

Variables	Social performance			Environmental performance			Financial performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Firm size	0.045	0.055	0.059	-0.061	-0.109	-0.108	0.056	0.004	0.004
Firm age	-0.063	-0.079	-0.079	-0.103	-0.009	-0.121	-0.042	-0.049	-0.050
Industry type	0.009	0.029	0.015	-0.009	-0.039	-0.047	-0.059	-0.086	-0.087
Ownership Structure	0.137**	0.105	0.118	-0.074	-0.031	-0.019	0.028	0.069	0.072
Green Entrepreneurial Orientation (GEO)		-0.085	-0.080		0.299***	0.312***		0.391***	0.396***
Green Technology Dynamism (GTD)		0.127***	0.122		0.278***	0.279***		0.213**	0.214**
Environmental Consciousness (EC)		0.412***	0.419***		-0.105	-0.113		-0.140*	-0.143*
GEO × GTD			-0.089			-0.139*			-0.040
GEO × EC			-0.095			-0.034			-0.132*
R <sup>2</sup>	0.023	0.209	0.223	0.024	0.232	0.251	0.035	0.257	0.259
ΔR <sup>2</sup>	0.013	0.014	0.186	0.024	0.209	0.019	0.007	0.250	0.002
F value	0.919	11.88***	1.351	0.936	13.77***	1.864	0.286	17.06***	0.159

**Note(s):** \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ , Standard errors in parentheses

Variables	Social performance			Environmental performance			Financial performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Firm size	0.062	0.051	0.044	0.012	-0.008	-0.010	-0.047	-0.058	-0.057
Firm age	-0.091	-0.030	-0.025	-0.125	-0.046	-0.044	-0.034	0.041	0.041
Industry type	-0.159*	0.048	0.047	-0.194	0.035	0.034	-0.172*	0.060	0.058
Ownership structure	0.333***	0.073	0.067	0.314***	0.026	0.024	0.284	-0.005	-0.004
Green Entrepreneurial Orientation (GEO)		0.204**	0.178**		0.280***	0.272***		0.159**	0.156**
Green Technology Dynamism (GTD)		-0.004	-0.002		0.195**	0.205***		0.125**	0.135
Environmental Consciousness (EC)		0.664***	0.676***		0.498***	0.502***		0.677***	0.676***
GEO × GTD			-0.062			-0.135*			-0.011
GEO × EC			-0.021			0.124*			0.132*
R <sup>2</sup>	0.152	0.331	0.037	0.154	0.344	0.511	0.111	0.210	0.428
ΔR <sup>2</sup>	0.120	0.179	0.016	0.134	0.189	0.112	0.024	0.074	0.110
F value	5.865***	10.93***	1.322	5.984***	14.23***	3.897*	4.108***	8.767***	4.120***

Note(s): \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , Standard errors in parentheses

**Table 7.** Malaysian SMEs' hierarchical regression analysis results

performance, as the interaction coefficient was insignificant and negative ( $\beta = -0.062$ , n.s., Model 3). Thus, H2a was rejected. On the other hand, H2b was accepted as the interaction coefficient of GEO and GTD was significant and negative for environmental performance ( $\beta = -0.135$ ,  $p < 0.05$ , Model 6). Table 7 illustrates that the interaction coefficient of GEO and GTD had an insignificant and negative effect on financial performance ( $\beta = -0.011$ , n.s., Model 9), which rejected H2c. Likewise, the moderating effect of environmental consciousness between GEO and social performance was insignificant and negative ( $\beta = -0.021$ , n.s., Model 3). Thus, H3a was rejected. In contrast, H3b was supported as environmental consciousness was found to significantly and positively moderate the relationship between GEO and environmental performance ( $\beta = 0.124$ ,  $p < 0.05$ , Model 6). Similarly, the interaction coefficient of GEO and environmental consciousness for financial performance was significant and positive ( $\beta = 0.132$ ,  $p < 0.05$ , Model 9), thereby confirming H3c. For Tables 6 and 7, hierarchical regression analysis was used to analyze whether GTD and environmental consciousness moderate the relationship between GEO and sustainable performance, following Preacher and Hayes (2008) approach. To calibrate for bias, 5000 bootstrap samples and a 95% confidence interval (CI) were applied, allowing for the calculation of the indirect effect of each variable. If the confidence interval for the indirect effect of a given variable did not include 0, this was taken as an indication that the indirect effect in question was significant at  $p = 0.05$  (Baron and Kenny, 1986; Hayes, 2013).

## 5. Discussion and implications

### 5.1 Discussion

The study aimed to investigate the influence of GEO, as IC, on manufacturing SMEs' sustainable performance with the moderating effects of environmental consciousness and GTD. The present study addressed the research questions by drawing on the ICV and using data from Malaysian and Pakistani SMEs. The findings revealed that GEO has a direct and significant relationship with environmental and financial performance in Pakistan, consistent with previous literature findings (Habib *et al.*, 2020; Jiang *et al.*, 2018). Surprisingly, GEO does not affect social performance in Pakistan, contradicting past empirical findings (Habib *et al.*, 2020). The findings revealed that GEO in Malaysia has a direct and significant impact on all three facets of sustainable performance (social, environmental, and financial), aligning with earlier scholars' findings (Fatoki, 2019; Habib *et al.*, 2020; Jiang *et al.*, 2018). The present study's findings have proven that IC, such as GEO, has different results across countries, differing from the work of Lomberg *et al.* (2017). Notably, the results of the direct relationships suggest that Malaysia is a developed economy with more advanced and resourceful collaborations for business opportunities than Pakistan. In contrast, Pakistan lacks an entrepreneurial process. Hence, the government and external environment needs different capital and development support to acquire a sustainable business model for social performance. The results of the direct relationships further show that GEO plays a vital role in the development of entrepreneurial actions, as it is categorised by green innovativeness, pro-activeness, and openness to risk. First, as per the ICV perspective, GEO leverages and modifies existing IC (launching new innovative products and processes). For example, the development of eco-design practices leads firms towards reducing toxic and hazardous material and minimising environmental impacts (health and safety) for the social welfare of their employees and society. Second, a strong GEO permits firms to discover, create, and exploit new business opportunities to achieve an eco-friendly product and process that satisfies market demand from customers. Indeed, strong IC development, such as GEO, enables firms to recognise business opportunities for expanding their market shares. Third, GEO reflects the characteristics of risk-taking. As far as the ICV is concerned, internal structure transformation and business model expansion are risk-taking

decisions. When a new task is applied in the traditional business model, a firm inherently faces structural risk, which is higher for firms relying on IC. Hence, protecting the firm's intellectual capital to compensate for inherent risk is essential. Overall, the researchers assert that GEO acts as a reliable predictor of environmental performance (Menguc and Ozanne, 2005), financial performance (Dean and McMullen, 2007), and social performance (Kraus *et al.*, 2012).

The second research question inquired whether GTD moderates the relationship between GEO and sustainable performance. The findings indicate that GTD has a significant moderating role between GEO and environmental performance in Pakistan and Malaysia, supporting previous findings (Jiang *et al.*, 2018). Nevertheless, GTD failed to moderate the relationship between GEO and the remaining two sustainable performance aspects (social and financial) in Pakistan and Malaysia. These results diverge from the extant literature (Jiang *et al.*, 2018), possibly due to the complexity of environmental issues in developing countries. Thus, the study provides empirical evidence that GTD is a vital contingent factor in the relationship between GEO and environmental performance, revealing three crucial implications. First, greater adoption of GTD may produce highly novel knowledge and technologies. Entrepreneurial projects are likely the duration of long-term business models. The adoption of GTD may create environmental ethics of responsibility to initiate green projects aimed at increasing marginal and incremental rates of return (Chan *et al.*, 2016). A firm's knowledge dynamism becomes more stable and diversified than the existing business environment with the higher adoption of GTD. Moreover, the absorption cost controls the firm, whereas novel knowledge and technologies create useful innovations. Second, higher consumer purchasing power would increase customers' preference for eco-friendly products, influencing social recognition, functional values, and advanced technology (Biswas and Roy, 2015). Therefore, the effective implementation of GEO would augment consumers' tendency for better social responsibility and sustainable consumer behaviour, which benefits better sustainable performance. Third, consumers are likely to pay less attention to entrepreneurial actions. Hence, increasing awareness on the welfare of eco-friendly products and services would fill the gap in consumers' environmental awareness and direct their behaviour towards green products and services consumption. Therefore, consumers will be more likely to adopt green products and services if environmental awareness is increased at the general level of the public.

Lastly, the third research question pertained to the moderating role of environmental consciousness in the relationship between GEO and sustainable performance. The study analysis reported that environmental consciousness is a significant moderator between GEO and financial performance in Pakistan, as evidenced in the literature (Magaji *et al.*, 2017; Huang *et al.*, 2014; Jang *et al.*, 2015; Martínez García de Leaniz *et al.*, 2018). Notably, environmental consciousness has an insignificant moderating effect between GEO and social and environmental performance in Pakistan, contrary to the work of Wong *et al.* (2012). This study further discovered that environmental consciousness in Malaysia has a significant moderating effect between GEO and environmental and financial performance, as per previous empirical findings (Huang *et al.*, 2014; Jang *et al.*, 2015). Nevertheless, environmental consciousness does not moderate between GEO and social performance, which contrasts earlier research by Martínez García de Leaniz *et al.* (2018). In addition, the findings demonstrate that greater environmental consciousness strengthens the effect on several sustainable performance elements, which is consistent with the past literature (Huang *et al.*, 2014; Jang *et al.*, 2015). The findings particularly imply that consumers' environmental consciousness creates greater emotional attachments to green products. Consequently, consumer loyalty for green products and services increased. Notably, the results reveal that Malaysian SMEs are more environmentally conscious than Pakistan SMEs, resulting in the former's better sustainable performance. For example, Starbucks began selling fresh juice in their stores after partnering with Evolution Fresh Juice. Consequently, Starbucks was able to



address its health-conscious consumers' needs, thereby improving its sales turnover. In addition, Good Guide's website and mobile apps provide information related to the health, environmental, and social benefits of products and companies to facilitate consumers' choice of green and socially responsible products.

### *5.2 Comparative analysis with previous studies*

Most of the extant GEO literature has focused on organisations in developed and developing nations, such as the EU member countries, China, Bangladesh, South Africa, Indonesia, Asia-Pacific, Thailand, and Iran. Scholars from these regions have found that the effective management of GEO has a strong link with firms' entrepreneurial success (Criado-Gomis *et al.*, 2017; Hernández-Perlines and Rung-Hoch, 2017; Jiang *et al.*, 2018; Guo *et al.*, 2020; Guo *et al.*, 2018; Li, 2013; Xiue and Qing, 2021). A burgeoning track of research has started to explore the GEO concept in SMEs operating in developing and under-developed economies, such as Malaysia and Pakistan, due to the overwhelming acknowledgement of the positive role GEO plays in the developing world. According to Bontis *et al.* (2000), intellectual capital significantly contributes to Malaysian SMEs' performance. Other researchers have corroborated this finding (Daud and Yusuf, 2008; Ngah *et al.*, 2009). Similarly, according to Khalique *et al.* (2015), intellectual capital plays a significant role in Pakistani SMEs. Nevertheless, a lack of empirical research was observed within the GEO context, particularly with regard to an in-depth, focused examination of IC practices in Pakistani and Malaysian SMEs. The comparative analysis of Malaysian and Pakistani SMEs in the GEO context is noteworthy for many reasons. First, Pakistan and Malaysia are developing economies experiencing a high level of turbulence, complexity from environmental dynamism, and a lack of entrepreneurial activity mechanisms (Khan and Khalique, 2014). Consequently, when comparing Malaysian and Pakistani SMEs, both market structures appear to have unique characteristics (lack of formal institutional support, co-existing non-state-owned and state-owned enterprises, lack of market-support institution, less-developed mechanism for surrounding services, limited mechanism of entrepreneurial action) (Khalique, 2011). Second, developing economies' specific characteristics have pushed their manufacturing sector into a complicated and unpredictable environment (Acs *et al.*, 2008; Del Giudice *et al.*, 2021b). Hence, manufacturing firms, especially pollution-intensive and less entrepreneurial firms, aim for rapid advancement in developing economies. Third, Pakistani and Malaysian SMEs have generated insignificant challenges to economic growth in dealing with environmental issues and green entrepreneurship practices in their manufacturing process. Hence, whether GEO plays an influential intellectual capital role in shaping Pakistani and Malaysian manufacturing firms' sustainable performance has rarely been investigated. The concept of GEO is still in its embryonic stages in these developing nations despite the significant contributions researchers have made in other fields. Therefore, the present study is the first to study the concept of GEO as intellectual capital in Pakistani and Malaysian SMEs to determine whether extant measures and constructs are generalisable across multiple developing nations.

### *5.3 Implications for theory*

The present study has contributed to the literature in several ways. First, the study applies the ICV to green entrepreneurship by addressing a firm's strategic and entrepreneurial orientation (GEO) as a vital IC. By doing so, this research establishes that GEO and intellectual capital are subtly interconnected through three different characteristics: (1) a desire to explore green innovation; (2) pro-activeness to grab business opportunities; and (3) an open attitude towards risk-taking and transforming the social economy. Second, this study affirms the significance of intellectual capital by establishing that GEO positively influences sustainable performance, an ambiguous area in the intellectual capital literature

---

(Carayannis *et al.*, 2014). Third, previous research has primarily relied on the institutional theory merits, specifically institutional factors and logic (Schaltegger and Wagner, 2011). This research adopted and extended the ICV to demonstrate the multiple intellectual capital components comprising firms' entrepreneurial behaviour, which ultimately lead towards sustainable performance. Fourth, most GEO research has been undertaken in developing economies (China, Iran, Bangladesh, and South Africa). Nevertheless, GEO adoption is more sensitive and critical in developing countries (Pakistan and Malaysia).

#### *5.4 Implications for practice*

The present study has also addressed several practical implications. First, firms are recommended to recognise GEO as an intellectual capital that allows the exploitation of intangible assets for future business opportunities in the marketplace. Intellectual capital like GEO encourages entrepreneurial actions (e.g. introducing new technology) and enhances self-awareness. Second, managers should address and adapt to technological changes to stabilise their business environment, which in turn engenders economic benefits. Third, managers should encourage employees to discover business opportunities, engage in entrepreneurial activities, and avoid failures between cross-functional contexts in the firm. Next, intellectual capital highlights the growing need to address innovation and entrepreneurship. A firm nurtures sustainable entrepreneurship to secure improved performance by encouraging managerial discussions of intellectual capital concerns (Nave and Franco, 2019; Schaltegger *et al.*, 2016). Fourth, the implementation of GEO aligned with SDG-oriented practices could help managers to take into account the implications of green practices in line with the UN 2030 agenda, when managers decide to redesign and reorganise their operational practices. In this sense, the choice of SDG-oriented practices will be affected not only by criteria related to the business, but also by those related to sustainability (Cammarano *et al.*, 2022).

#### *5.5 Limitations and future research*

One of the study's limitations is that GEO was measured with a single informant from each firm who provided self-reported data, which has been criticised for potential bias. Although several remedial measures were undertaken in this study and CMB was not present, it might lead to bias in future studies. Considering the possibility of CMB stemming from the single-source used in this study, future research is recommended to evaluate GEO by sampling multiple levels of employees and managers. Next, the present study only investigated the moderating effects of GTD and environmental consciousness on sustainable performance. Future studies must expand this body of knowledge by considering the moderating role of various factors, such as system thinking, open and experimental environments, and management commitment. Finally, this research was limited by its specific sample of SMEs and only two developing countries' contexts. The experience and implementation of GEO could be compared across developed and developing economies in upcoming studies. Therefore, future research should attempt to reveal in-depth generalisable conclusions in diverse settings.

## **6. Conclusion**

The growing IC trend has given a tremendous boost to SMEs' sustainable development through strategic efforts such as GEO. The adoption of GEO may illuminate critical strategies for firms to achieve a competitive advantage and enhance sustainable performance. Based on the ICV, this research revealed that IC (GEO) positively influences firms' sustainable performance in social, environmental, and financial aspects. Thus, this study has recognised the role of GEO as IC for exploiting business opportunities, encouraging innovativeness, and taking risks for

transformation to achieve social, environmental, and economic benefits. Moreover, the moderating roles of GTD and environmental consciousness in these relationships were established based on the premise that GTD and environmental consciousness strengthen and promote knowledge management capabilities that translate GEO into sustainable performance.

## References

- Acs, Z.J., Desai, S. and Hessels, J. (2008), "Entrepreneurship, economic development and institutions", *Small Business Economics*, Vol. 31, pp. 219-234.
- Alvino, F., Di Vaio, A., Hassan, R. and Palladino, R. (2020), "Intellectual capital and sustainable development: a systematic literature review", *Journal of Intellectual Capital*, Vol. 22 No. 1, pp. 76-94, 2021.
- Arend, R.J. (2014), "Entrepreneurship and dynamic capabilities: how firm age and size affect the 'capability enhancement-SME performance' relationship", *Small Business Economics*, Vol. 42, pp. 33-57.
- Awan, A.G. (2013), "Relationship between environment and sustainable economic development: a theoretical approach to environmental problems", *International Journal of Asian Social Science*, Vol. 3, pp. 741-761.
- Bagnoli, L. and Megali, C. (2011), "Measuring performance in social enterprises", *Nonprofit and Voluntary Sector Quarterly*, Vol. 40, pp. 149-165.
- Bamel, U., Pereira, V., Del Giudice, M. and Temouri, Y. (2020), "The extent and impact of intellectual capital research: a two decade analysis", *Journal of Intellectual Capital*, Vol. 23, pp. 375-400.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17, pp. 99-120.
- Barney, J.B. (2001), "Resource-based theories of competitive advantage: a ten-year retrospective on the resource-based view", *Journal of Management*, Vol. 27, pp. 643-650.
- Baron, R.M. and Kenny, D.A. (1986), "The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51 No. 6, p. 1173.
- Biswas, A. and Roy, M. (2015), "Leveraging factors for sustained green consumption behavior based on consumption value perceptions: testing the structural model", *Journal of Cleaner Production*, Vol. 95, pp. 332-340.
- Bontis, N. (2001), "Assessing knowledge assets: a review of the models used to measure intellectual capital", *International Journal of Management Reviews*, Vol. 3, pp. 41-60.
- Bontis, N., Keow, W.C.C. and Richardson, S. (2000), "Intellectual capital and business performance in Malaysian industries", *Journal of Intellectual Capital*, Vol. 1, pp. 85-100.
- Cammarano, A., Perano, M., Michelino, F., Del Regno, C. and Caputo, M. (2022), "SDG-oriented supply chains: business practices for procurement and distribution", *Sustainability*, Vol. 14 No. 3, p. 1325.
- Caputo, F., Giudice, M.D., Evangelista, F. and Russo, G. (2016), "Corporate disclosure and intellectual capital: the light side of information asymmetry", *International Journal of Managerial and Financial Accounting*, Vol. 8, pp. 75-96.
- Carayannis, E., Del Giudice, M. and Della Peruta, M.R. (2014), "Managing the intellectual capital within government-university-industry R&D partnerships: a framework for the engineering research centers", *Journal of Intellectual Capital*, Vol. 15, pp. 611-630.
- Carayannis, E.G., Ferreira, J.J. and Fernandes, C. (2021), "A prospective retrospective: conceptual mapping of the intellectual structure and research trends of knowledge management over the last 25 years", *Journal of Knowledge Management*, Vol. 25, pp. 1977-1999.
- Carmines, E.G. and Zeller, R.A. (1979), *Reliability and Validity Assessment*, Sage University Paper, Series 07-017, Sage Publications, Thousand Oaks, CA.

- 
- Carrillo, F.J., Mohamed, M., Stankosky, M. and Mohamed, M. (2009), "An empirical assessment of knowledge management criticality for sustainable development", *Journal of Knowledge Management*, Vol. 13 No. 5, pp. 271-286.
- Casali, G.L. and Perano, M. (2021), "Forty years of research on factors influencing ethical decision making: establishing a future research agenda", *Journal of Business Research*, Vol. 132, pp. 614-630.
- Chan, H.K., Yee, R.W., Dai, J. and Lim, M.K. (2016), "The moderating effect of environmental dynamism on green product innovation and performance", *International Journal of Production Economics*, Vol. 181, pp. 384-391.
- Cheema, S., Afsar, B., Al-Ghazali, B.M. and Maqsoom, A. (2020), "Retracted: 'how employee's perceived corporate social responsibility affects employee's pro-environmental behaviour? The influence of organizational identification, corporate entrepreneurship, and environmental consciousness'", *Corporate Social Responsibility and Environmental Management*, Vol. 27, pp. 616-629.
- Cohen, J. (1992), "Statistical power analysis", *Current Directions in Psychological Science*, Vol. 1 No. 3, pp. 98-101.
- Conway, J.M. and Lance, C.E. (2010), "What reviewers should expect from authors regarding common method bias in organizational research", *Journal of Business And Psychology*, Vol. 25, pp. 325-334.
- Covin, J.G. and Miller, D. (2014), "International entrepreneurial orientation: conceptual considerations, research themes, measurement issues, and future research directions", *Entrepreneurship Theory and Practice*, Vol. 38, pp. 11-44.
- Criado-Gomis, A., Cervera-Taulet, A. and Iniesta-Bonillo, M.-A. (2017), "Sustainable entrepreneurial orientation: a business strategic approach for sustainable development", *Sustainability*, Vol. 9, p. 1667.
- Criado-Gomis, A., Iniesta-Bonillo, M.Á. and Cervera-Taulet, A. (2018), "Sustainable entrepreneurial orientation within an intrapreneurial context: effects on business performance", *International Entrepreneurship and Management Journal*, Vol. 14, pp. 295-308.
- Crupi, A., Cesaroni, F. and Di Minin, A. (2020), "Understanding the impact of intellectual capital on entrepreneurship: a literature review", *Journal of Intellectual Capital*, Vol. 22, pp. 528-559.
- Daud, S. and Yusuf, W. (2008), "An empirical study of knowledge management processes in small and medium enterprises", *Communications of the IBIMA*, Vol. 4, pp. 169-177.
- Davidsson, P. and Henrekson, M. (2002), "Determinants of the prevalence of start-ups and high-growth firms", *Small Business Economics*, Vol. 19, pp. 81-104.
- De Lange, D.E. (2016), "A social capital paradox: entrepreneurial dynamism in A small world clean technology cluster", *Journal of Cleaner Production*, Vol. 139, pp. 576-585.
- De Sousa Jabbour, A.B.L., Ndubisi, N.O. and Seles, B.M.R.P. (2020), "Sustainable development in Asian manufacturing SMEs: progress and directions", *International Journal of Production Economics*, Vol. 225, p. 107567.
- Dean, T.J. and McMullen, J.S. (2007), "Toward A theory of sustainable entrepreneurship: reducing environmental degradation through entrepreneurial action", *Journal of Business Venturing*, Vol. 22, pp. 50-76.
- Del Giudice, M., Scuotto, V., Orlando, B. and Mustilli, M. (2021a), "Toward the human-centered approach. A revised model of individual acceptance of AI", *Human Resource Management Review*, 100856.
- Del Giudice, M., Scuotto, V., Papa, A., Tarba, S.Y., Bresciani, S. and Warkentin, M. (2021b), "A self-tuning model for smart manufacturing SMEs: effects on digital innovation", *Journal of Product Innovation Management*, Vol. 38, pp. 68-89.
- Dwianika, A. and Gunawan, J. (2020), "SME's green entrepreneurial intellectual capital", *International Journal of Business, Economics and Law*, Vol. 23, pp. 322-332.

- Ebrahim, A., Battilana, J. and Mair, J. (2014), "The governance of social enterprises: mission drift and accountability challenges in hybrid organizations", *Research in Organizational Behavior*, Vol. 34, pp. 81-100.
- Ebrahim, A. and Kasturi Rangan, V. (2014), "What impact? A framework for measuring the scale and scope of social performance", *California Management Review*, Vol. 56 No. 3, pp. 118-141.
- Edvinsson, L. (1997), "Developing intellectual capital at Skandia", *Long Range Planning*, Vol. 30, pp. 366-373.
- Fait, M., Cillo, V., Papa, A., Meissner, D. and Scorrano, P. (2021), "The roots of 'volunteer' employees' engagement: The silent role of intellectual capital in knowledge-sharing intentions", *Journal of Intellectual Capital*. doi: [10.1108/JIC-04-2020-0133](https://doi.org/10.1108/JIC-04-2020-0133).
- Fatoki, O. (2019), "Green entrepreneurial orientation and firm performance in South Africa", *Entrepreneurship and Sustainability Issues*, Vol. 7, p. 247.
- Fichter, K. and Tiemann, I. (2018), "Factors influencing university support for sustainable entrepreneurship: insights from explorative case studies", *Journal of Cleaner Production*, Vol. 175, pp. 512-524.
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18, pp. 39-50.
- Gast, J., Gundolf, K. and Cesinger, B. (2017), "Doing business in A green way: a systematic review of the ecological sustainability entrepreneurship literature and future research directions", *Journal of Cleaner Production*, Vol. 147, pp. 44-56.
- Golsefid-Alavi, M., Sakhdari, K. and Alirezaei, A. (2021), "A review of the literature on entrepreneurship and the environment: opportunities for researching on the green entrepreneurial orientation", *Environmental Engineering and Management Journal (EEMJ)*, Vol. 20, pp. 819-839.
- Graham, S. and Mcadam, R. (2016), "The effects of pollution prevention on performance", *International Journal of Operations and Production Management*, Vol. 36, pp. 1333-1358.
- Gray, B.J., Duncan, S., Kirkwood, J. and Walton, S. (2014), "Encouraging sustainable entrepreneurship in climate-threatened communities: a Samoan case study", *Entrepreneurship and Regional Development*, Vol. 26, pp. 401-430.
- Guo, Y., Wang, L. and Xie, Y. (2018), "Green innovation, green entrepreneurial orientation and supply chain learning: evidence from manufacturing firms in China".
- Guo, Y., Wang, L. and Chen, Y. (2020), "Green entrepreneurial orientation and green innovation: the mediating effect of supply chain learning", *SAGE Open*, Vol. 10, 2158244019898798.
- Guthrie, J., Petty, R., Ferrier, F. and Wells, R. (1999), "There is no accounting for intellectual capital in Australia: a review of annual reporting practices and the internal measurement of intangibles", *OECD Symposium on Measuring and Reporting of Intellectual Capital*, OECD, Amsterdam, Vol. 9030, p. 134.
- Habib, M.A., Bao, Y. and Ilmudeen, A. (2020), "The impact of green entrepreneurial orientation, market orientation and green supply chain management practices on sustainable firm performance", *Cogent Business and Management*, Vol. 7, p. 1743616.
- Hair, J.F., Anderson, R.E., Babin, B.J. and Black, W.C. (2010), *Multivariate Data Analysis: A Global Perspective*, Vol. 7, Pearson, Upper Saddle River, NJ.
- Hajmohammad, S. and Vachon, S. (2016), "Mitigation, avoidance, or acceptance? Managing supplier sustainability risk", *Journal of Supply Chain Management*, Vol. 52, pp. 48-65.
- Hall, B.H. and Oriani, R. (2006), "Does the market value R&D investment by European firms? Evidence from A panel of manufacturing firms in France, Germany, and Italy", *International Journal of Industrial Organization*, Vol. 24, pp. 971-993.
- Hall, J.K., Daneke, G.A. and Lenox, M.J. (2010), "Sustainable development and entrepreneurship: past contributions and future directions", *Journal of Business Venturing*, Vol. 25, pp. 439-448.

- 
- Hayes, A.F. (2013), *Mediation, Moderation, and Conditional Process Analysis. Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-based Approach*, The Guilford Press, New York, NY, p. 120.
- Hernández-Perlines, F. and Rung-Hoch, N. (2017), "Sustainable entrepreneurial orientation in family firms", *Sustainability*, Vol. 9, p. 1212.
- Hockerts, K. and Wüstenhagen, R. (2010), "Greening goliaths versus emerging dauids—theorizing about the role of incumbents and new entrants in sustainable entrepreneurship", *Journal of Business Venturing*, Vol. 25, pp. 481-492.
- Hormiga, E., Batista-Canino, R.M. and Sánchez-Medina, A. (2011), "The role of intellectual capital in the success of new ventures", *International Entrepreneurship and Management Journal*, Vol. 7, pp. 71-92.
- Huang, H.-C., Lin, T.-H., Lai, M.-C. and Lin, T.-L. (2014), "Environmental consciousness and green customer behavior: an examination of motivation crowding effect", *International Journal of Hospitality Management*, Vol. 40, pp. 139-149.
- Jang, Y.J., Kim, W.G. and Lee, H.Y. (2015), "Coffee shop consumers' emotional attachment and loyalty to green stores: the moderating role of green consciousness", *International Journal of Hospitality Management*, Vol. 44, pp. 146-156.
- Jiang, W., Chai, H., Shao, J. and Feng, T. (2018), "Green entrepreneurial orientation for enhancing firm performance: a dynamic capability perspective", *Journal of Cleaner Production*, Vol. 198, pp. 1311-1323.
- Kaur, S., Gupta, S., Singh, S.K. and Perano, M. (2019), "Organizational ambidexterity through global strategic partnerships: a cognitive computing perspective", *Technological Forecasting and Social Change*, Vol. 145, pp. 43-54.
- Khalique, M. (2011), "Do Malaysia and Pakistan are suitable for A comparative study of SMEs: an intellectual capital perspective?", *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 3 No. 8, pp. 98-107.
- Khalique, M., Bontis, N., Bin Shaari, J.A.N. and Isa, A.H.M. (2015), "Intellectual capital in small and medium enterprises in Pakistan", *Journal of Intellectual Capital*, Vol. 16, pp. 224-238.
- Khan, M.W.J. and Khalique, M. (2014), "An overview of small and medium enterprises in Malaysia and Pakistan: past, present and future scenario", *Business and Management Horizons*, Vol. 2, pp. 38-49.
- Kibler, E., Fink, M., Lang, R. and Muñoz, P. (2015), "Place attachment and social legitimacy: revisiting the sustainable entrepreneurship journey", *Journal of Business Venturing Insights*, Vol. 3, pp. 24-29.
- Kraus, M.W., Piff, P.K., Mendoza-Denton, R., Rheinschmidt, M.L. and Keltner, D. (2012), "Social class, solipsism, and contextualism: how the rich are different from the poor", *Psychological Review*, Vol. 119, p. 546.
- Kraus, S., Rehman, S.U. and García, F.J.S. (2020), "Corporate social responsibility and environmental performance: the mediating role of environmental strategy and green innovation", *Technological Forecasting and Social Change*, Vol. 160, p. 120262.
- Latif, B., Mahmood, Z., Tze San, O., Mohd Said, R. and Bakhsh, A. (2020), "Coercive, normative and mimetic pressures as drivers of environmental management accounting adoption", *Sustainability*, Vol. 12, p. 4506.
- Leonard-Barton, D. (1992), "Core capabilities and core rigidities: a paradox in managing new product development", *Strategic Management Journal*, Vol. 13, pp. 111-125.
- Li, X. (2013), "Marketing innovation of the transformation from transformational leadership to the new venture performance in the context of green entrepreneurial orientation: a theory model and empirical study in China", *Journal of Applied Statistics and Management*, Vol. 32 No. 4, pp. 595-607.
- Li, D., Zhao, Y., Zhang, L., Chen, X. and Cao, C. (2018), "Impact of quality management on green innovation", *Journal of Cleaner Production*, Vol. 170, pp. 462-470.



- Lomberg, C., Urbig, D., Stöckmann, C., Marino, L.D. and Dickson, P.H. (2017), "Entrepreneurial orientation: the dimensions' shared effects in explaining firm performance", *Entrepreneurship Theory and Practice*, Vol. 41, pp. 973-998.
- Luthy, D. (1998), "Intellectual capital and its measurement", *Paper Presented at The Asian Pacific Interdisciplinary Research in Accounting (APIRA) Conference*, Osaka, available at: [Www3.Bus.Osaka-Cu.Ac.Jp/Apira98/Archives/Htmls/25.Htm](http://Www3.Bus.Osaka-Cu.Ac.Jp/Apira98/Archives/Htmls/25.Htm) (accessed 19 Juny 2019).
- Luu, T.T. (2021), "Green creative behavior in the tourism industry: the role of green entrepreneurial orientation and a dual-mediation mechanism", *Journal of Sustainable Tourism*, Vol. 29, pp. 1290-1318.
- Mačerinskienė, I. and Aleknavičiūtė, G. (2011), "The evaluation of intellectual capital influence on entrepreneurship", *Ekonomika Ir Vadyba*, No. 16, pp. 558-566.
- Magaji, M.S., Baba, R. and Entebang, H. (2017), "Entrepreneurial orientation and financial performance of Nigerian SMES", *Journal of Management and Training for Industries*, Vol. 4, pp. 25-41.
- Malik, S., Tariq, F. and Maliki, N. (2017), "Study of environmental impact assessment (EIA) process in Scotland, Malaysia and Pakistan", *Technical Journal*, Vol. 22, pp. 1-9.
- Martínez García De Leaniz, P., Herrero Crespo, Á. and Gómez López, R. (2018), "Customer responses to environmentally certified hotels: the moderating effect of environmental consciousness on the formation of behavioral intentions", *Journal of Sustainable Tourism*, Vol. 26, pp. 1160-1177.
- Mayo, A. (2000), "The role of employee development in the growth of intellectual capital", *Personnel Review*, Vol. 29, pp. 521-533.
- Melay, I., O'dwyer, M., Kraus, S. and Gast, J. (2017), "Green entrepreneurship in SMEs: a configuration approach", *International Journal of Entrepreneurial Venturing*, Vol. 9, pp. 1-17.
- Menguc, B. and Ozanne, L.K. (2005), "Challenges of the 'green imperative': a natural resource-based approach to the environmental orientation-business performance relationship", *Journal of Business Research*, Vol. 58, pp. 430-438.
- Morrish, S.C., Miles, M.P. and Polonsky, M.J. (2011), "An exploratory study of sustainability as a stimulus for corporate entrepreneurship", *Corporate Social Responsibility and Environmental Management*, Vol. 18, pp. 162-171.
- Muangmee, C., Dacko-Pikiewicz, Z., Meekaewkunchorn, N., Kassakorn, N. and Khalid, B. (2021), "Green entrepreneurial orientation and green innovation in small and medium-sized enterprises (SMEs)", *Social Sciences*, Vol. 10, p. 136.
- Muhamad, N., Leong, V.S. and Mizerski, D. (2016), "Consumer knowledge and religious rulings on products: young Muslim consumer's perspective", *Journal of Islamic Marketing*, Vol. 7, pp. 74-94.
- Nave, A. and Franco, M. (2019), "University-firm cooperation as A way to promote sustainability practices: a sustainable entrepreneurship perspective", *Journal of Cleaner Production*, Vol. 230, pp. 1188-1196.
- Ngah, R., Hoo, C.H. and Ibrahim, A.R. (2009), "The relationship between knowledge management and trust: Malaysian perspective", *International Journal of Management Innovation Systems*, Vol. 1, pp. 1-11.
- Oliveira, L., Rodrigues, L.L. and Craig, R. (2010), "Intellectual capital reporting in sustainability reports", *Journal of Intellectual Capital*, Vol. 11 No. 4, pp. 575-594.
- Podsakoff, P.M., Mackenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88, p. 879.
- Popa, S., Soto-Acosta, P. and Palacios-Marqués, D. (2021), "A discriminant analysis of high and low-innovative firms: the role of IT, human resources, innovation strategy, intellectual capital and environmental dynamism", *Journal of Knowledge Management*. doi: [10.1108/JKM-04-2021-0272](https://doi.org/10.1108/JKM-04-2021-0272).
- Popescu, C.R.G. (2020), "Approaches to sustainable and responsible entrepreneurship: creativity, innovation, and intellectual capital as drivers for organization performance", in Hernández-Sánchez, B.R., Sánchez-García, J.C. and Moreira, A.C. (Eds), *Building an Entrepreneurial and Sustainable Society*, IGI Global, Hershey, PA, pp. 75-95.

- Pratono, A.H., Darmasetiawan, N.K., Yudianto, A. and Jeong, B.G. (2019), "Achieving sustainable competitive advantage through green entrepreneurial orientation and market orientation: the role of inter-organizational learning", *The Bottom Line*, Vol. 32, pp. 2-15.
- Preacher, K.J. and Hayes, A.F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, Vol. 40 No. 3, pp. 879-891.
- Rao, V.C.A. (2012), "Intangible asset achieving green entrepreneurship and sustainable development", *SEDME (Small Enterprises Development, Management and Extension Journal)*, Vol. 39, pp. 62-74.
- Reed, K.K., Lubatkin, M. and Srinivasan, N. (2006), "Proposing and testing an intellectual capital-based view of the firm", *Journal of Management Studies*, Vol. 43, pp. 867-893.
- Rehman, M.A., Seth, D. and Shrivastava, R. (2016), "Impact of green manufacturing practices on organisational performance in Indian context: an empirical study", *Journal of Cleaner Production*, Vol. 137, pp. 427-448.
- Schaltegger, S. and Wagner, M. (2011), "Sustainable entrepreneurship and sustainability innovation: categories and interactions", *Business Strategy And The Environment*, Vol. 20, pp. 222-237.
- Schaltegger, S., Hansen, E.G. and Lüdeke-Freund, F. (2016), *Business Models for Sustainability: Origins, Present Research, and Future Avenues*, Sage Publications Sage, Los Angeles, CA.
- Segarra, A. and Teruel, M. (2014), "High-growth firms and innovation: an empirical analysis for Spanish firms", *Small Business Economics*, Vol. 43, pp. 805-821.
- Shafique, I., Kalyar, M.N. and Mehwish, N. (2021), "Organizational ambidexterity, green entrepreneurial orientation, and environmental performance in SMEs context: examining the moderating role of perceived CSR", *Corporate Social Responsibility and Environmental Management*, Vol. 28, pp. 446-456.
- Shahzad, M., Qu, Y., Zafar, A.U., Rehman, S.U. and Islam, T. (2020), "Exploring the influence of knowledge management process on corporate sustainable performance through green innovation", *Journal of Knowledge Management*, Vol. 24, pp. 2079-2106.
- Shen, N., Au, K. and Li, W. (2020), "Strategic alignment of intangible assets: the role of corporate social responsibility", *Asia Pacific Journal of Management*, Vol. 37, pp. 1119-1139.
- Sheng, S., Zhou, K.Z. and Li, J.J. (2011), "The effects of business and political ties on firm performance: evidence from China", *Journal of Marketing*, Vol. 75, pp. 1-15.
- Shet, S.V., Del Giudice, M. and Rammal, H.G. (2021), "Managerial challenges to promoting competency-based intellectual capital in emerging market economies-developing A framework for implications", *Journal of Intellectual Capital*, Vol. 23, pp. 85-102.
- Singh, S.K., Del Giudice, M., Chierici, R. and Graziano, D. (2020), "Green innovation and environmental performance: the role of green transformational leadership and green human resource management", *Technological Forecasting and Social Change*, Vol. 150, p. 119762.
- Singh, S.K., Del Giudice, M., Chiappetta Jabbour, C.J., Latan, H. and Sohal, A.S. (2021), "Stakeholder pressure, green innovation, and performance in small and medium-sized enterprises: the role of green dynamic capabilities", *Business Strategy and the Environment*, Vol. 31, pp. 500-514.
- Soomro, B.A., Ghumro, I.A. and Shah, N. (2020), "Green entrepreneurship inclination among the younger generation: an avenue towards A green economy", *Sustainable Development*, Vol. 28, pp. 585-594.
- Spector, P.E. (2006), "Method variance in organizational research: truth or urban legend?", *Organizational Research Methods*, Vol. 9, pp. 221-232.
- Sveiby, K.E. (1997), *The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets*, Berrett-Koehler Publishers, San Francisco, CA.

- Temouri, Y., Pereira, V., Muschert, G.W., Ramiah, V. and Babula, M. (2020), "How does cluster location and intellectual capital impact entrepreneurial success within high-growth firms?", *Journal of Intellectual Capital*, Vol. 22, pp. 171-189.
- Testa, F., Gusmerottia, N.M., Corsini, F., Passetti, E. and Iraldo, F. (2016), "Factors affecting environmental management by small and micro firms: the importance of entrepreneurs' attitudes and environmental investment", *Corporate Social Responsibility and Environmental Management*, Vol. 23, pp. 373-385.
- Trapp, C.T. and Kanbach, D.K. (2021), "Green entrepreneurship and business models: deriving green technology business model archetypes", *Journal of Cleaner Production*, Vol. 297, p. 126694.
- Truong, Y. and Nagy, B.G. (2021), "Nascent ventures' green initiatives and angel investor judgments of legitimacy and funding", *Small Business Economics*, Vol. 57 No. 4, pp. 1801-1818.
- Widyaningdyah, A.U. (2020), "Levers of control dan keunggulan bersaing: apakah pengendalian manajemen sebuah sistem?", *Media Riset Akuntansi, Auditing and Informasi*, Vol. 20, pp. 221-246.
- Wong, C.W., Lai, K.H., Shang, K.C., Lu, C.S. and Leung, T.K.P. (2012), "Green operations and the moderating role of environmental management capability of suppliers on manufacturing firm performance", *International Journal of Production Economics*, Vol. 140 No. 1, pp. 283-294.
- Wright, P.M., McMahan, G.C. and McWilliams, A. (1994), "Human resources and sustained competitive advantage: a resource-based perspective", *International Journal of Human Resource Management*, Vol. 5, pp. 301-326.
- Xianjiang, L. (2012), "Relation research among green entrepreneurial orientation, low carbon-based innovation and organizational performance in service enterprise", *Science of Science and Management of S&T*, Vol. 8, Corpus ID: 156442368.
- Xiue, Z. and Qing, L. (2021), "Does green entrepreneurial orientation improve the green competitive advantage?", *Foreign Economics and Management*, Vol. 43, pp. 20-33.
- Youssef, A.B., Boubaker, S. and Omri, A. (2018), "Entrepreneurship and sustainability: the need for innovative and institutional solutions", *Technological Forecasting and Social Change*, Vol. 129, pp. 232-241.
- Yucedag, C., Kaya, L.G. and Cetin, M. (2018), "Identifying and assessing environmental awareness of hotel and restaurant employees' attitudes in the Amasra district of Bartin", *Environmental Monitoring and Assessment*, Vol. 190, pp. 1-8.
- Yusoff, Y.M., Omar, M.K., Zaman, M.D.K. and Samad, S. (2019), "Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the partial least squares method", *Journal of Cleaner Production*, Vol. 234, pp. 626-637.
- Zailani, S., Govindan, K., Iranmanesh, M., Shaharudin, M.R. and Chong, Y.S. (2015), "Green innovation adoption in automotive supply chain: the Malaysian case", *Journal of Cleaner Production*, Vol. 108, pp. 1115-1122.

#### About the authors

Ong Tze San, PhD, is an Associate Professor of Accounting in School of Business and Economics, Universiti Putra Malaysia and Adjunct Professor at Bangladeshi University. She earned her Ph.D. from University of Leeds, UK in 2005. Her research interests include corporate sustainability, corporate performance measurement system, corporate governance, management accounting and carbon accounting. Her research has been published in various prestigious journals, such as *Journal of Cleaner Production*, *International Journal of Environmental Research and Public Health*, *International Journal of Productivity and Performance Management*, *Sustainability*, *Ecosystem Health and Sustainability*. To date, she has published more than 100 academic articles, chapters-in-book both local and internationally and has 2,352 citations (as per Google Scholar).

Badar Latif, PhD, is a former Lecturer of Accounting and currently enrolled as a full-time PhD Accounting scholar in Department of Accounting and Finance, School of Business and Economics, Universiti Putra Malaysia. His research interests are management accounting, business strategy and

---

corporate social responsibility. He did his Master of commerce (Accounting) and Master of philosophy (Accounting) from BZ University, Pakistan. He has also an academic membership of prestigious accounting association from UK, namely BAFA (British Accounting and Finance Association).

Assunta Di Vaio, PhD, is Associate Professor of Business Administration at the University of Naples Parthenope, Italy, where she served as Deputy-Director of the Department of Law (from 2017 to May 2022). Since 2014, she has been serving as Delegate for International Affairs of this Department. She is qualified as Full Professor in the same scientific field. Her research fields include managerial accounting for the decision-making processes in the public and private sector, performance measurement, intellectual capital, non-financial disclosure and sustainability reporting, sustainable accounting, UN 2030 Agenda, digital transformation, Artificial Intelligence and Blockchain technology. Her research has been published in leading management and accounting journals and top tier, peer-reviewed, ABS-ranked journals like *Technological Forecasting and Social Change* (3\*), *Journal of Business Research* (3\*), *Production, Planning and Control* (3\*), *International Journal of Information Management* (2\*), *Journal of Cleaner Production* (2\*), *Journal of Intellectual Capital* (2\*), *Energy Policy* (2\*), *Maritime Policy and Management* (2\*) and *Mediterranean Accountancy Research* (1\*). She is Editorial Board Member of international journals (e.g. *Journal of Knowledge Management*, *Journal of Intellectual Capital*, *Environment, Development and Sustainability*, *Asia-Pacific Journal of Business Administration* and *Frontier in AI – AI in Business*). She is Peer Reviewer for international journals edited by Elsevier, Emerald, Taylor & Francis, MDPI, Springer. She has been visiting fellow of UCL Quantitative and Applied Spatial Economic Research Laboratory (QASER) at University College London (UK). Her name is listed in the World Scientist and University Rankings 2022. She ranked in Business Administration category: #1 in University of Naples Parthenope and #69 in Italy. Assunta Di Vaio is the corresponding author and can be contacted at: [susy.divaio@uniparthenope.it](mailto:susy.divaio@uniparthenope.it)

---

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgrouppublishing.com/licensing/reprints.htm](http://www.emeraldgrouppublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)