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The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis

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ABSTRACT

Drawing on the resource-based view (RBV) of the firm and the ecological modernization theory (EMT), the current study examines the mediating effect of green innovation (GI) between green manufacturing practices (GMP) and corporate sustainable performance (CSP). In addition, it investigates the moderating effect of green organizational culture (GOC) on the relationship between GMP and GI. To test the hypothesized model, the data was collected from 328 Saudi manufacturing SMEs and analyzed using the hierarchical regression analysis in SPSS. The empirical results confirmed the effect of GMP on GI, which in turn, has an effect on CSP. The results also confirmed the positive effect of GMP on CSP through GI, which is enhanced by the presence of GOC. Thus, this study expands our understanding of the GMP-CSP relationship, its potential mechanism, and its conditional effect. This study has valuable contributions to the sustainability and green literature, and it has managerial implications for firms seeking to develop effective sustainable performance.

1. Introduction

Environmental issues have become more critical and have been gaining an increasing scholarly attention not only in developed countries but in developing countries as well (Shi et al., 2021). This increasing importance is due to its detrimental effects on the countries' economic status and national strategies (Tseng et al., 2013). Moreover, preserving natural habitats has recently become a serious issue. These critical environmental issues urge manufacturing firms to comply with environmentally friendly measures. Specifically, manufacturing firms have been working so hard towards reducing waste and making their manufacturing processes cleaner and greener, which results in better organizational performance (Al-Swidi and Saleh, 2021). According to Baah et al. (2021), an in-depth view of environmental manufacturing, termed "green manufacturing" in this study, is a crucial weapon for achieving superior performance in today's business environments. Green manufacturing practices (GMP) are defined as "cost-efficient and unified methods utilized to reduce or eliminate all waste streams related to the design, manufacturing, and disposal of waste products and materials" (Andaregie and Astatkie, 2021, 2).

According to the ideology of cleaner manufacturing, firms will save the environment and reap economic rewards by preventing pollution (Gärdström and Norrthon, 1994). Related to this, numerous firms in many nations have either adopted GMP or expressed a desire to do so (Moldavska and Welo, 2017). For instance, "6R" practices, including "reduce, reuse, recover, redesign, remanufacture, and recycle" and lean manufacturing practices have been adopted by manufacturers as practices of green manufacturing (GM; Karuppiah et al., 2020). The current stream of research on sustainability emphasizes that corporations embrace GMP in response to societal and legal constraints (Rehman et al., 2016). Another stream of research demonstrates that being pro-environmental has many advantages (Cabral and Dhar, 2019; Zameer et al., 2020), including assisting in the increase of productivity (Evans and Lindsay, 2002), minimizing costs (Rusinko, 2007), environmental protection and consolidating a positive perception of the firm (Qu et al., 2021), and improving long-term financial performance (Zaid

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et al., 2018). From a Resource-Based View (RBV), a firm that embraces environmentally friendly practices like GMP creates a competitive position for itself and, as a result, improves corporate sustainable performance (CSP) (Afum et al., 2020a). Principally, GMP can help to decrease the environmental effect of manufacturing practices and activities without sacrificing product quality or reliability or increasing production costs (Shang et al., 2010), ensuring overall economic profit (Hens et al., 2018).

Despite the importance of GMP for environmentally sustainable manufacturing of products, some firms have real problems on how to implement those green practices across different industries to attain sustainability. Prior research has considered the GMP as an integral portion of enhancing sustainability through various innovation-based capabilities to enhance CSP (e.g., Sezen and Cankaya, 2013). However, green innovation (GI) is deemed by some researchers as the mechanism that translate the effect of GMP on the CSP (Waheed et al., 2020). According to Ecological Modernization Theory (EMT), green management acts as an innovation driver for businesses to incorporate environmental concerns into their operations (Huang and Li, 2015). In that direction, Abbas and Sağsan (2019) have highlighted the importance of GI as a key determinant of sustainability. Moreover, prior research has established that stakeholders exert pressure on firms to invest in GMP as it affects GI (e.g., Rehman et al., 2016). That is, companies would not be able to achieve CSP by investing in institutionalizing GMP unless they created GI capabilities to sustain this business direction.

Numerous efforts have been made regarding the adoption of GMP in large and well-established firms, mainly in the food (Ahmad and Wong, 2019), auto (Gandhi et al., 2018), and chemical industries (Shohan et al., 2020), while very few studies have looked at GMP in SMEs (Ghadimi et al., 2021). Overall, large firms are more obliged than SMEs to embrace GMP because they are more influential and have superior organizational management and financial stability (Seth et al., 2018). However, SMEs constitute a pertinent context for GMP research for a variety of reasons. One of the key causes is that SMEs are usually not knowledgeable of feasible GM best practices. This is related to a lack of extensive expertise, personnel, time, and funds (Al-Hakimi et al., 2022a; Ghadimi et al., 2021). Global competition and industrialization, on the other hand, compel SMEs to improve their organizational structures and implement environmentally conscious manufacturing methods, rules, and standards (Aboelmaged, 2018; Al-Hakimi et al., 2022b). While the implementation of GMP is important for both small and large firms, SMEs are relatively more hesitant to embrace GMP (Karuppiah et al., 2020; Tumpa et al., 2019), especially in developing countries (Baah et al., 2020). In Saudi Arabia, which is one of the most active developing countries in economic development in the Gulf region, the policies adopted by the government are in line with the growing need to protect the environment and to cope with its threats (Alwakid et al., 2021b). Saudi Arabia's economy is centered on oil, as its energy sector is entirely dependent on fossil fuels (Rahman and Khondaker, 2012). Thus, the country faces a unique dilemma with carbon dioxide emissions (Mosly, 2015). Therefore, the need for green practices adoption becomes more significant with time (Lotfi et al., 2018). In the Saudi Vision 2030, the government emphasizes that one of their action plans for a more sustainable and diversified economy is to promote environmentally friendly businesses and establish socially inclusive enterprises (Moshashai et al., 2020). With the Saudi Vision 2030, increasing expectations are put on enhancing sustainable development by lowering the country's reliance on oil and contributing to the global effort to reduce carbon dioxide emissions by 2030. By 2030, SMEs are expected to represent 35% of Saudi Arabia's GDP compared to the current percent (20%) (Delbeke and Lamas, 2021). Therefore, promoting green initiatives (such as GMP and GI) among SMEs are seen as the way forward towards sustainable development (Kingdom of Saudi Arabia, 2016). As such, to fill this gap, the current study investigates the impact of GMP on the CSP of SMEs in the context of a developing country such as Saudi Arabia.

To successfully transition towards GI by investing in GM, firms need to build a green organizational culture (GOC), which is a long-time-consuming process (Verrier et al., 2014). GOC could be viewed as "an organizational culture that considers environmental protection to be fundamental and a core value of the firm, integrated into their mission statement in such a way that a sense of environmental responsibility is internalized by each team member in the firm" (Qu et al., 2021, 9). Dissemination of GOC among employees can help management implement GMP effectively and achieve their high levels of innovation. Despite previous research has highlighted the critical role of GOC in successful implementation of GMP, there is a dearth of research, to the best of our knowledge, on the role of GOC in enhancing the impact of GMP on GI and, ultimately, CSP. As industrial firms' organizational culture varies (Morris et al., 1998), examining the moderating influence of GOC may explain the discrepancy in success or failure to achieve the goals of sustainability through GMP and GI and provide more accurate and generalizable results. Hence, the current study seeks to bridge this gap in the literature.

Based on the identified gaps in the prevailing literature, the present research makes numerous contributions. First, it fills the research gap by examining the mechanism by which GMP affects CSP. It is strongly believed that GMP would not be able to enhance the sustainable performance of any organization without building the capabilities of GI (Waheed et al., 2020). This study presents an important theoretical insight that has received little attention. In contrast to the research efforts of scholars who examined direct relationships (e.g., Roy and Khastagir, 2016) and the research work of Maruthi and Rashmi (2015), which focused on the tools and techniques associated with GM, this study contributes considerably to the GM literature by developing a model that investigates both direct and indirect effects between GMP, GI, and CSP. Second, this study explores the moderating effect of GOC on the GMP-CSP relationship. When examining the link between some practices and GI and CSP, the effect of some managerial factors such as GOC has not been given the deserved attention (Despeisse et al., 2012; Seth et al., 2016). This study, therefore, investigates whether GOC moderates the indirect link between GMP and CSP via GI. Such a moderated mediation effect has not been investigated earlier, and it is critical to enhance our conceptual realization of the GMP-CSP relationship. Third, this study focuses on SMEs in the context of a developing country such as Saudi Arabia when assessing the link between GMP and CSP. Despite the growing environmental concern about the environmental impacts of SMEs, the engagement of SMEs in GMP still requires more scholarly investigation (Andaregie and Astatkie, 2021), with most prior studies focusing on GMP related to large enterprises (Digalwar et al., 2017). This study is extraordinary since the Saudi Arabian SME sector is incomplete. Our selection of Saudi Arabia was motivated by the large growth in CO_2 emissions, robust economic growth, which were accompanied by structural changes and diversification of the economy. As Saudi Arabia is a major supplier of oil and gas to the world, it is the second largest source of carbon dioxide pollution in the Middle East after Iran and one of the top 10 most polluting nations (Alkhathlan and Javid, 2015; Omri et al., 2019). Additionally, ensuring environmental sustainability is one of the primary priorities of Saudi Vision 2030, which points out that sustaining environmental sustainability is crucial for future generations. Therefore, Saudi Arabia is a great context to investigate this issue, and academics and practitioners may find that the results are valuable for learning and decision-making purposes.

To sum up, this study, based on RBV and EMT, aims to:

1. Examine the influence of GMP on GI.
2. Examine the influence of GI on CSP.
3. Investigate the mediating effect of GI between GMP and CSP.
4. Examine the moderating effect of GOC on the GMP-GI relationship.
5. Examine the moderating effect of GOC on the GMP-CSP relationship via GI.

The remainder of this study is structured as follows: Section 2

provides a review of the literature. The following Sections 3, 4, and 5 reflect methodology, data analysis with results, and discussion, respectively. Finally, Section 6 includes the conclusion and future research directions.

2. Literature review

2.1. Theoretical foundation

Theoretically, this study integrated the resource-based view (RBV) of the firm and the ecological modernization theory (EMT) to examine the moderating effect of GOC on the GMP-CSP link via GI in the context of manufacturing SMEs in Saudi Arabia.

According to the resource-based view (RBV), organizations acquire competitive advantages depending upon how they exploit their strategic resources, which are rare, valuable, and difficult to imitate by the competitors in the market (Al-Hakimi et al., 2021a,b; Wernerfelt, 1984). The term "firm's resources" refers to all of the firm's assets, capabilities, organizational processes, firm qualities, and knowledge that it controls and that enable it to design and execute effective strategies (Barney, 1991). When we apply RBV to the GMP-CSP relationship, we view GMP as a crucial resource that meets the RBV's criteria for creating and supporting higher performance and competitive edge. GMP helps firms reduce or eliminate all waste streams related to the design, production, and disposal of waste products and materials. According to this reasoning, organizations that embrace environmentally friendly practices such as GMP carve out a competitive niche for themselves and thereby increase their CSP (Afum et al., 2020a). On the other hand, existing research indicates that leading enterprises in GI can achieve competitive advantages through product differentiation (e.g., reputation and green image) and low-cost manufacturing (e.g., lower cost of pollution prevention reduction and higher productivity of resources; Chang, 2011). Moreover, RBV also backs the adoption of GOC in firms, claiming that including green concern in a firm's culture enhances the firm's environmental performance and provides competitive advantages (Russo and Fouts, 1997; Rizvi and Garg, 2020). By providing helpful insights (Qu et al., 2021), GOC can help a firm make environmentally friendly alterations to its operations. GOC creates a greater sense among employees for environmental issues (Tariq et al., 2016). Employees will have a greater sense of responsibility for the environment, whether it is through product stewardship, pollution avoidance, or sustainable growth initiatives (Jabbour and Santos, 2008). Accordingly, we argue that GMP can assist firms in managing their natural environment more effectively and converting it into a competitive edge through GI.

Along with the RBV, we used EMT to argue that green management acts as an innovation tool for enterprises to incorporate environmental concerns into their operations (Jänicke, 2008; Zhu et al., 2012). GI can prepare firms for greater performance by addressing environmental risks and developing resources, leading to enhanced sustainability (Haden et al., 2009; Zhu and Sarkis, 2004). Cai and Zhou (2014) argue that GI not only improves competitiveness and complies with environmental standards, but also mitigates adverse environmental repercussions. EMT encourages firms to implement new scientific and technical practices that enhance GI (Huang and Li, 2015; Mol et al., 2020). Drawing upon EMT, we argue that the primary goal of GMP is to eliminate waste while concentrating on depleting natural resources towards the objectives of environmental management through GI for superior green firm performance (Huang and Li, 2015). A framework for RBV and EMT has been developed in order to treat the gap/limitation of failing to characterize the relationship among the current study variables.

2.2. Green manufacturing practices (GMP)

In the current business environment, firms' practice of GM has become critical, as GMP helps any firm, small or large, to understand what to do about its negative environmental implications and the consequent decrease in efficiency, increase in costs, and decrease in production (Hassan and Jaaron, 2021; Seth et al., 2018). GM activities focusing on waste minimization were started in the 1980s (Singh and Thakar, 2018). This was followed by a typical transition in GM from process-oriented to product-oriented manufacturing, with an emphasis on resource conservation, energy efficiency, and the development and use of recycled resources (Seliger et al., 2008). Regarding that, numerous countries have enacted environmental protection legislation and laws (Gungor and Gupta, 1999), which have influenced industries globally to become eco-friendly (Gupta et al., 2021). For instance, several European countries, such as Netherlands, Norway, Sweden, and Finland, have imposed a carbon tax as one of the operations-based policies to reduce CO_2 emissions (Lee et al., 2007). In China, the Chinese government has developed and implemented several regulations, including the "Circular Economy Promotion Law (2009)" and the "Cleaner Production Promotion Law (2003)" (Seth et al., 2018). In Nigeria, the government has enacted a set of laws related to the environment, including "Federal Environmental Protection Agency (1988)", "Environmental Protection (Pollution Abatement in Industries Generating Wastes) Regulations (1991)", and "National Environmental Protection (Effluent Limitations) Regulations (1991)" (Ambituuni et al., 2014).

GMP is accountable for generating environmentally friendly products that do not harm the environment during their production, usage, or destruction (Afum et al., 2020a). However, no product is completely green as it is a relative case. In general, the implementation of cleaner production and removal processes by industry in an effort to mitigate negative environmental implications is understood to be GMP (Binnemans et al., 2015; Karuppiah et al., 2020). In this regard, several studies have sought to identify best practices in the industry from different countries. For example, Govindan et al. (2015) identified reducing, recycling, and reusing as best GMP in a case study of rubber tires and tubes manufacturers in India. Similarly, Hui et al. (2001) identified the five best practices for assessing GM, where waste reduction, waste reuse, and recycling occupied the top three positions, followed by waste treatment and sustainable use of resources. In addition, Kannan et al. (2014, 432) found in their study of "green supply chain" practices in the Brazilian context that "reduce, reuse, and recycle or recover resources" reflect the most influential criteria. Indeed, Rusinko (2007) claims that "pollution prevention" practices are the best ones that directly affect the performance of firms in the environmental and economic spheres. Furthermore, Migdadi and Elzzqaibeh (2018), in their study of ISO 14001-certified companies in Jordan, indicated that the solid waste management pattern and hazard material management pattern, or hybrid pattern of both solid waste and hazard material, represent the best strategic patterns of GM. From this discussion, it is worth noting the inconsistency of results. While Rusinko's study dealt with the carpet industry, Govindan et al."s study focused on rubber tubes and tires firm. Therefore, the value of GMP may change from one industry to another.

GMP has been suggested as a solution for manufacturing industries to reduce unfavorable environmental impacts (Thanki et al., 2016). Despite the fact that the GMP has developed in the recent past, the status in the SME sector is very different. Adoption of GMP is absolutely crucial for SMEs in light of the fact that surviving in a global competitive environment without these practices has become increasingly challenging (Karuppiah et al., 2020). However, SMEs may face many barriers to GMP implementation, including a lack of data, technical skills, financial resources, and infrastructure (Mittal et al., 2013), as well as lax enforcement of environmental laws in some cases (Shi et al., 2008). The situation is even worse for SMEs in developing countries where there is inequality in the progress of GM between developing and developed countries.

In a developing country like Saudi Arabia, a recent study revealed that implementation of GMP in SMEs is still at an initial stage (Chien et al., 2022). Musaad O et al. (2020), in their study to identify barriers

that prevent the adoption of GMP in the context of SMEs in Saudi Arabia, concluded that the majority of the barriers are technical, market, economic, informational, political, and managerial in nature. Islam et al. (2017) also noted that top management's attitude and organizational culture, leadership, policies and strategies, product quality and supplier availability, financial and capacity barriers are the barriers to practicing green procurement in Saudi SMEs. Other scholars in this discussion argued that, in order to assure sustainability, firms must incorporate environmental practices into their strategy management of social responsibility activities, which has been regarded as a difficult process for firms (e.g., Pinto and Allui, 2020). In this regard, Razak (2015) claims that the notion of social responsibility in Saudi Arabia is still in its infancy compared to its global evolution, and there is a lack of clarity regarding the concept, its methods, and its implementation. Therefore, there is no uniform understanding of GMP among Saudi Arabia's SMEs (Chien et al., 2022). This lends support to Jamian et al. (2012), who asserted that, unlike large companies, SMEs in developing nations rarely implement GMP due to uncertainty surrounding the concept. Accordingly, the majority of manufacturing SME managers in developing nations view GMP as unclear and difficult to implement (Afum et al., 2020a). However, a study carried out by D'Souza and Taghian (2018) of 181 employees in Saudi SMEs revealed that the environmental initiatives taken by those firms lower their costs, giving them a competitive advantage. The authors also emphasized that there is a proactive move by SMEs in Saudi Arabia towards environmentalism, albeit with slow environmental progress. In fact, the government of Saudi Arabia is moving towards a green business environment (Alkhathlan and Javid, 2015). There are a number of policies under Saudi Arabia's 2030 vision that support economic and social progress (Alwakid et al., 2021b). Saudi Arabia's policies are in line with the growing need to protect the environment and deal with its threats. According to the UN High-Level Political Forum's (2018) report on "*Transformation towards sustainable and resilient societies*", Saudi Arabia encourages firms to adopt GMP through the offer of awards, an example being the Saudi Arabia Environmental Management Award.

Within this debate, some researchers suggest that regulatory stakeholders and organizational stakeholders have occupied key roles regarding the adoption of environmental practices due to their immense impact on the survival of the firm (Eesley and Lenox, 2006). According to Baah et al. (2020, 2021), organizational stakeholder pressures motivate proactive environmental practices, in contrast to reactive environmental practices spurred by regulatory stakeholder pressures. In the context of Saudi Arabia, a study by Mariotti et al. (2014) revealed that firms adopt voluntarily "ISO 14001" certification for a number of motives, such as improving the firm's image, making its business more efficient, reducing waste, and ensuring that key stakeholders are happy. In their study, the authors argue that Saudi enterprises may see the certification as a financial matter, with little regard for strengthening their internal operations or environmental standards. Mostly, legislation, organizational style, innovation, eco-knowledge, business environment, society impacts as well as financial incentives act as the drivers that motivate the adoption of GMP in SMEs (Ghazilla et al., 2015).

2.3. Corporate sustainable performance (CSP)

From a business perspective, sustainability represents the appropriate mix of environmental, social, and economic aspects (Dey et al., 2020). CSP reflects the long-term competitive advantage that is represented in the financial returns that firms achieve by taking into account their environmental and social impacts without sacrificing the needs of stakeholders (Huo et al., 2019). In this sense, CSP is measured by three critical dimensions (social, environmental, and economic), which are adopted in this study. Economic performance is measured in operational and financial terms. Operationally, it relates to the ability of manufacturers to cut input prices, energy usage, and waste treatment and disposal (Afum et al., 2020b). Financially, it is assessed by market share, profitability, and ROI (Flynn et al., 2010; Yang et al., 2018). Environmental performance is associated with manufacturing firms' ability to energy-save, waste minimize, and decrease the consumption of harmful inputs (Amui et al., 2017; Han and Huo, 2020; Yusuf et al., 2013). Social performance assesses the extent to which firms contribute to society beyond economic interests (Huo et al., 2019). It shows the outcomes of adopting CSR towards multiple stakeholders (Afum et al., 2020b; Turban and Greening, 1997). Social sustainability assures that the industry makes a profit and that its actions do not damage society (Hussain et al., 2019).

2.4. Green innovation (GI)

GI is related to firms' capacity to develop new ideas, products, and processes that minimize the negative environmental impact of their operations (Ahuja et al., 2019; Al-Swidi et al., 2022). GI refers to "innovation in technologies, products, services, organizational structures or management modes adopted by enterprises to achieve sustainable development" (Li et al., 2018, 44). Globally, specialists concerned with environmental challenges are paying close attention to GI (Dangelico et al., 2017). GI may result in energy savings, pollution prevention, effective waste management, environmental management, and green product strategies; all of which are critical components in the context of putting GMP in place (Ahuja et al., 2019). Many researchers indicate that GI includes products and processes (Xie et al., 2019a). Green product innovation strives to alter or adapt product designs through the use of nontoxic compounds or biodegradable materials throughout the manufacturing process in order to decrease the environmental impact of disposal and enhance energy efficiency (Lin et al., 2013). As such, it requires a new perspective on the product's life cycle, from manufacturing to distribution, and from use to reuse or recycling/disposal, i.e., from "cradle to grave" (Xie et al., 2019a). More precisely, it encompasses enhancements to a product's durability or recyclability, raw material reduction, the use of ecologically friendly raw materials, and the elimination of dangerous materials (Kivimaa and Kautto, 2010). On the other hand, green process innovation seeks to minimize energy consumption throughout the manufacturing process or during the process of recycling trash (Amores-Salvadó et al., 2015). Specifically, it works to reduce lowering air or water emissions, reducing water use, increasing resource and energy efficiency, and transitioning away from fossil fuels toward bioenergy (Xie et al., 2019a).

Nowadays, numerous nations are transitioning their SMEs to adopt GI practices, which can help them solve their problems by getting past the barriers (Musaad O et al., 2020). In Saudi Arabia, to support GI policies, the government uses "Saudi Arabia Vision 2030" as a mechanism to stimulate the growth of SMEs, which play a crucial role in the economy. In addition, the Saudi Fast Growth 100, a policy mechanism that was recently utilized, was applied nationally and encourages innovation (Alamoudi and Bagaaifar, 2017). Therefore, SMEs with the greatest revenue growth in the country receive the necessary support (Alwakid et al., 2021a). In relation to this, green absorptive capacity, organizational support, and sustainable human capital are identified as the most important drivers of GI in the context of Saudi SMEs (Baeshen et al., 2021). However, a recent study by Chien et al., (2022) revealed 24 barriers, reflecting six main barriers: economic, market, political, informational, technical, and managerial, which stand in the way of adopting GI in SMEs in Saudi Arabia, and that the implementation of GI practices in Saudi SMEs is still in the initial stage.

2.5. Green organizational culture (GOC)

GOC represents a set of "assumptions, values, and symbols of the organization that reflect a desire or need to operate in an environmentally sustainable manner" (Asadi et al., 2020, 8). It is because of cultural shifts within organizations that employees are more concerned about environmental issues, which has a ripple effect throughout the firm.

GOC will thrive if management demonstrates a greater commitment to environmental conservation (Tariq et al., 2016; Qu et al., 2021). GOC acts as a catalyst for change by challenging the status quo (Wang, 2019). As a result, GOC can play a critical role in engaging the firm's staff in the effort to address environmental concerns. The formal framework of GOC derived from "environmental values" can offer helpful insights to a firm to make eco-friendly improvements to their operations (Leonidou et al., 2015). Indeed, a recent study by Alwakid et al. (2020) revealed that environmental measures, environmental awareness, and temporal orientation are cultural factors that contribute to an increase in green activities in the context of Saudi Arabia. Roscoe et al. (2019) argue that message credibility, leadership emphasis, employee empowerment, and peer involvement act as enablers of GOC. In contrast, Harris and Crane (2002) identify barriers to the spread of GOC, including organizational barriers (that is, the extent of coordination between functions, centralized decision-making, structural diversity, and the concentration of information systems) and cultural fragmentation (the number, size, and strength of subcultures).

2.6. Hypotheses development

2.6.1. Green manufacturing practices and green innovation

Research on GMP and GI is generating considerable interest among academicians, policymakers, and practitioners since it is still in its embryonic stages (Lin et al., 2013; Wang and Bernell, 2013). GMP has gained significant relevance for businesses, focusing on environmentally friendly product design, process design, and innovative technology creation (Tseng, 2013). Offering eco-friendly or GM products has become a crucial driver due to consumers' consciousness that eventually props firms that are environmentally responsible to achieve a competitive advantage in today's world (Deif, 2011; Singh et al., 2019). Proactive environmental practices are reflected in using eco-friendly technologies, adding green products to product lines, and reducing production costs by reducing raw material and energy usage and waste (Waheed et al., 2020). Green process innovation necessitates firms to minimize the costs of clean manufacturing and reduce pollutant emissions, which are required to comply with environmental standards (Huang and Li, 2015). Innovations in products and processes eventually help enhance market share and competitive efficiency (Teixeira et al., 2012). To maintain a competitive edge, businesses must incorporate green capabilities by following GMP (Pampanelli et al., 2014; Xie et al., 2019b). Firms can attain GI objectives by adopting environmental management practices and systems (Qi et al., 2010; Sáez-Martínez et al., 2016), such as GMP. In this regard, Roy and Khastagir (2016) argued that GM was related to enhanced environmental performance for the Indian petrochemical industry, contributing to improved business sustainability by way of improved process and product advancements. The authors argued that GMP has a favorable effect on a firm's capability to innovate in a green manner. In China, Waheed et al. (2020) concluded in their study that GMP positively affects GI practices. In a related development, Yousaf (2021) found that GMP improves the GI mechanism in Pakistani SMEs. Depending on the above discussion and theoretical basis, we propose the following:

H1. GMP is positively associated with GI.

2.6.2. Green innovation and corporate sustainable performance

GI is one of the main tools used by organizations to eliminate or decrease the harmful environmental influence of their manufacturing operations (Fernando et al., 2019; Lin et al., 2014; Takalo and Tooranloo, 2021). Aside from general innovation concerning the substance of change in a neutral and all-directional manner, GI focuses on innovation that promotes sustainability while contributing to efforts to reduce environmental burdens (Li et al., 2018). GI reflects the progress in products, processes, technology, and management structures that reduce resource use, waste, and pollution (Li et al., 2017). According to Xie et al. (2019a), GI not only improves existing products or processes and mitigates the negative impact of firm activities, but it also represents a critical success element for CSP due to the increased flexibility and performance enabled by employees' knowledge resources (Lopes et al., 2017) and sophisticated techniques (Schaltegger et al., 2012).

Indeed, GI in products and processes not only mitigates negative environmental implications but also boosts enterprises' competitiveness (Presley et al., 2007). Furthermore, firms could incarnate the green concept into their products and processes in an innovative way to distinguish their products from competitors (Sarkar et al., 2022; Zailani et al., 2015). The application of innovative and environmentally friendly practices offers two advantages to the industry, including commercial advantages for firms that manufacture eco-friendly products and enhances the economic gains that can boost competitiveness (Albort-Morant et al., 2016). Firms that make significant investments in GI can reduce manufacturing waste and boost productivity to offset environmental expenses (Huang and Li, 2015). On the other hand, GI enables businesses to meet environmental protection requirements while avoiding regulatory objections or penalties (Chang, 2011). Thus, GI is positively associated with environmental performance (Huang and Li, 2015). Previous research has demonstrated that businesses must be vigilant about GI and employ eco-friendly technologies that demonstrate efficient resource consumption while evolving environmental practices (e.g., Galdeano-Gómez et al., 2013). Additionally, earlier studies related to GI have identified environmental performance as the most important outcome (e.g., Sharma et al., 2021; Singh et al., 2020; Weng et al., 2015). According to Asadi et al. (2020), Shahzad et al. (2020), and Zailani et al. (2015), it can be argued that GI influences CSP through its dimensions (environmental, social, and economic). Accordingly, the following link is proposed to be empirically examined:

H2. GI is positively associated with CSP.

2.6.3. Mediating of green innovation

The current study also tries to investigate whether GMP has a direct effect on CSP and whether GI mediates that effect. GMP is a leading driver of GI improvement (Waheed et al., 2020), and is adept at exploring new directions for CSP (Abualfaraa et al., 2020). The relationship between GMP and CSP appears when a firm adopts and utilizes green resources for innovation (Sezen and Cankaya, 2013). Recent literature has also indicated that GMP directly and positively affects CSP (e.g., Afum et al., 2020b). Based on the experiences of manufacturing SMEs that had achieved ISO 14001 certification, Burke and Gaughran (2007) developed a framework for sustainability through GMP. Furthermore, GI is a vital element for business sustainability (Nidumolu et al., 2009) since it allows for greater flexibility through the use of sophisticated technics (Hansen and Schaltegger, 2016). According to Waheed et al. (2020), GI may support enterprises to gain a competitive edge through the use of GMP, which eventually may lead to achieving sustainability in the manufacturing operations. Further, Shahzad et al. (2020) found that GI acts as a mediator in the link of the knowledge management process to CSP. Given the above, GI can have a role in the relationship of GMP to CSP. Therefore, the following hypotheses are articulated:

H3. GMP is positively associated with CSP.

H4. GI mediates the GMP- CSP relationship.

2.6.4. Moderating effect of green organizational culture

Sustainability is crucial for firms that make trade-offs among social, environmental, and economic performance (Pislaru et al., 2019). Waheed et al. (2020) have argued that GMP significantly affects GI. Indeed, Abualfaraa et al. (2020) claim that in order to succeed in practicing GM, firms must not only have access to benchmark sustainability metrics, but they must also take into account all relevant operational, cultural, and business prospects. According to Welford (1995),

the shift in a firm's approach toward sustainability is highly dependent on its culture. Organizations should boost consciousness of the environment and GMP in order to improve their image (Li et al., 2020). Regarding that, Verrier et al. (2014) highlighted the importance of culture in successfully implementing GMP. Abdul-Rashid et al. (2017) mentioned that the motivation for organizations to implement a variety of environmental initiatives is tied to their GOC.

GOC can enhance an organization's pro-environment strategy to GI (Wang, 2019). Jabbour and de Sousa Jabbour (2016) also indicate that a firm's culture serves as a catalyst in building novel organizational manners for sustainable manufacturing. GOC generates motivation for employees to adopt sustainable practices (Schein, 1984). In SME's context, Ghazilla et al. (2015) mentioned that culture is one of the vital drivers that motivate the implementation of GMP. In this regard, scholars argue that GOC values drive firms to include green value into their processes in order to develop eco-friendly products (Leonidou et al., 2015). Thus, it is expected that firms having a powerful GOC will find it simple to transform GMP to improve GI. Accordingly, the following link is proposed:

H5. GOC moderates the GMP-GI relationship so that it is stronger for high GOC.

2.6.5. Moderated mediation effect of green organizational culture

Organizational culture is one of the most crucial success elements in attaining CSP through the use of the green approach (King and Lenox, 2001). Ng et al. (2015) stated that GOC adoption is critical to implementing the green approach and obtaining sustainable results. Firms with GOC can effectively practice GM (Ghazilla et al., 2015), enhancing GI, which not only minimizes production waste and environmental pollution but also strengthens the firm's reputation and green image (Michaelis et al., 2018). These firms' managers, who have GOC, are more likely to execute environmental protection practices (such as GMP) to enhance GI. Furthermore, GOC instills a sense of responsibility for environmental preservation in personnel. Thus, if a firm is capable of addressing environmental challenges, GOC will motivate staff to safeguard the environment, as the evidence demonstrates that GOC increases employees' environmental stewardship behavior (Chen et al., 2012; Gürlek and Tuna, 2018; Qu et al., 2021). H1 suggests an association between GMP and GI. H5 assumes that GOC moderates the GMP-GI relationship. Considering these results and hypotheses together (as shown in Fig. 1), we proposed a moderated mediation based on the recommendations of Muller et al. (2005), as follows:

H6. GOC moderates the indirect relationship between GMP and CSP via GI so that it is strong when GOC is high.

The conceptual model displayed in Fig. 1 connects the hypotheses that have been generated and indicates how the research has been conceptualized.

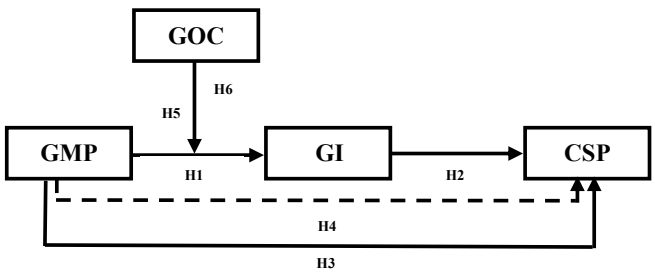

Fig. 1. The conceptual model.

3. Methodology

3.1. An overview of the saudi economy

The Saudi Arabian economy is the largest free market economy in the Middle East and North Africa region, where it constitutes 25% of the overall Arab GDP, and 25% of the world's oil reserves (Al-Subaie et al., 2020). Saudi Arabia's national income is primarily dependent on oil revenues, so it can be said that the price of oil influences economic growth in Saudi Arabia (Albassam, 2015). According to AlArjani et al., (2021), Saudi Arabia has nine sectors that contribute to GDP, with oil dominating the mining sector at 46% (see Fig. 2), with a negligible employment rate of 2% (see Fig. 3).

3.2. Sample and procedure

To achieve the objectives of the present work, a quantitative approach was used with primary data collected from manufacturing SMEs in Saudi Arabia, specifically in Makkah, Riyadh, and the West region, which have the greatest proportion of the country's SMEs in all sectors. In the Saudi context, manufacturing enterprises are classified on the basis of number of employees and annual revenue. According to the Saudi Industrial Development Fund (SIDF), micro-sized enterprises have 1–2 employees and an annual revenue of less than 27,000 USD. Mostly micro enterprises are cottage and handicraft type industries and their negative effect on environment is negligible. Therefore, micro industry from this study has been excluded. Small-enterprises have between 3 and 49 employees and annual revenues range between 27,000 and 1.3 million USD, while medium-enterprises have between 50 and 200 employees and an annual revenue range between 1.3 and 13.3 million USD (Jeddah Chamber of Commerce and Industry, 2016). As per the Jeddah Chamber of Commerce and Industry's (2016) report, the contribution of SMEs to GDP stands at 33% and employs nearly 25% of Saudi Arabia's labor force. Within Saudi Arabia, according to the World Bank estimates, self-employment, a proxy for employment in the unorganized sector, constitutes 3.8% of total employment (Chen et al., 2017; Gatti et al., 2014). SMEs have a strong presence in Saudi Arabia as a consequence of the region's broader economic policy to diversify away from the oil sector. As shown in Fig. 4, 47% of SMEs are in the trade and construction sector, followed by 10% in the manufacturing sector, according to Monsha'at (2022).

Depending on the database of the "Jeddah Chamber of Commerce and Industry" (which contains the contact information of the enterprises), the sample of SMEs from different manufacturing sectors in Saudi Arabia was drawn according to simple random sampling. In total, there are around 5,820 manufacturing SMEs (Jeddah Chamber of Commerce and Industry, 2018). The sample size of 360 SMEs was determined as a minimum to represent the study population according to the equation developed by Krejcie and Morgan (1970), shown below.

$$n = \frac{x^2\, NP(1-P)}{e^2\,(N-1) + x^2\, P\,(1-P)}$$

Where x^2 is the Chi square table value for "one degree of freedom", N is "the population size", P is "the population proportion", and e is "the accuracy degree".

To minimize sample size error and address the issue of non-response, the sample size was doubled to 720 (Hair et al., 2012). Subsequently, firms were contacted via telephone to explain the objective of the study, identify the lead respondent with knowledge of GMP and GI, and confirm their consent to participate. 720 questionnaires were distributed to the selected respondents by e-mail. Out of 720, the researchers received 328 useable responses (with a rate response of 46 percent). Based on the sample-to-variable ratio of 20:1 as a "bare minimum requirement" for multiple or hierarchical regression analysis (Hair et al., 2018; Tabachnick and Fidell, 2013), 328 is an acceptable sample size for

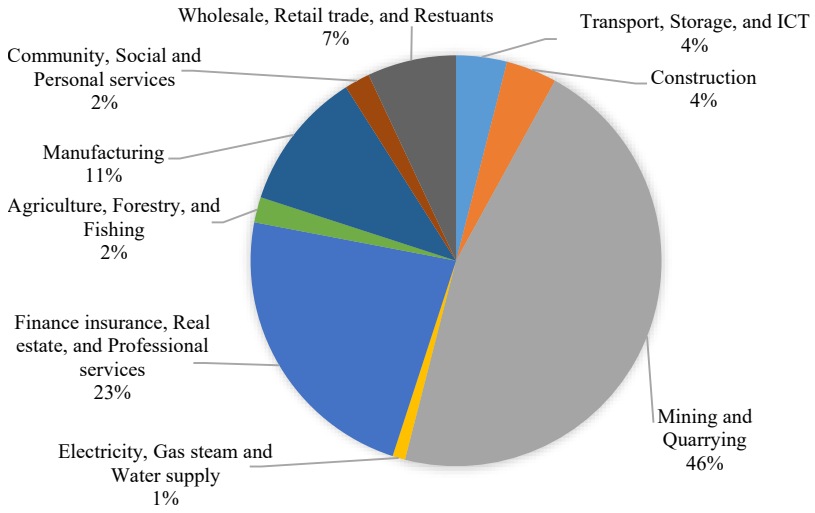

Fig. 2. GDP by sector.

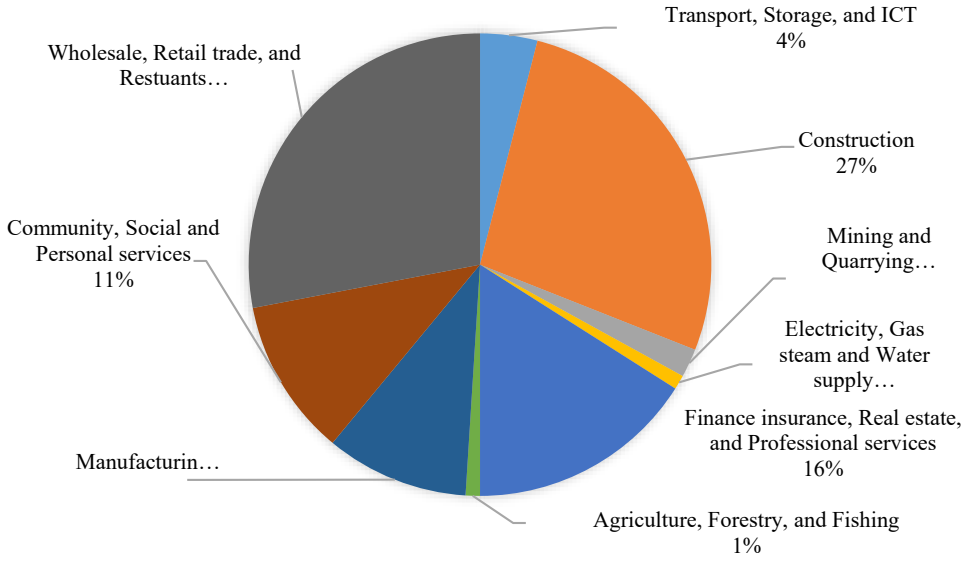

Fig. 3. Employment by sector.
[**Data source:** (General authority for statistics: Kingdom of Saudi Arabia, 2016)]

this study. Table 1 demonstrates the sample profile.

3.3. Measures

For this research, we used the questionnaire tool to collect the necessary data to measure the links in the proposed model. This study's metrics were derived from related prior research and "in-depth" interviews with 25 executives from the enterprises studied. Initially, an English version of the measures was developed. Subsequently, it was translated into Arabic and again into English to reduce concern about the validity of measures. Finally, based on comments acquired from "in-depth" interviews with managers, the phrasing of some items has been adjusted to ensure that all items are obvious and fit the business environment in Saudi Arabia.

Main variables: GMP was measured with 12 items adopted from Afum et al. (2020a) and Waheed et al. (2020). Likewise, CSP was measured with 8 items that evaluated its dimensions (environmental, social, economic) adopted from Huo et al. (2019). As for GI, it was measured with 6 items that evaluated its dimensions (product, process innovation) adopted from Wang (2019) and Xie et al. (2019a). GOC was measured with 5 items adopted and adapted from Wang (2019). The measure items are included in Appendix A.

Control variables: For this research, variables such as firm size, firm age, and job status in the firm were used as "control" variables. Control variables allow exogenous variables to be included in the model as being non-central in the research but theoretically important (Nielsen and Raswant, 2018).

4. Data analysis and results

4.1. Reliability and validity

Prior to testing the study's hypotheses in the conceptual model, some tests were conducted to guarantee consistency with the underlying assumptions identified for the covariance analyses. First, a logarithmic correction was employed to alter the distribution of the frequency of

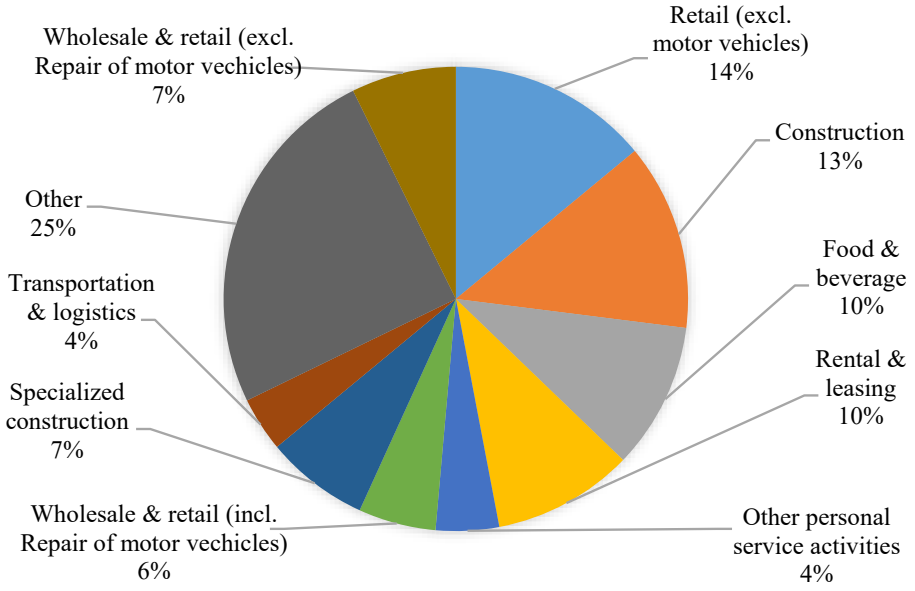

Fig. 4. SME distribution by sector for quarter1, 2022
[**Data source:** (Monsha'at, 2022)]

Table 1
Sample's profile.

Respondents	Frequency (%)	SMEs	Frequency (%)
Gender		Firm size	
Male	237 (72.26)	3-49 employees	181 (55.18)
Female	91 (27.74)	50-200 employees	147 (44.82)
Experience		Job status	
Less than 15	104 (31.71)	Owner	74 (22.6)
15 and above	224 (68.29)	Manager	254 (77.4)
Age		Firm age	60 (18.3)
20–29	7 (2.13)	Less than 20 years	268 (81.7)
30–39	104 (31.71)	20 years and above	
40–49	198 (60.36)		
50 and above	19 (5.8)		
Education			
Secondary and below	73 (22.26)		
Undergraduate	212 (64.63)		
Postgraduate	43 (13.11)		

Table 2
Convergent validity.

Construct	Item	Loading	α	CR	AVE
Green Manufacturing Practices (GMP)			**0.95**	**0.95**	**0.62**
	GMP 1	0.805			
	GMP 2	0.815			
	GMP 3	0.852			
	GMP 4	0.844			
	GMP 5	0.835			
	GMP 6	0.738			
	GMP 7	0.740			
	GMP 8	0.746			
	GMP 9	0.765			
	GMP 10	0.776			
	GMP 11	0.779			
	GMP 12	0.758			
Green Innovation (GI)			**0.90**	**0.90**	**0.60**
	GI1	0.689			
	GI2	0.716			
	GI3	0.723			
	GI4	0.824			
	GI5	0.857			
	GI6	0.834			
Green Organizational Culture (GOC)			**0.82**	**0.85**	**0.54**
	GOC1	0.717			
	GOC2	0.665			
	GOC3	0.858			
	GOC4	0.803			
	GOC5	0.600			
Corporate Sustainable Performance (CSP)			**0.90**	**0.91**	**0.57**
	CSP 1	0.664			
	CSP 2	0.856			
	CSP 3	0.850			
	CSP 4	0.851			
	CSP 5	0.839			
	CSP 6	0.600			
	CSP 7	0.642			
	CSP 8	0.709			

presenteeism, as advised by Tabachnick and Fidell (2013) and used by other authors (Côté et al., 2021; Gosselin et al., 2013).

Second, the scales' reliability and validity were assessed, and the findings are given in Table 2. The values of Cronbach alpha (α), composite reliability (CR), and average variance extracted (AVE) met the minimum cut-off of 0.70, 0.70, and 0.50, respectively, as suggested by Hair et al. (2012). Additionally, factor loading values were higher than 0.60 (Bagozzi and Yi, 1988). The AVE of two standardized constructs was above the squared correlation between the two constructs, showing discriminant validity (see Table 3) (Fornell and Larcker, 1981).

Third, Harman's single-factor test, which consisted of performing a preliminary factor analysis on all questions contained in the questionnaire, was used to check for the presence of a CMV issue (Podsakoff et al., 2012). A high effect of error variance can be considered when one factor appears from the analysis and/or when the variance explained by the first factor exceeds 50%. In this work, the analysis results demonstrated that the factor accounts for 26% of the total variance, i.e., there were no CMV issues related to the existing model.

Fourth, the "variance inflation factors" estimated using the various regression models were found to be of modest amplitude (between 1.071 and 1.188).

Finally, confirmatory factor analyses were done using AMOS version 24 to measure the proposed model fitness with data. A number of indicators were also employed, including Chi-square/df < 5 (Tabachnick and Fidell, 2013), the "Comparative Fit" Index (CFI), the "Goodness of Fit" Index (GFI), the "Tucker-Lewis" Index (TLI) above 0.9, and the

Table 3
Discriminant validity.

Variables	N	Mean	S.D.	GMP	GI	GOC	CSP
	Statistic	Statistic	Statistic				
GMP	328	3.4802	.51419	**.787**			
GI	328	3.4914	.53075	.224***	**.775**		
GOC	328	3.3037	.49977	.187***	.215***	**.735**	
CSP	328	3.5053	.52222	.048	.396***	.320***	**.755**

***p < 0.01.

"Root Mean Square Error Approximation" (RMSEA) is less than 0.08 (Hair et al., 2012). Model fit indicators were: (CMIN/DF = 2.767; p = 0.00; GFI = 0.843; CFI = 0.927; TLI = 0.914; and RMSEA = 0.074), indicating acceptable measurement model fit (Byrne, 2013).

4.2. Hypotheses testing

To test the hypotheses of this research, including the effect of moderated mediation, the PROCESS macro (model 7) was employed (Hayes, 2013), with similar analysis and presentation followed in PROCESS (e.g., Iqbal et al., 2020). As indicated in Table 4, the findings support the first premise that GMP has a positive effect on GI (H1). The results also reveal that GI has a positive effect on CSP, which supports H2. To verify mediation in H4, we followed the procedures of Awang (2016), where the findings demonstrated that GI mediates the GMP-CSP association. While the indirect effect in the GMP-CSP link was significant, which supports H4, the direct effect was non-significant (b = −0.04, P > 0.10), implying that there is full mediation of GI in the GMP-CSP relationship, and thus H3 is not supported (see Fig. 5).

Table 4
Results from the model 7 of PROCESS.

Path	Mode	Indirect effect β(BootSE)	Direct effect β(SE)	Bootstrap (LLCI, ULCI)	Results
GMP-GI			.193 (.055) ***	(.085, .303)	H1: *Supported*
GI-CSP			.40 (.051) ***	(.30, .500)	H2: *Supported*
GMP-CSP			−.04 (.53)	(-.14, 061)	H3: *Not supported*
GMP*GOC-GI			.357 (.118) ***	(.126, .590)	H5: *Supported*
Conditional effects of GOC	Low (−.4998)		.015 (.08) ***	(-.14, .17)	
	Medium (.00)		.19(.05) ***	(.08, .30)	
	High (.4998)		.37(.08) ***	(.21, .53)	
Conditional indirect effect (through GI) on CSP by three levels of GOC	Low (−.4998)	.006(.033)		(-.06, .07)	H4: *Supported*
	Medium (.00)	.078(.024)		(.034, .13)	
	High (.4998)	.150(.039)		(.077, .23)	
Index of Moderated mediation		.144(.054)		(.046, .257)	H6: *Supported*
Control paths			β		
Firm age	GI		−.021		
Firm size	GI		.009		
Job status	GI		.075		
Firm age	CSP		−.121*		
Firm size	CSP		.002		
Job status	CSP		−.128**		

Note: *p < 0.10; **p < 0.05; ***p < 0.01.
GMP: green manufacturing practices; GI: green innovation; GOC: green organizational culture; CSP: corporate sustainable performance.

The results indicate that GMP has a considerable indirect positive effect on CSP via GI mediation, which means that SMEs will achieve sustainability if GMP is implemented in tandem with GI. Our findings also reveal that GOC moderates the GMP-GI relationship (H5) and supports a significant moderated mediation effect (H6). Fig. 6 demonstrates the moderating effect of GOC, with the line rising more sharply with a high level of GOC; therefore, H5 is supported. This result demonstrates that the effect of high GOC is evidenced by greater levels of GI, specifically, when enterprises practice a high level of GMP.

There is moderated mediation of GOC if GMP has an indirect effect on CSP via GI regarding the various levels of GOC (H6). It should be highlighted that the indirect influence of GMP on CSP via GI varies depending on whether the GOC in the corporate environment is low, medium, or high. To assess the effect of moderated-mediation on the GMP-CSP relationship, we followed Hayes (2018) instructions. Low and high GOC were determined based on one 1SD (standard deviation) below and above its mean score. As indicated in Table 4, the conditional indirect influence of GI is higher at the higher level of GOC (0.150) and significantly weaker at the lower level of GOC (0.006). Therefore, H6 is supported.

Considering the contextual effect, we divided the sampled firms into age and size categories. In contrast to firm size, introducing firm age as a control variable yielded a significant outcome for CSP. This suggests that the level of CSP differs between old and new enterprises, as old firms usually reflect greater viability than start-ups, and also differs according to the perceptions of those firms' owners and managers regarding the importance of green initiatives towards sustainability, which may be the reason for these important results.

5. Discussion

To date, the current study is the first empirical work that examines the link between GMP, GI, GOC and CSP. It is important to note that most of the hypotheses have been supported by the results. The current results contribute to the literature on sustainability by using an empirical approach, which also yields theoretical and practical implications and new opens potential research areas for the future. The results are elaborated as follows.

The analysis of GMP impact on GI shows a significant result. This empirical evidence is the same as in previous research, which also found that cleaner production practices are positively related to GI (Severo et al., 2017). This also relates to Yousaf's (2021) finding, who identified the same relationship between GMP and GI in the SMEs context. This significant finding implies that the sampled SMEs in Saudi Arabia can boost the mechanism of GI through implementing GMP.

As expected, the results showed that GI had a positive effect on CSP. The findings of this study are consistent with those of other studies that found the same positive correlation (e.g., Shahzad et al., 2020). This finding indicates that the development of GI contributes positively to the explanation of CSP. This conclusion lends empirical support to the EMT of green management as a mechanism for achieving a competitive edge (Huang and Li, 2015). This finding is similar to prior literature results that also support the positive relationship of GI with corporate

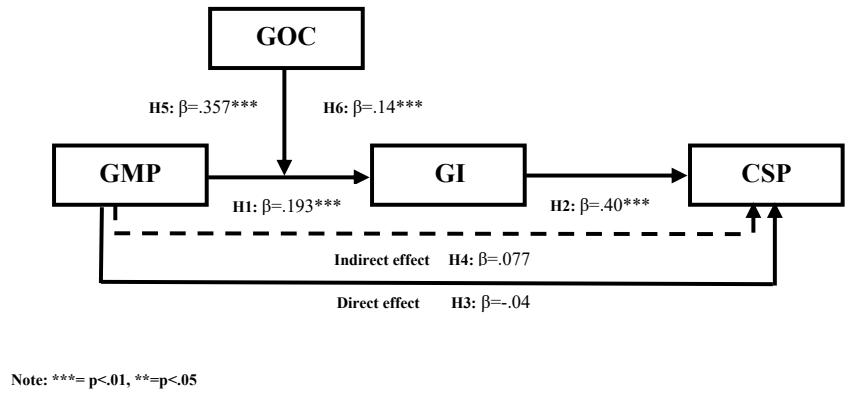

Fig. 5. Alternative model.

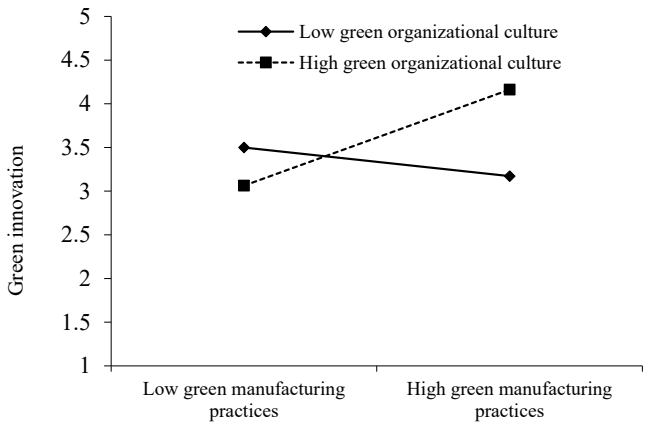

Fig. 6. Interaction graph of GOC and GMP.

sustainability (e.g., Sezen and Cankaya, 2013).

Additionally, the study's mediation analysis demonstrated that GI serves as a mediator in the GMP-CSP link. While the indirect effect of GMP on CSP was significant, the direct effect was also non-significant, implying that GI fully mediates the GMP-CSP relationship. Thus, the current study established the GI's mediating role and demonstrated that it is capable of fully mediating the link between GMP and CSP. Through GI, GMP can lead to increased production efficiency, decreased environmental and occupational safety costs, lower raw material costs, and an improved firm image. This is supported by Baah et al. (2021) that whether a firm adopts proactive or reactive GMP, these practices positively and significantly influence CSP.

Finally, the findings showed that GOC positively moderates the effect of GMP on GI and supports the moderated mediation effect. The results suggest GOC as a factor that affects the level of the influence of GMP on GI. GOC is the most critical element in implementing GMP. This finding corroborates those of Al-Swidi et al. (2021) and Welford (1995), who indicated that firm sustainability initiatives are contingent on the organizational culture in place. These results show that GOC is one of the important human success components in sustainable manufacturing. Additionally, our analysis indicates that GOC is necessary for fostering GI and any change that results from the adoption of GMP.

5.1. Theoretical implications

This study has many theoretical implications. First, the current body of research on CSP has focused on the direct impact of different factors and organizational strategies. Previous studies indicated that additional investigation is necessary to better grasp the essential mediating role of GI in the sustainable manufacturing practices-CSP link (Hami et al., 2015). This study identified GI as an important mediator between GMP and CSP, a relationship that has been limited previously (Hamann et al., 2017). The investigation of GI as a mediator in the suggested model offers a new theoretical perspective in the context of developing countries. This is because very few studies have explored the mechanisms through which GMP affects CSP (Afum et al., 2020a). GI serves as a facilitator for innovative products and processes that allow businesses to become eco-friendly. It is crucial in developing countries such as Saudi Arabia, where the natural environment has suffered significant harm as a result of inefficient manufacturing operations and waste management. Recently, the Saudi government has taken significant steps and invested heavily in promoting green practices through the development of green technology and related innovation (Vision 2030 report, 2016). The findings imply that the sampled SMEs are making sufficient use of GI to achieve CSP. As a result, this research contributes to the RBV and EMT in the context of developing countries by showing that GI is still an important element in CSP.

Second, this study adds to the knowledge by giving new insights into the conditions in which GMP affects CSP. The present work investigated an uncharted region and tried to close a research gap by empirically exploring the moderating role of GOC on the indirect effect of GMP on CSP via GI. GMP is a hot topic of study at the moment; however, still there is a lack of research that explores the link of GMP to GI and CSP with the moderation of GOC in a comprehensive model. As a result, these findings supplement the existing literature on CSP and extend the work of Russo and Fouts (1997). It is backed by the RBV, which believes that enterprises must be able to handle quickly and effectively shifting environmental challenges by generating novel resources (Wang, 2019).

Finally, this study also fills a literature gap by providing actual evidence from SMEs in the context of a developing country like Saudi Arabia, as the majority of the past research regarding GMP and CSP has primarily focused on developed countries within larger enterprises (Sarkis et al., 2010), as well as diverse contexts other than GMP and CSP throughout the world. Finally, this study contributes to advancing RBV and EMT in order to comprehend and clarify the CSP drives.

5.2. Practical implications

This study has practical implications for GM, pointing out how GMP and GI might improve CSP, especially in the light of societal, competitive, and regulatory pressures to embrace sustainable practices that meet economic, environmental, and social demands. First, the findings emphasize the importance of GMP and GI in the manufacturing industries for achieving CSP objectives. GMP instructs business leaders to pay attention to how much energy and resources their companies are putting into production and waste production, resulting in better CSP. Knowing that current green environmental standards and rapid

technological changes may pose significant challenges, our findings advise managers to embrace GMP. This study, on the other hand, encourages SME managers to pay attention to the delicate balance of nature by adopting GMP to promote their firms' capability of GI, which is very important for businesses in today's competitive world (Song et al., 2020). Moreover, the current results also show that GMP is just as important for SMEs as for large firms, implying that regardless of firm size, SMEs that implement GMP effectively are more likely to achieve CSP objectives. As a result, our study offers confidence to SMEs managers that they, too, may benefit from GMP in the same way that large firms do. The evidence presented in this study also shows that the positive influences of GMP are not limited to enterprises acting in developed countries, as firms in under-developed or developing countries that apply GMP effectively can achieve similar results as well.

Second, the finding regarding the full mediation influence of GI strategy is significant because mediation has been largely ignored in earlier research. This is a major result, as it has consequences for the GI strategy. It appears from the findings that firms' managers can have an impact on innovation by fostering environmental harm reduction practices that result in high-quality GI. For this to happen, managers must set an example of environmental stewardship. Managers must adhere to a set of agreed values in order to successfully innovate and adapt to dynamic environmental circumstances. In addition, it is essential to encourage creative thinking inside the firm, as it is a key driver of GI and plays a crucial role in improving CSP (Awan et al., 2019). This GI could be integrated into GMP that managers are extremely expected to follow.

Finally, this study demonstrates that GOC positively moderates the GMP–GI relationship towards CSP. If the link between GMP and GI is causal, then our results have substantial implications for management. Like Huffman and Klein (2013) and Harvey et al. (2013), the present study advocates instilling GOC between staff to help them embrace GMP. Researchers found that GMP provides a way for industrial firms' managers to enhance GI. Therefore, managers should develop a culture supporting environmental values in order to direct employees' energy toward attaining GI. Through GOC, managers can foster a shared value for environmentally friendly production practices in order to mitigate negative environmental influences (e.g., Jaffe et al., 2002). Motivated staff will develop an eco-friendly business culture (Ahuja et al., 2019), which often values the GI that leads to CSP. To make GOC a priority for a firm, it should select managers who are committed to environmental issues and represent the shared values of GOC that firms wish to promote. Under the present severe environmental legislation and environmental attitudes, managers should engage in environmentally friendly practices to expand their firms' market potential and so boost their green performance.

6. Conclusion and future research directions

The objective of this study was to explore how GMP contributes to CSP through GI, as well as investigate the moderating and moderation-mediating effects of GOC using cross-sectional survey data from the selected SMEs in Saudi Arabia. The empirical evidence revealed that the adoption of GMP has a significant and positive effect on GI, which in turn significantly affects CSP. Perhaps the most intriguing finding was the empirical evidence of the moderating effect of GOC on the GMP and GI along with its moderation-mediating impact on the GMP and CSP. In spite of the importance of these findings, it is still necessary to reconsider these findings in light of the limitations of the research. First, the current study merely explored the moderating influence of GOC on the indirect influence of GMP on CSP via GI in the context of Saudi Arabia. Future research, thus, may address other variables that may affect this relationship, such as leadership style. Second, the present study was conducted on only 328 SMEs, so the results are difficult to generalize. Future studies can expand the sample size by taking into account the differences associated with the adoption of GMP, GI, and GOC by firms, if any, according to their unique characteristics and thus generalizability of the results. Besides, future studies can consider micro, small, and medium-sized enterprises or large enterprises. In addition, it may be useful to test the current study model through a case study or focus on specific industries to identify whether there is any deviation in the conclusions drawn. Furthermore, future research can investigate whether firms' adoption of GM can either lower costs or help promote the brand through a case study. Finally, the context of this study was Saudi Arabia; future studies, hence, can replicate similar investigation in undeveloped and other developing countries or cross countries to be able to generalize results.

CRediT authorship contribution statement

Mohammed A. Al-Hakimi: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft. **Abdullah Kaid Al-Swidi:** Methodology, Visualization, Supervision. **Hamid Mahmood Gelaidan:** Supervision, Writing – review & editing. **Abdulalem Mohammed:** Methodology, Writing – review & editing.

Declaration of competing interest

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

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2022.134346.

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