Journal of Supply Chain Management System
9 (1) 2020, 31-49
http://publishingindia.com/jscms/

Translating Environmental Management Practices into Improved Environmental Performance via Green Organizational Culture: Insight from Ghanaian Manufacturing SMEs

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Abstract

The aim of this study is to examine the mediating role of green organizational culture between environmental management practices (EMPs) and environmental performance. The study collected data from 157 manufacturing firms and employed the Partial Least Square–Structural Equation Modeling as an analytical tool to test all hypothesized relationships. The results of the study indicated that EMPs (green manufacturing and green procurement) and green organizational culture are significant predictors of environmental performance. The study further showed that EMPs (green manufacturing and green procurement) have a significant positive effect on green organizational culture. It was also realized that green organizational culture plays a mediating role between EMPs and environmental performance. The study provides insight for managers to ensure that EMPs become a vital and permanent activity, thus becoming a cultural value which will be accepted and supported by all organizational members in the quest to achieve environmental performance goals.

Keywords: Environmental Management Practices, Green Manufacturing, Green Procurement, Green Organizational Culture, Environmental Performance

Introduction

In the last few decades, environmental sustainability has been a thematic area that keeps attracting urgent research interest among practitioners as well as academicians within national and global domains. The urgency attached to this research area is attributed to the persistent environmental imbalances and catastrophes such as ozone layer depletion causing climate change, environmental pollution, rapid resource depletion, and global warming. Operational activities of manufacturers have often been labeled as one of the major causative factors to global environmental crisis (Wong et al., 2013). A report by Global Environmental Outlook (GEO 4) in 2007 highlighted that activities from the manufacturing industry increased global temperature by 0.74% via the production of greenhouse gases (GHGs). This has presented peculiar challenges for firms within the manufacturing sector to modify their conventional operations to include environmental management (Buffa, Franch & Rizio, 2018). In effect, manufacturers (including those in developing countries such as Ghana) have reactively started managing their supply chains in a responsible manner via the adoption of environmental management practices (EMPs) (Gyasi-Mensah & Xuhua, 2018).

EMPs can be viewed as a bundle of environmental initiatives employed by firms to monitor, reduce, and manage the adverse impact of their respective operational activities on the natural environment (ecosystem). Adopting EMPs does not only ensure sanity within a firm's supply chain (Bour, Asafo & Kwarteng, 2019) but also shows the level of seriousness a firm attaches to environmental issues, in order to demonstrate the same to customers, the community, and other relevant stakeholders such as regulatory bodies (Fei-Baffoe et al., 2013). Nonetheless, EMPs significantly improve firm's environmental performance via reducing pollution, decreasing the consumption of hazardous waste or toxic material, and reducing the rate of recurrence of environmental accidents, thereby minimizing the negative effects of firms' operations. In relation to this claim, several studies (Ulubeyli, 2013; Yu & Ramanathan, 2016) have confirmed that the adoption of EMPs leads to an overall improvement of firm's environmental performance in diverse ways.

Comparable to other developing countries, the state of Ghana's environment is still gloomy despite the relentless efforts and commitment by stakeholders toward environmental protection and sustainability. For example, taking the Environmental Performance Index (EPI) as a benchmark, Ghana was scored at 51.3% and ranked 109th out of 163 countries in 2010. In a related report in 2014, Ghana's EPI declined to 32.1% and the country was ranked 151 out of 178 countries (United Nations Industrial Development Organization, 2015). The same report further highlighted that Ghana lost approximately 70 positions in global EPI rankings from 2006 to 2014. These statistics shows the relatively porous nature of the country's environmental situation. Paradoxically, the manufacturing sector which is perceived as the catalyst for economic growth has often been blamed for the country's environmental problems. Confirming this, Ghana's manufacturing sector has been found to be the leading contributor of emitting GHGs (UNEP, 2013). These emissions do not only pollute the environment but also endanger the health of both workers and the public.

A large body of research on EMPs has overwhelmingly focused on advanced countries compared to under developed economies such as Ghana. For instance, Nath and Ramanathan (2016) investigated how the various aspects of EMPs (strategic, tactical, and operational) of UK manufacturing firms affect both pollution control and pollution prevention (environmental technology portfolios: ETPs). Lucas and Noordewier (2016) undertook a study in the United States by examining the moderating role of industry pollution-related factors on the relationship between EMPs and financial performance. Likewise, Chen, Ong and Hsu (2016) in sampling multinational construction firms from developed countries examined the relationship between EMPs and financial performance. It is clear that most of these studies have had a different focus as far as EMPs is concerned. Thus, research is predominantly silent on the relative importance of green organizational culture in sustaining and achieving the goals of EMPs. Unlike other studies on environmental management, this study places emphasis on the need for manufacturing firms to develop a resolute green culture dedicated to ensure the continues integration of EMPs in order to improve environmental performance. The current research is rooted in the premise that "the success of EMPs as a sustainability drive is embedded in proper organizational culture" (Bakhsh Magsi et al., 2018). Hence, by collecting data from a developing country (Ghana), the researchers sought to fill this gap by examining the mediating role of green organizational culture in the relationship between EMPs (green manufacturing and green procurement) and environmental performance. This study specifically attempts to answer the following questions: a) Do EMPs significantly impact environmental performance? b) Do EMPs significantly impact green organizational culture? c) Does green organizational culture mediate the relationship between EMPs and environmental performance?

In this study, the researchers focused their attention on small and medium enterprises (SMEs) in Ghana's manufacturing sector because the concept and status of implementing of EMPs is still in its infancy among industry practitioners and managers. Secondly, anecdotal and empirical evidences suggest that compared to large or multinational firms, SMEs in developing countries are less likely to adopt effective EMPs because they believe that their economic and operational activities have less significant adverse impact on the natural environment (Brammer, Hoejmose & Marchant, 2012). However, this is not the case in the Ghanaian setting because it has been reported that manufacturing operations among SMEs have over the years been releasing large amounts of toxic or hazardous substances, thereby negatively affecting the environment and quality of life (Gyasi-Mensah & Xuhua, 2018). Finally, flagship initiatives such as "One district One Factory" introduced by the Ghanaian government to speed up the rate of industrialization in the country support the vision of making the country a manufacturing hub in the African sub-region. With more factories being cited in the country, it means more pollution is likely to be emitted; hence, a study in this direction will be useful to both industry practitioners and managers.

The remainder of this paper is organized as follows. In the next section, we provide a theoretical foundation, develop hypotheses, and provide a research model that guides the study. We later proceed to describe the research methodology. This is followed by analyzing the data collected for the study and presentation of the results. We subsequently provide a detailed discussion of the results and finally provide conclusions, practical implications, and directions for future studies.

Theoretical Background, Hypotheses Development and Conceptual Model

Resource-Based View Theory

The researchers rely on the arguments of the resource-based view (RBV) theory to establish a link between the constructs (EMPs, green organizational culture, and environmental performance) under the study. The RBV (Barney, 1991) theory has expanded in recognition and its application in the field of supply chain management and logistics management. The theory posits that firms have resources that can be translated into strategic assets and, thus, a competitive advantage. However, in order to gain this competitive edge, the resources must be scarce, distinctive, non-substitutable, and extremely valuable. These resources and capabilities are difficult to imitate or very difficult to transfer because they are heterogeneously distributed or dispersed within firms. Thus, the RBV theory suggests that some firms have competitive edge over their rivals due to the possession of unique resources and capabilities. In this case, firms that have such unique resources and capabilities have the ability to respond quickly to external environmental pressures compared to rival firms that do not. Resources, according to this theory, are not only limited to tangible assets but also intangible assets.

In relating the RVB theory to the natural environment, it can be explained that adopting and implementing EMPs in a firm's operation serves as a complement to its resources and capabilities and further provides a leverage to increase performance (Darnall et al., 2008). Parallel to this, Richey, Montabon et al. (2007) revealed that firms increase their performance when they invest their resources in EMPs. From the organizational culture point of view, the RBV argues that firms gain a competitive advantage and improve their performance by prioritizing and preserving EMPs via top management support and propagating mission statements that focus on continues environmental improvement (Tatoglu, 2014). Green organizational culture can be one of the complementary and significant resources that firms can rely on to translate their EMPs into environmental performance (Schlegelmilch, Bohlen & Diamantopoulos, 1996).

EMPs in Ghanaian Context

In Ghana, the Environmental Management Protection Agency (EPA) regulates the operations of manufacturing firms. Thus, the EPA, established in 1994 via the Environmental Protection Act 490, provides a legal lens and framework that guides the activities of manufacturers regarding environmental protection. Another key legislation that regulates manufacturers on environmental issues is the Environmental Assessment and Regulations, LI 1652, promulgated in 1999. These laws mandate manufacturing firms to submit their environmental management plans or purported practices as a prerequisite for registration. The laws also mandate manufacturers to take responsibility of monitoring the emission of toxic waste (pollution) via undertaking a yearly environmental impact assessment and report the results to the EPA. It must, however, be highlighted that, despite the presence of these laws, there is a worrying situation regarding the environment due to the adverse impact of manufacturers operations. A report by Partnership for Action on Green Economy (PAGE, 2015) highlights that the EPA lacks a proper database on manufacturing firms that comply with their directives and laws. Consequently, most of the manufacturing firms fail to adhere strictly to EMPs (Bour et al., 2019). It is even highlighted that some manufacturing firms only submit their environmental plans and proposed practices to the EPA because it is a requirement for registration, but they are not necessarily interested in keeping faith with EMPs (Fei-Baffoe et al., 2013).

Concept of EMPs

The concept of EMPs has received significant amount of rich literature in an era where sustainable business practices are considered a necessity rather than a peripheral afterthought. Previous studies have consciously attempted to define and categorize EMPs in diverse ways. EMPs reflect the integration of environmental concerns and related practices in the management and operational activities of a firm with the aim of demonstrating to stakeholders that a firm cares about the environment and its protection therein (Paillé, Boiral & Chen 2013). It primarily focuses on the various actions adopted by a firm to alleviate the adverse impact of its operations on the natural environment. It also includes environmental reporting, adopting, and complying with ISO 14001 norms, implementation of environmental policies, and other sustainable practices.

Determining the scope of EMPs is relatively complex and inconclusive. Literature on environmental management has tried categorizing EMP from a multidimensional perspective. For instance, Gilley et al. (2000) classified EMPs into two basic operational practices: product development and environmentally conscious manufacturing. Gonzalez-Benito (2008) further classified EMPs into four distinct constructs: logistics processes, planning and organization, internal production management, and product design. Others studies (Montabon, Sroufe & Narasimhan 2007; Nath & Ramanathan, 2016) provide three generic scopes and dimensions, namely, strategic practices (involving coordinated planning and the implementation of control mechanisms established by top-level managers), tactical practices (involve initiatives or activities affecting structural changes in firms' operational systems such as change in plant capacity as well as change in production technology and equipment aimed at containing waste in the production methods or processes), and operational practices (involve daily operational decisions and sustainable management practices that tackle environmental issues). The various categorizations are indicative of the fact the application of EMPs can permeate all the areas of an organization's operations including manufacturing processes, product design, material procurement and selection, distribution of the final product, and the management of product's life-cycle even after use by the consumer. In this study, the researchers restricted EMPs to two main interrelated sustainable practices: green manufacturing practices and green procurement.

Green Manufacturing (GM) Practices

With the 'wind' of sustainable blowing across the manufacturing industries, manufacturers are turning their attention to environmentally conscious manufacturing, also known as "Green Manufacturing (GM)" practices rather than resorting to conventional manufacturing practices. Thus, GM signifies a bandwagon within the manufacturing sector, which highlights the importance of adopting innovative techniques and green strategies with the aim of maximizing production efficiency and ensuring that the adverse impact of a firm's operations on the environment is negligible or eliminated. Although the scope of GM is non-exhaustive, it encapsulates a number of key manufacturing issues such as natural resource conservation, management of waste, complying with environmental laws, controlling the emission of toxic substances (Hallam & Contreras, 2016; Setyaningsih & Indarti, 2018), and the "6Rs", which include recover, reduce, recycle, remanufacturing, reuse, and redesign (Rehman, Seth & Shrivastava, 2016).

The predominant goal for adopting GM is sustainability. Thus, through GM practices manufacturers can take steady steps to conserve natural resources for future generations. Adopting GM practices shows that a firm is privy to its social responsibilities to the community in which it operates. Firms practicing green manufacturing coin a good reputation for themselves, avoid incurring unnecessary huge costs related to noncompliance of environmental laws, reduce energy consumption and resort to renewable energy, engage in cleaner production, and minimize the emission of greenhouse gases and other artificial chemicals (Maruthi & Rashmi 2015).

Green Procurement

Manufacturers who are keen on protecting the environment cannot underestimate the significance of green procurement in their daily operational agenda. As such, green procurement has become one of the key ingredients in the sustainability goals of most manufacturing firms across geographical regions. Traditionally, firms have resorted to strategic criteria such as cost, quality, and delivery among others when making purchasing decisions. However, with the advent of sustainability, environmental thinking has been included to the criteria (Dubey, Bag, Ali & Venkatesh, 2013) in firms' procurement decisions. Green procurement (GP) is sometimes known as green purchasing, green sourcing, or sustainability procurement. It is fundamentally considered as the practice of selecting and buying from suppliers that provide a firm with ecofriendly raw materials or inputs or services (Susanty et al., 2017). GP has become a valuable tool implemented by firms to promote cleaner production, eliminate waste, and further mitigate the environmental impact of consumption (Dubey et al., 2013).

Engaging with eco-oriented suppliers is very instrumental to the success of a firm's green procurement objective. It is averred that approximately 80% of customers tend to blame manufacturing firms of environmental negligence if the firm's suppliers are environmentally or ecologically irresponsible (Wong et al., 2016). On this backdrop, manufacturers have, in recent times, resorted to selecting suppliers who support their environmental objectives. Another strategy is that manufacturers prefer and insist on buying materials that have ecological attributes from suppliers who have environmental competence. However, choosing the right supplier and buying materials with eco-attributes may not be sufficient. Hence, it behooves manufacturers to form strategic alliances with suppliers to manage the entire supply process. This can be achieved when firms decide to educate and set environmental goals with suppliers (Mitra & Datta, 2014).

Green Organizational Culture

Green organizational culture (GOC) is a relatively new research field in the sustainability domain. Hence, its definition is somewhat not conclusive. However, some scholars (Norton, Zacher & Ashkanasy, 2015; Gürlek & Tuna, 2018) claim that the definition of green organizational culture can be adapted and inferred easily from previous literature on organizational culture. Organizational culture is perceived as the values, beliefs, ethos, as well as sets of shared mental assumptions that guide members of an organization regarding the appropriateness of their actions and behavior in various situations (Schein, 1992; Ravasi & Schultz, 2006). By making deductions, green organizational culture be defined as values, principles, and beliefs that guide the behavior and actions of members of an organization vis-à-vis the natural environment. It reflects the unwavering desire or obligation of an organization to stay committed to environmental issues. Other terms of GOC are pro-environmental culture, sustainability culture, green consciousness, and ecofriendly culture.

The culture of an organization is perceived as "green" if organizational members think and act beyond profit-seeking motives to maximize the positive impact of organizational operations while simultaneously minimizing harmful operational activities on the natural environment (Roscoe et al., 2019). Firms with a green culture tend to assess and develop various strategies to solve problems related to the environment. Such firms take steps to incorporate strategies for environmental improvement in organizational mission and vision. Having a resolute green culture exerts pressure and prompts manufacturers to stay committed to organizational values. Thus, green culture tends to shape the behavior of organizational members to act consistently with organizational initiatives and ethos (Chang, 2015).

Environmental Performance

An attempt to select a meaningful measure for performance is becoming increasingly challenging but important among industrial practitioners and researchers. In this study, the researchers focused on environmental performance (EP). This was because the researchers were interested in measuring the environmental impacts of manufacturing firms' operations, especially with the implementation of EMPs. A holistic measure of performance from the environmental perspective provides manufacturers with the opportunity to assess their efforts, initiatives, and improvements concerning the natural environment. In this respect, Dubey, Gunasekaran and Ali (2015) narrowly defined EP as a link between an organization's operations and the environment. It looks at the ability of firms to decrease or curtail the emission of harmful gases such as carbon dioxide that comes from the operational activities across a firm's supply chain network. In as much as this explanation is true, it only captures one of the significant aspects of measuring environmental performance, which is the reduction of harmful emissions. Consequently, several researchers (Laari et al., 2018; Esfahbodi et al., 2016; Centobelli, Cerchione & Singh, 2019) have conceptualized and measured environmental performance from a holistic perspective. These prior studies measure firm's environmental performance from its ability to decrease the volume of waste, decrease in carbon dioxide emission, decrease in the volume of energy consumption during production, decrease in consumption of toxic materials, frequent conduct of environmental audit, and the overall minimization of environmental impact of operational activities.

Green Procurement and Green Manufacturing

Akin to the conventional statement "Garbage In, Garbage Out," it is perceived that buying hazardous inputs for production purposes will result in the emission of toxic substances, which may negatively influence the environment. Statistics from the US Environmental Protection Agency shows that manufacturing operations account for approximately 43% of the release of GHGs. However, the agency believes that sustainable procurement can significantly help reduce these emissions. While empirical findings linking green procurement and green manufacturing tend to be scanty, some scholars have made general statements that connote that a significant relationship exists between the two constructs. For instance, Yan et al. (2016) suggest that procuring ecofriendly resource and energy-efficient resources tend to facilitate cleaner production. The scope of green operational activities can be traced to the sourcing of the right materials from eco-oriented supply (Blome, Hollos & Paulraj, 2014). According to Dornfeld et al. (2013), materials are important inputs for green manufacturing processes as well as systems, while emissions and wastes are considered as outputs. Hence, to achieve greener manufacturing, firms are entreated to buy materials that are deemed eco-friendlier. The caveat here is that to achieve greener operation, manufacturers need to select and buy from eco-oriented suppliers. Based on this, we hypothesize that:

H1: *Green procurement has a significant positive impact on green manufacturing.*

Environmental Management Practices and Environmental Performance

There is an influx of studies regarding the link between EMPs and EP. Findings from a study conducted by Yu and Ramanathan (2016) among 121 UK-based manufacturing firms showed that EMPs have a significant positive influence on environmental performance. The current study limited EMPs to green manufacturing practices and green procurement. Hence, the hypothesized relationship between environmental performance and EMPs was explored. In conducting an extensive review of literature on GM practices among various SMEs, Setyaningsih and Indarti (2018) provided a justification that the primary rationale behind the implementation of GM practices is to minimize the adverse effect of a firm's operation on the environment via the elimination of waste and pollution, improve resource efficiency, and ensure cleaner production. Thus, firm's that strive to improve environmental performance can successfully do so via the implementation of GM practices. In another study undertaken by Chien and Shih (2007), it was highlighted that GM-based manufacturing firms have a positive influence on not only financial performance but also environmental performance. In fact, such firms have maximum impact in reducing the emission of CO_2 compared to their competitors who fail to employ GM practices. A related study conducted by Govindan et al. (2015) acknowledged that environmental performance is considered as one of the significant drivers for the implementation of GM practices. Environmental performance highlights the responsibility of a firm toward the environment and, in most cases, the application of GM and other green practices such as GP is likely to improve a firm's performance (Zhan et al., 2016).

Elsewhere in Malaysia, Chin, Tat, and Sulaiman (2015) indicated that both GM and GP are significant environmental practices that impact firm's environmental performance. However, Susanty et al. (2017) found a positive link between GP and environmental performance among small-scale enterprises, but their study further highlighted that the relationship was insignificant. Thus, in as much as GP is a driver of environmental performance, its effect tends to be relatively small because it is perceived as voluntary environmental practice. GP strategies provide an avenue for firms to enhance their environmental performance via the sourcing of environmentally friendly inputs, aimed at eliminating waste and preventing the emission of GHGs. Inferring from the above prior studies, the researchers proposed a positive link between EMPs and EP. Specifically, we propose that:

H2a: *Green manufacturing practices have a significant positive impact on environmental performance.*

H2b: *Green procurement has a significant positive impact on environmental performance.*

Environmental Management Practices and Green Organizational Culture

Adopting EMPs was, in the past, considered a voluntary practice by most manufacturing firms. However, with increasing pressure from multiple stakeholders (customers, suppliers, governments, media, etc.), manufacturers are switching their attention to the implementation of EMPs, thus, forcing firms to be reactive toward sustainable practices. The question is, how manufacturers can make EMPs a daily practice so that it becomes a culture rather than a "one-time" or sporadic initiative. The answer to this question may lie in the consistency with which EMPs are practiced. An organization that engages and invests in EMPs tends to develop a culture that will support such initiatives. Thus, the cultural structure of firms may be influenced by how consistent a firm engages in EMPs (Gürlek & Tuna, 2018). While the initial implementation of EMPs (GMP and GP) may set the tone toward protecting the environment, it is the continuing implementation of such practices that results in the adoption of a resolute green culture. It is believed that the implementation of EMPs such as GM and GP will get to its advance stage within an organization if such practices can influence the values and ethos of organizational members as well as the alteration of the organization's mission (Prajogo et al., 2014). This is primarily because the green climate for EMPs in an organization is a true reflection of the support and commitment from all organizational members (top management and employees) to embrace environmental initiatives and further translate them into everyday practices (Kitazawa & Sarkis, 2000). Practically, manufacturing firms that strive to be successful in the implementation of their EMPs such as GMP and GP should make conscious efforts to develop a greener culture that transcends the entire organization (Crane, 2017). Supporting this statement, Sarkis et al. (2010) highlight that the investment and efforts in implementing EMPs may lose its efficacy if a firm fails to develop an organization's culture that based on ecological values. From the preceding arguments, the researchers propose the following hypotheses:

H3a: *Green manufacturing practices have a significant positive impact on green organizational culture.*

H3b: *Green procurement has a significant positive impact on green organizational culture.*

Green Organizational Culture and Environmental Performance

Whether green organizational culture leads to improved environmental performance is an area worth debating. Relatively few studies have been conducted to validate the relationship between these two important constructs. A study undertaken by Wang (2019) among 321 manufactures from different sectors in Taiwan disclosed that green organizational culture is a significant predictor of environmental performance. In a related study conducted in Indonesia, Hadjri, Perizade and Farla (2019) found green organizational culture to be positively related to environmental performance. Manufacturing firms with the aim of improving or enhancing their environmental performance must strive to encourage a learning climate within the "four walls" of their organization so that they can swiftly adapt to the changing environmental conditions (Balzarova et al., 2006). Some researchers (Fergusson & Langford 2006; Yung et al., 2011) suggest that manufacturing firms have a high tendency of developing and adopting a green culture if the top management demonstrates stronger commitment and value matters relating to environmental protection. Thus, to improve environmental performance, the top management tends to prioritize and monitor a wide spectrum of environmental policies consistently, and officially act to make sure that all other members of the organization work in pursuit of environmental goals.

However, a GOC-based firm that wishes to improve environmental performance does not only emphasis the top management support but also takes a conscious effort to invest in other organizational members (employees) regarding ecological initiatives. Such firms incorporate green initiatives into their mission statements to orient organizational members (Dangelico, 2015) and further develop workforce who are capable of solving environmental problems aimed at achieving improved environmental performance. One of the main rationales for the adoption of a green culture strategy is to ensure that the idea of environmental sustainability permeates the thinking of all organizational members. As firms adopt a green culture based on a winning strategy where all organizational members are entirely involved, environmental performance is likely to improve. In line with the above argument, we hypothesize that:

H4a: *Green organizational culture has a significant positive impact on environmental performance.*

Mediation Role of GOC Between EMPs and EP

Manufacturing firms implementing EMPs (in this scenario, GMP and GP) have the tendency of sustaining and improving the environmental aspects of their operations. In spite of the perceived and validated direct relationship between EMPs and EP, it is important for firms to design and develop a culture that supports the implementation of EMPs. A resolute green culture characterized by the top management's unwavering commitment and employees' green thinking can ensure that EMPs are formally adopted within an organization to achieve environmental goals. Parallel to this claim, Burki, Ersoy and Dahlstrom (2018) posit that green organizational culture via the top management support serves as a strategic lens that helps a firm to achieve not only financial performance but also its environmental performance objectives.

As indicated by Schlegelmilch et al. (1996), green organizational culture serves as a significant asset that firms can use as a leverage to translate their EMPs into improved environmental performance. Thus, developing and emphasizing a culture that supports ecological practices such as green manufacturing and green procurement tend to improve the environmental performance of firms in the manufacturing industry. Unlike firms that do not have a supportive environmental culture, those with supportive green culture are better placed to engage in proactive eco-oriented practices that lead to higher environmental performance (Bakhsh Magsi et al., 2018). Drawing inferences from the above, we posit that establishing EMPs (both GMP and GP) may be necessary for improving environmental performance; however, for these EMPs to remain consistent and proactive practices, firms must endeavor to carve well-designed culture that supports green initiatives. With a well-designed green culture, firms will not only limit environmental pollution and minimize waste in production but also actively achieve higher environmental performance. Given this, we propose the following hypotheses:

H5a: *Green organizational culture mediates the relationship between green manufacturing practices and environmental performance.*

H5b: *Green organizational culture mediates the relationship between green procurement and environmental performance.*

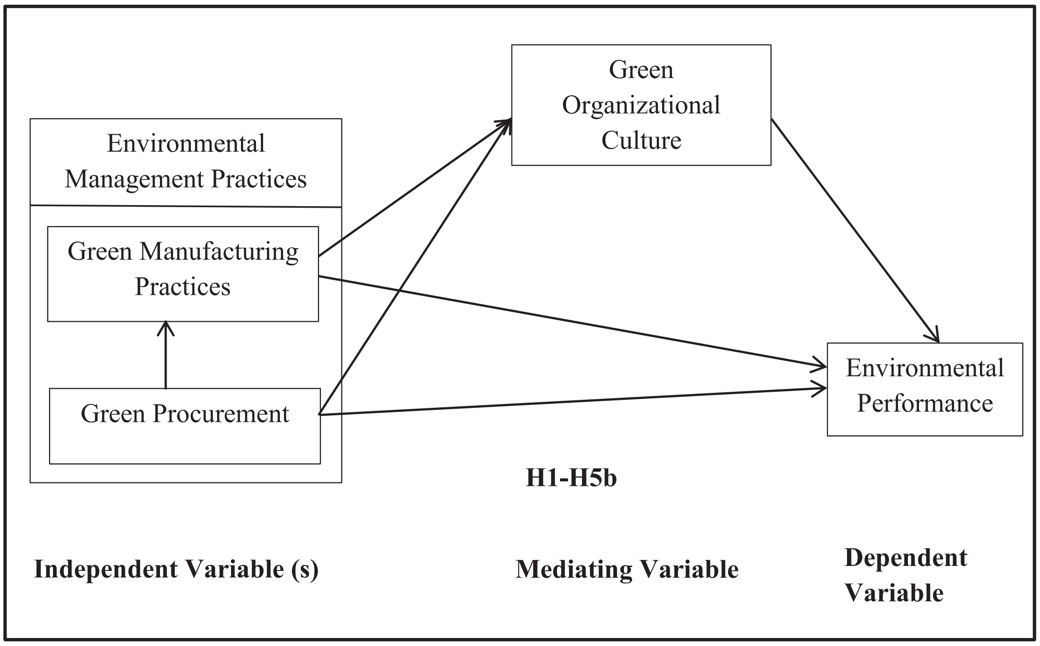

Fig. 1: Conceptual Model

RESEARCH METHODOLOGY

Sample and Data Collection

The data for the study was collected from manufacturing firms in the Accra-Tema Metropolitan areas of Ghana. These areas chosen by the researchers were selected for the study due to the strategic saturation of manufacturing firms. In fact, these areas are considered as the manufacturing habitat of Ghana's numerous industries. Before the data collection, 503 manufacturing firms from diverse sectors (agro-processing, chemical and pharmaceutical, wood processing, plastic manufacturers, and steel manufacturers) were contacted regarding their readiness to partake in the study. Out of the 503 manufacturing firms, 258 gave their consent to be included in the study. As such, 258 questionnaires were administered to these firms via personal distributions and emails. However, only 157 valid and completed questionnaires were duly collected and found to be fit for analysis. This represented a response rate of 61%. Also, personal follow-ups were made via two (2) trained research assistants, who volunteered to help the researchers.

Among the valid questionnaires, 33% were from agro-processing, 22% were from chemical and pharmaceutical, 20% were from plastic manufacturers, 13% were from steel manufacturers, while only 12% were from wood processing. A period of four months (December 2018–March, 2019) was allowed for collecting the data from the respondents. During that period, email reminders were sent. Concerning the positions of the respondents, 37% were general managers, 27% were purchasing or procurement managers, 25% were operations or production managers, while only 11% were environmental, health and safety managers. Considering the work experience, it was indicated that majority of the respondents had worked with their companies for relatively long periods; hence, their responses could be relied upon for making informed decisions (see Table 1 for results on demographic information of respondents).

Table 1: Demographic Information

Variables	Options	Frequency	Percentage (%)
Number of Employees	<10	6	4%
	10-50	38	24%
	51-100	81	52%
	101-500	32	20%

Variables	Options	Frequency	Percentage (%)
Category of Manufacturing Firm	Agro-processing	52	33%
	Chemical and Pharmaceutical	34	22%
	Wood Processing	19	12%
	Plastic Manufactures	32	20%
	Steel Manufactures	20	13%
Respondent's Position	Operations/Production Manager	39	25%
	Purchasing/Procurement Manager	43	27%
	General Managers	58	37%
	Environmental, Health and Safety Manager	17	11%
Working Experience	<5 years	47	30%
	6-10 years	71	45%
	11-15 years	34	22%
	Above 16 years	5	3%
Total		157	

Source: Field Data

Measurements

The researchers resorted to the use of structured questionnaire as the primary data collection instrument. The content validity of the questionnaire was ensured before the administration of the final version. Initially, the questionnaire was subjected to rigorous reviews and scrutiny from industrial experts, practitioners, and academicians. Later, the researchers conducted a pilot study using 24 manufacturing firms engaging in EMPs per the demands of both international and local (the EPA of Ghana) standards. The feedback from the pilot study was used to modify and improve the quality of the questionnaire. The item scale for measuring all the constructs was adapted from prior validated studies and in consistent with the literature review as well as study hypotheses (see Table 2). In all, 23 indicators were used to measure all the constructs (GPM = 6 items, GP = 5 items, GOC = 6 items, and EP = 6 items). The responses were measured on a five-point Likert-scale between "1 = strongly agree" and "5 = strongly disagree."

Table 2: Measuring Instrument

Items	Source
Green Manufacturing **GMP1**: Produces products the reduce the consumption of materials and energy during use **GMP2**: Employ eco-technological equipment and process during manufacturing **GMP3**: Reduces power consumption in products during manufacturing and transportation **GMP4**: Produces products with reused and recycled contents such as recycled plastics and glass **GMP5**: Produces products that are free from hazardous substances such as lead, mercury, and chromium **GMP6**: Uses life-cycle assessment to evaluate the environmental load of products	Maruthi & Rashmi 2015; Rehman, Seth, & Shrivastava, 2016
Green Procurement **GP1**: We seek suppliers with low energy consumption **GP2**: We urge suppliers to supply eco-friendly materials or inputs **GP3**: We collaborate with suppliers to commit to waste reduction goals **GP4**: We select suppliers based on environmental-related criteria **GP5**: Provide design specification to suppliers that include environmental requirements for purchased items	Mitra & Datta, 2014; Blome, Hollos & Paulraj 2014

Items	Source
Green Organizational Culture **GOC1**: Top management actively support environmental practices **GOC2**: Environmental preservation is a high priority activity in our firm **GOC3**: Our firm makes a concerted effort to make every employee understand the importance of environmental preservation **GOC4**: Organizational vision/mission statements include environmental improvement **GOC5**: Preserving the environment is a central corporate value in our firm **GOC6**: Top management develop punishment system and penalties for noncompliance in the environmental management	Gürlek & Tuna, 2018; Wang, 2019
Environmental Performance **EP1:** Reduction in air emission **EP2:** Decrease of consumption for hazardous/toxic materials **EP3:** Decrease of frequency for environmental accidents **EP4:** Adopt measures for ecological design in products/services **EP5:** minimize the environmental impact of operational activities **EP6:** Regular conduct of environmental audits	Yu & Ramanathan 2016; Centobelli, Cerchione, & Singh, 2019

Data Analysis

Partial Least Square–Structural Equation Modeling (PLS-SEM version 3.0) was the primary analytical procedure employed for the study. The PLS-SEM has gained massive recognition in business research, particularly in the domain of supply chain and operations management (Peng & Lai, 2012). The study adopted the PLS because it is a robust predictive-criterion analytical tool that is best used in handling complex predictive models (Bodoff & Ho, 2016; Hair et al., 2017). Thus, the PLS is an analytical technique that has the ability to simultaneously estimate as well as test relatively complex causal relationships among endogenous and exogenous latent variables. Again, the PLS is able to deal with normality violations, data noise, and missing data. Furthermore, the PLS is perceived to have more statistical power even in dealing with small sample size compared to other maximum-likelihood covariance-based SEM techniques and, further, has the ability to handle collinearity in exogenous latent variables.

Common Method Bias

The study further estimated common method bias by employing the cut-off point suggested by Kock (2015). In finding out whether the study was free from common method, Kock (2015) suggests that the Inner VIF values should not exceed 3.3 (see Table 3). Again, common method bias may be inherent with survey studies. Podsakoff et al. (2003) posits that common method bias test deals with an exploratory factor analysis (EFA), which considers all observed variables and when a single factor explicates a value ≥0.50 (i.e., ≥50%), which is majority of the cumulative variance among measures. Then, there is a common method bias. The EFA performed on the variables in this study suggests 0.4512 (45.12%) as the first extracted factor explicated of the variance, which is below the 50% threshold. Considering this threshold, it can be reasonably stated that our study is free from common method. We also adhered to the recommendation of Armstrong and Overton (1977) to test the nonresponse bias of the sample. The results of our test of nonresponse bias between the first 100 samples and the last 57 samples using the *t*-test showed that common bias should not be a problem since the two samples are not substantially different at the 5% significance level.

Table 3: Inner VIF

Constructs	EP	GMP	GOC	GP
EP		2.505	2.844	2.715
GMP	2.555		2.792	2.802
GOC	2.226	2.168		2.250
GP	2.275	2.299	2.350	

Source: Field Study

Reliability and Validity

Before testing the hypothesized relationship proposed in the study, it was very imperative to check if our model had any reliability and validity concerns. As a result, construct reliability, convergent validity, and discriminant validity were estimated for our reflective model (see Tables 4, 5, and 6). Construct reliability was determined via the

Cronbach's alpha and composite reliability. According to some researchers (Hair, Hult, Ringle & Sarstedt, 2016; Ab Hamid, Sami & Sidek, 2017), the minimum cut-off points for the Cronbach's alpha and composite reliability should be more than or equal to 0.7 and 0.6, respectively. The convergent validity was estimated by considering factor loadings and average variance extracted (AVE). The cut-off point for the factor loadings should be greater than or equal to 0.7 while that for the AVE should be greater than 0.5 (Ringle, Wende & Becker, 2015; Hair et al., 2017). Discriminant validity was estimated by considering the Fornell–Lacker criterion, cross loadings, and Hetrotrait–Monotrait Ratio (HTMT).

Construct Reliability and Convergent Validity

As depicted in Table 4, the constructs reliability was estimated using Cronbach's alpha and composite reliability. The results indicate that the Cronbach's alpha and the composite reliability meet the minimum cut-off points. The Cronbach's alpha was within the range of 0.804 to 0.852 while the composite reliability ranged from 0.873 to 0.890. This is an indication that our scales were internally reliable; hence, there are no reliability issues regarding our reflective model. Table 4 further presents the results of the convergent validity as estimated via factor loadings and the AVE. The factor loadings of the items were also within the acceptable range 0.718 to 0.855; hence, they met the minimum cut-off point of 0.7. It is important to indicate that all loadings which fell below the recommended cut-off point were carefully deleted to strengthen the AVE, direct path between the constructs, as well as the whole model. Finally, the AVE values meet the acceptable threshold and fall from 0.575 to 0.632. Based on the results, we can say that convergent validity for our reflective model was ensured.

Table 4: Construct Reliability and Validity

Latent Variables	Indicators	Factor Loadings	Cronbach's Alpha	Composite Reliability	AVE
Green Manufacturing	GMP1	0.810	0.852	0.890	0.575
	GMP2	0.761			
	GMP3	0.770			
	GMP4	0.743			
	GMP5	0.738			
	GMP6	0.724			
Green Procurement	GP1	0.851	0.843	0.895	0.680
	GP2	0.815			
	GP3	0.829			
	GP4	0.804			
Green Organizational Culture	GOC1	0.828	0.805	0.873	0.632
	GOC2	0.756			
	GOC3	0.787			
	GOC4	0.807			
Environmental Performance	EP1	0.826	0.849	0.893	0.626
	EP2	0.855			
	EP3	0.811			
	EP4	0.738			
	EP5	0.718			

Source: Field Data

Discriminant Validity

The reflective model's discriminant validity was further estimated by considering the Fornell–Lacker Criterion, cross loadings, and HTMT ratio. The Fornell–Lacker rests on the basic premise that a model successfully achieves discriminant validity if the square roots of the AVEs are greater than the correlations of the variables in the given model. Based on the results in Table 5, it can be said that our model achieved discriminant validity since the basic premise for the Fornell–Lacker criterion was met.

Table 5: Fornell–Lacker Criterion

Latent Variables	EP	GMP	GOC	GP
EP	0.791			
GMP	0.768	0.758		
GOC	0.702	0.708	0.795	
GP	0.718	0.715	0.665	0.825

Source: Field Study

The cross loadings were also estimated to assess discriminant validity. The cross loadings is based on the fundamental premise that indicators in the model should load higher on the constructs its intended to measure than any other construct in the model. Based on the results in Table 6, it can be said that discriminant validity was achieved because the indicators successfully loaded higher on the construct they measure in our reflective model.

Table 6: Cross Loadings

Latent Variables	EP	GMP	GOC	GP
EP1	0.826			
EP2	0.855			
EP3	0.811			
EP4	0.738			
EP5	0.718			
GMP1	0.576	0.810	0.554	0.565
GMP2	0.533	0.761	0.560	0.562
GMP3	0.549	0.770	0.523	0.531
GMP4	0.570	0.743	0.570	0.523
GMP5	0.667	0.738	0.501	0.609
GMP6	0.591	0.724	0.511	0.450
GOC1	0.552	0.582	0.828	0.572
GOC2	0.612	0.537	0.756	0.543
GOC3	0.559	0.587	0.787	0.476
GOC4	0.502	0.541	0.807	0.517
GP1	0.553	0.551	0.619	0.851
GP2	0.603	0.555	0.469	0.815
GP3	0.616	0.610	0.569	0.829
GP4	0.595	0.639	0.531	0.804

Source: Field Study

Lastly, the HTMT ratio was used as a benchmark for evaluating discriminant validity. According to Hair et al. (2016), the HTMT ratio values should not exceed 0.9. It can, therefore, be inferred from Table 7 that all constructs meet the threshold and, hence, our reflective model achieved discriminant validity.

Table 7: Heterotrait–Monotrait Ratio (HTMT)

Latent Variables	EP	GMP	GOC	GP
EP				
GMP	0.900			
GOC	0.843	0.854		
GP	0.848	0.839	0.804	

Source: Field Study

Results and Discussion

Predictive Accuracy, Predictive Relevance, and Effect Size

After making sure our model was without reliability and validity concerns, the researchers tested the hypothesized relationships proposed in the study. To achieve this, a structural model was evaluated via *R* Square, *Q* Square, and estimating the effect size. The *R* Square (R^2) looks at the predictive accuracy of the model and specifies how the exogenous latent variables combine to influence or explain the endogenous latent variable. The *Q* Square (Q^2) was used to assess the predictive relevance of our model. Hensley et al. (2015) suggest that a model lacks predictive relevance if the Q^2 values are less than zero (0). Thus, Q^2 values should always be greater than zero.

Results from Table 8 shows that our structural model explains 67.2% of the variance of EP. Thus, GMP, GP, and GOC combine to explain 67.2% of the variance in EP. Also, both GM and GP (which were constructs for measuring EMPs) combine to explain 53.3% of the variance of GOC. Moreover, GP explains 51.1% of the variance of GMP. Concerning the Q^2 values which were achieved via a blindfolding result, it was found that the model achieved predictive relevance because all the Q^2 values were greater than zero (EP = 0.385, GMP = 0.269, and GOC = 0.323).

Table 8: ***R*** **Square and** ***Q*** **Square**

Latent Variables	R^2	Q^2
EP	0.672	0.385
GMP	0.511	0.269
GOC	0.533	0.323

Source: Field Data

The effect size was further estimated to find out whether the exogenous latent variables made any significant contribution to the endogenous variables (see Table 9). The underlying premise for assessing f^2, according to Cohen (1988), is that values of 0.35, 0.15, and 0.02 stand for large, medium, and small effects of the exogenous latent variables, respectively. Therefore, from the results in Table 8, it can be extrapolated that GMP has medium effect size on EP (f^2 = 0.202) while GOC (f^2 = 0.074) and GP (f^2 = 0.097) have small effect size on EP. Also, the results indicate that GP (f^2 = 1.047) has a large effect size on GMP. Furthermore, GPM (f^2 = 0.247) has a medium effect on GOC while GP (f^2 = 0.115) has a small effect size on GOC.

Table 9: Effect Size (f^2)

Latent Variables	EP	GMP	GOC	GP
EP				
GMP	0.202		0.247	
GOC	0.074			
GP	0.097	1.047	0.115	

Source: Field Data

Structural Model

To test for the hypothesized relationships proposed in the study, a bootstrapping procedure using 5000 re-samples was used to determine the significance of the reflective model's path coefficient. The results of the bootstrap are presented in Tables 10 and 11. Considering the hypothesized relationships, it is evident that GP has a significant positive effect on GMP (β = 0.715, t = 16.558, p-value = 0.000), thus, providing support for H1. Also, the results indicate that GMP has a significant positive effect on EP (β = 0.411, t = 4.306, p-value = 0.000), thereby satisfying H2a. Likewise, GP has a significant positive effect on EP (β = 0.269, t = 3.069, p-value = 0.002), an indication that H2b was supported. Moreover, the result supports H3a, which stated that GMP has a significant positive effect on GOC (β = 0.476, t = 4.790, p-value = 0.000). More so, the results show that GP has a significant positive effect on GOC (β = 0.324, t = 4.368, p-value = 0.000). Thus, we found support for H3b. Finally, the results indicated that GOC has a significant positive effect on EP (β = 0.232, t = 3.637, p-value = 0.000). Therefore, it can be confirmed that H4 was supported.

Table 10: Path Coefficient (Direct Effect)

Hypotheses	Path	Beta Coefficient	T Statistics	P Values	Supported?
H1	GP->GMP	0.715	16.558	0.000	Yes
H2a	GMP->EP	0.411	4.306	0.000	Yes
H2b	GP->EP	0.269	3.069	0.002	Yes
H3a	GMP->GOC	0.476	4.790	0.000	Yes
H3b	GP->GOC	0.324	4.368	0.000	Yes
H4	GOC->EP	0.232	3.637	0.000	Yes

Source: Field Data

Mediation Analysis (Indirect Effect)

The current study modeled GOC as a mediating variable between the two key EMP variables (GMP and GP) and EP. The results show that GOC mediates the relationship between GMP and EP (β = 0.111, *t* = 2.701, p-value = 0.007). Thus, H5a was supported. Furthermore, GOC was found to mediate the relationship between GP and EP (β = 0.075, *t* = 2.760, p-value = 0.006). Consequently, we can confirm that GOC mediates the relationship between EMPs and EP.

Table 11: Mediation (Indirect Effect)

Hypotheses	Path	Beta Coefficient	T Statistics	P Values	Supported?
H5a	GMP -> GOC -> EP	0.111	2.701	0.007	Yes
H5b	GP -> GOC -> EP	0.075	2.760	0.006	Yes

Source: Field Data

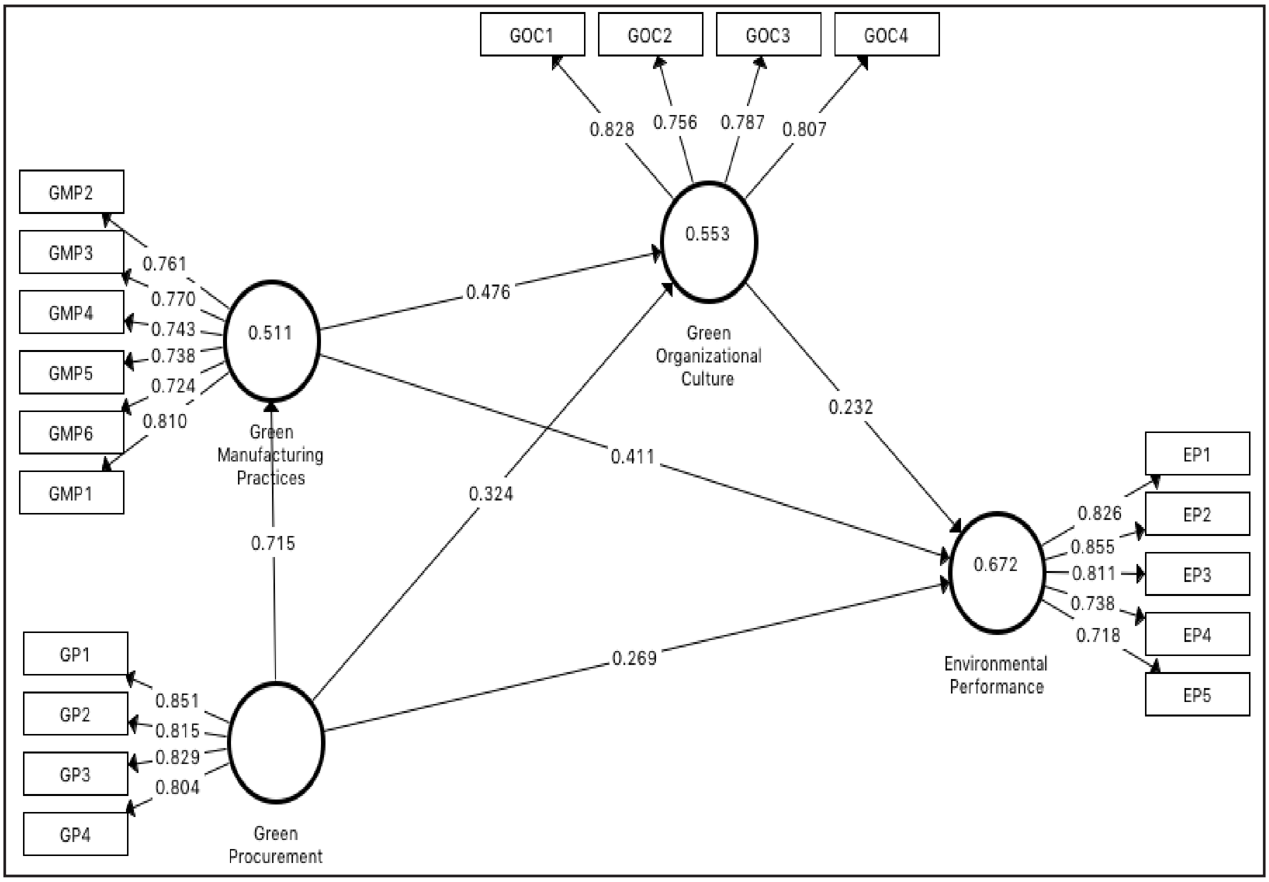

Fig. 2: Structural Model (PLS Algorithm)

In this study, we were interested in finding out whether EMPs in terms of GMP and GP lead to an improvement in EP. We were also interested in ascertaining if EMPs in terms of GMP and GP have a significant positive effect on GOC. Again, we wanted to know if GOC has a significant positive effect on EP. Furthermore, we were interested in determining if GOC mediates the relationship between EMP (GMP and GP) and EP. The findings of this empirical study provide some significant contribution to literature and, further, provide an insight into understanding the explanatory link (mediated role) of GOC between EMP (in terms of GMP and GP) and EP. The findings show that EMP, in terms of GMP and GP, has a significant positive effect on EP. This finding is parallel with the results of other prior studies (Chien & Shih, 2007; Chin, Tat & Sulaiman, 2015; Setyaningsih & Indarti, 2018). However, the finding which confirmed that GP, as an EMPs variable had a significant positive effect on EP, was contrary to the findings of Susanty et al. (2017), which revealed that although GP and EP are positively linked, the relationship between the two is insignificant. In spite of this, our study advances that it is very imperative for manufacturing firms to implement EMPs, such as green manufacturing and green procurement, to enhance their environmental performance and reduced negative operational effect via eliminating waste and pollution, improve resource efficiency, and ensure cleaner production.

Another important finding of this study is that EMPs (both GMP and GP) were found as significant predictors of GOC. This finding is congruent with the results of prior studies (Sarkis et al., 2010; Prajogo et al., 2014; Crane, 2017). Thus, engaging in EMPs has the tendency to influence an organization's culture. Manufacturing firms are likely to alter the structure of their organizational culture to instill 'green thinking' and eco-oriented practices into their mission and objectives. Whether the culture of manufacturing firms' will change toward green thinking or not is largely dependent on how consistently EMPs are adopted and implemented. Thus, implementing EMPs consistently has the tendency to influence top management to commit to green initiatives by altering the organization's mission and educating employees to understand the importance of staying committed to ecological issues. The current study further revealed that GOC has a significant and positive on EP. This finding concurs with previous empirical findings (Balzarova et al., 2006; Burki, Ersoy & Dahlstrom, 2018; Wang, 2019). Thus, GOC is a significant driver of improving environmental performance.

Finally, our findings indicate that GOC appears to mediate the relationship between EMPs and EP. Thus, implementing EMPs improves EP because manufacturing firms that have a green culture that supports green practices have a tendency to translate those practices into higher EP. In order words, EMPs and their effect on EP are better explained via a resolute green culture that supports ecofriendly initiatives. This finding provides a significant theoretical and empirical insight because little attention has been given to the importance of green culture in the wake of investing and implementing environmental practices.

Conclusions and Implications

Manufacturing firms are beginning to appreciate the need to implement EMPs to manage their operations due to the enormous pressure exerted by myriad stakeholders such as government and other environmental regulatory bodies, customers, suppliers, and the media. Despite the wide acceptance of EMPs, most manufacturers, especially those in developing countries such as Ghana, have adopted a reactive approach rather than a proactive approach toward the implementation of EMPs. As such, the concept seems to be slowly assimilated within such firms because of the virtually nonexistence of a resolute green culture based on EMPs. While some studies have linked EMP to improved EP (Chin, Tat & Sulaiman, 2015; Yu & Ramanathan, 2016; Setyaningsih & Indarti, 2018), scanty empirical studies have tested the mediating role of GOC between EMPs and EP. This presented study, therefore, attempted to fill that gap by exploring the mediating role of GOC and EMPs, in terms of GMP and GP, and EP.

The results indicate that the implementation of EMPs in terms of GMP and GP have a significant influence on both EP and GOC. It was also evident that GOC plays a mediating role between EMPs and EP. This result is very significant since it provides an extension and contributes to the literature on environmental management and green supply chain management by modeling GOC as a mediator between EMPs and EP, especially from a developing country's context. The results reemphasize the significance of investing and engaging in EMPs on a continuous basis such that it becomes a permanent value, which will influence the culture of the organization in order to achieve EP goals.

Managerial Implications

The results of this study validate our model and provide key insights for managerial and stakeholder (policy-makers) implications. From the perspective of SMEs, this study shows that it is very important for managers to invest and continue engaging in EMPs since these practices tend to improve their EP goals. Another key insight for managers is the need to ensure that EMPs become a vital and permanent activity rather than a sporadic initiative. By doing so, EMPs will become a cultural value that will be accepted, supported, and practiced by all organizational members in the quest of achieving EP goals. This culture will in the long-run, pave the way for such practices to be formally adopted even in the midst of external stakeholder pressure. For policy-makers (especially government and environmental regulatory bodies), this study provides the needed springboard to tighten and ensure the enforceability of already existing policies while simultaneously drafting new policies that will coerce manufacturing firms to adopt green strategies with urgency.

Future Research Directions

One of the key limitations of our study is that data was collected from SMEs within the Ghanaian context. Consequently, it will be important for other future related studies to conduct a replica study by considering data from a broader geographical area to allow or facilitate the generalizability of our results. In addition, our study limited EMPs to only two interrelated practices; however, in reality, there are other significant EMPs. Therefore, it emerges that future studies should expand the EMPs to find out their relationship on environmental performance. Furthermore, future research directions can consider other moderators such as environmental dynamism or mediating variables such as firm reputation. Finally, the study was cross-sectional; hence, future studies should consider a longitudinal study to find out if the relationship will change over time.

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