OPERATIONS AND SUPPLY CHAIN MANAGEMENT
Vol. 17, No. 3, 2024, pp. 252 - 266
ISSN 1979-3561 | EISSN 2579-9363

Institutional Pressures, Top Management Leadership and Sustainable Supply Chain Management Practices of Manufacturing Firms: Evidence from a Developing Economy

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ABSTRACT

The study examined the mediating role of top management leadership between institutional pressures and sustainable supply chain management practices. Specifically, it examined how top management leadership mediates the relationship between institutional pressures and sustainable procurement, sustainable manufacturing operations and reverse logistics. It also assessed how institutional pressures and top management leadership influence sustainable supply chain management practices. The research was quantitative, with data gathered from 386 medium and large-sized manufacturing facilities located in the Greater Accra, Ashanti, and Western regions of Ghana. Structural equation modelling was used as the analytical tool. The study's findings show that institutional pressures significantly affect the components of sustainable supply chain management. It also demonstrated that top management leadership significantly affects sustainable supply chain management aspects except for sustainable manufacturing operations. Furthermore, the research findings indicate that, except for sustainable manufacturing operations, the relationship between institutional pressures and other aspects of sustainable supply chain management is significantly mediated by top management leadership.

Keywords: *institutional pressures, reverse logistics, sustainable manufacturing operations, sustainable procurement, top management leadership.*

1. INTRODUCTION

As driven by concerns for the environment, natural resources, and social equity, the sustainable development agenda has grown to be a major driver of sustainability within business value chains. Governments and corporations therefore have a responsibility to take part in initiatives that promote financial gain, stakeholder social advancement, and environmental preservation. Industry must reduce waste and resource usage, adopt sustainable practices, and consider the social and environmental effects of its products to meet Goal 12 (Ensuring Sustainable Production and Consumption) (Küfeoğlu, 2022). This is in line with the cradle-to-cradle design concept, which calls for creating completely circular goods and procedures that enable resources and materials to be recycled or continuously used until the end of their useful lives (McDonough & Braungart, 2010; Zhang *et al.*, 2023).

Thus, sustainable supply chain management (SSCM) has received a lot of attention from governments, academics, practitioners, and businesses over the past 20 years (Balon, 2020; Tseng *et al.*, 2019). The primary driving force behind this interest stems from the conviction that industrialisation and manufacturing supply chains are largely to blame for environmental degradation (Mumtaz et al., 2018; Tseng et al., 2019). Sustainable supply chain management (SSCM) encompasses manufacturing, procurement, and reverse logistics among others (Tate & Bals, 2018; Tseng *et al.*, 2019; Balon, 2020). Sustainable procurement entails making

ethical and socially conscious purchases and making sure that the goods and services acquired are economically viable and socially and environmentally responsible (Agarwal *et al.,* 2018). Producing goods and services through methods and systems that try to reduce negative environmental effects, protect finite natural resources, guarantee the welfare of clients and staff while maintaining economic viability is known as sustainable manufacturing operations (SM) (Moktadir *et al.,* 2018b; Rosen & Kishawy, 2012). According to Tate and Bals (2018), this also highlights the use of renewable energy sources and minimizing the negative effects of production processes on the environment. Reverse logistics (RL), unlike traditional logistics, involves returning products to the manufacturer for purposes such as recycling, reprocessing, reuse, repair, or disposal (Agrawal & Singh, 2019; Sharma *et al.,* 2021). The assertion made by Sharma *et al.* (2021) is that RL is necessary to manage costs, reduce environmental issues, and obtain a competitive edge.

Companies are being pushed to manage their supply chains from a sustainability perspective by government regulations and growing consumer concerns about the environment (Afum *et al.,* 2020c; Hartmann & Moeller, 2014; Mutingi *et al.,* 2014). These outside forces on companies to implement sustainable practices are referred to as isomorphic pressures by the institutional theory (Balasubramanian & Shukla, 2018). These pressures, which push organisations to gradually change their behaviour in order to gain legitimacy and support, are what propel the adoption of sustainable supply chain practices, especially in the manufacturing sector (DiMaggio & Powell, 1983; Shukla & Balasubramanian, 2018). In Ghana, regulatory bodies that enforce laws and standards of social and environmental issues such as product and employee safety, as well as harmful gas emissions, include the Food and Drugs Authority (FDA) and the Environmental Protection Agency (EPA).

Stakeholder theory states that different stakeholders have varying degrees of influence over a firm's choices and actions. While the company must modify its operations in response to external pressures, internal stakeholders like top management have a major influence on how the company responds to these pressures by determining its strategic course (Graham, 2020). Senior executives in top management leadership roles establish the strategic direction and supervise the execution of sustainable supply chain initiatives in manufacturing companies. As a result, organisations must be motivated to adopt sustainable practices by both internal and external forces (Liu *et al.,* 2020). Businesses need to take a wide range of actors into account in their strategic planning for both long-term survival and the preservation of their operating licence (Touboulic & Walker, 2015). Strong leadership and a dedication to sustainability are shown by top management through the establishment of a clear vision, the creation of policies, the distribution of resources, and the promotion of a sustainable culture (Kitsis & Chen, 2021).

Studies on sustainable supply chain initiatives in developing nations are scarce, which contributes to the under-representation of SSCM issues unique to emerging economies (Fahimnia *et al.,* 2015; Khalid *et al.,* 2015). A review of the literature by Tseng *et al.* (2019) indicates that there is a dearth of SSCM research with an African focus. Majority of the studies on SSCM sustainability dominate in Europe (Daddi *et al.,* 2016; Esfahbodi *et al.,* 2017), the United States (Yang & Kang, 2020), and certain regions of Asia (Fahimnia *et al.,* 2015). According to research, empirical studies need a context unique to developing economies (Sánchez-Flores *et al.,* 2020). Therefore, considering the general interest in SSCM, the lack of research from the perspective of developing countries represents a significant gap that needs to be addressed. Furthermore, to improve practice and policy in developing economies such as Ghana, it is imperative to look into the subject of supply chain management (SSCM).

In the study of the drivers or factors influencing SSCM, institutional pressures from external sources have received a lot of attention while internal stakeholders have received comparatively less attention (Liu *et al.,* 2020). Moreover, there has not been enough discussion in the literature about the function of top management in converting outside pressures into the real adoption of sustainable supply chain management practices (SSCMPs). The responsibility for formulating strategies and deciding how much money should be invested in the environment falls on top management. Graham (2020) posits that internal stakeholders, especially top management, significantly influence pragmatic responses to external influences. This emphasises how external institutional pressures and internal stakeholder influences interact to affect the adoption of SSCMPs. A more thorough understanding of the mechanisms by which external institutional pressures are translated into concrete actions by firms adopting SSCPs would come from an empirical investigation into this mediating effect.

The current study, thus, examines how institutional pressures and top management leadership influence sustainable supply chain management practices and how top management leadership ultimately mediates the relationship between institutional pressures and these practices. The literature review, research methodologies, findings and discussion, conclusions, and implications are covered in the subsequent sections.

2. LITERATURE REVIEW

2.1 Institutional Theory

The framework offered by institutional theory helps to explain how organisational behaviours are shaped by outside forces. The institutional environment has a bigger influence on a firm's organisational mechanisms than market conditions, according to neo-institutional theory, also referred to as institutional theory. The seminal works of Zucker (1977), Meyer and Rowan (1977), and DiMaggio and Powell (1983) serve as its foundation. According to institutional theorists, organisations are forced to conform to the norms, laws, and ideologies that prevail in their institutional environment (David *et al.,* 2019). This results in an enforced homogeneity across organisations. These forces, which are referred to as isomorphic or institutional pressures overall, come in the forms of normative (pressures from non-governmental organisations (NGOs), professional associations); mimetic (pressures to imitate other organisations perceived to be doing well); and coercive (formal and informal pressures from regulatory bodies and the society) (Balasubramanian & Shukla, 2018; Jia *et al.,* 2018).

Organisations are compelled by pressures from the institutional environment to modify their practices to obtain legitimacy and support (DiMaggio & Powell, 1983). Among these pressures is the implementation of socially and environmentally conscious behaviours. The motivation behind the implementation of sustainable business practices can be explained by this dynamic. As a result, businesses that engage in unsustainable practices might be subject to fines or legal constraints. The goal of maximising profits may also be jeopardised by product boycotts, penalties, fines, tax ramifications, or investor withdrawals. It is crucial to understand that while organisations generally give in to isomorphic pressures and become more homogeneous over time, not all institutions react to these pressures in the same way (Boon *et al.*, 2009). Greenwood and Hinings (1996) note that a combination of internal and external dynamics shapes how people react to institutional pressures.

2.2 Stakeholder Theory

According to Jones (1995), stakeholder theory is a management framework that emphasises how crucial it is to take into account the interests of all parties rather than just the owners or shareholders when making decisions. Stakeholder-centric approaches, according to their proponents, can improve a company's reputation, reduce risks, increase employee satisfaction and engagement, and fortify customer loyalty (Mitchell *et al.,* 1997). By employing a stakeholder-centric approach to supply chain management, organisations can identify and prioritise the needs and expectations of stakeholders, including consumers, workers, suppliers, communities, and the environment. This makes it possible for businesses to proactively handle risks and opportunities associated with sustainability, such as labour laws, ethical sourcing, and environmental effects.

According to Boon *et al.* (2009), Agarwal *et al.* (2018), and Etse *et al.* (2022) internal stakeholders like top management can act as a mediator between institutional pressures and strategic decisions about the adoption of sustainable practices. Thus, stakeholder theory provides additional insight into these complex dynamics. As intimated by Graham (2020), internal stakeholders like top management, who develop strategies and have power over ecological investments, are primarily responsible for practical responses to external pressures. By putting stakeholder interests first, communicating with them, and resolving conflicts amicably, businesses can create sustainable supply chains that benefit all parties involved.

2.3 Hypotheses Development

2.3.1 Institutional Pressures and Sustainable Supply Chain Management Practices

Ye *et al.* (2013) investigated how top management's inclination towards implementing reverse logistics is influenced by three different types of institutional pressures: government, competitor, and customer pressures. The study, which polled 209 companies in China's Pearl River Delta, discovered that top managers' opinions regarding reverse logistics adoption are considerably and favourably influenced by these institutional pressures. In particular, the study found that while there was no correlation found for product return, there was a strong correlation between the attitudes of top managers and the product recovery component of reverse logistics. Additionally, the study showed that while product returns hurt businesses' economic performance without obviously affecting their environmental performance, product recovery has a significant and positive impact on both.

In a recent study, Etse *et al.* (2022) investigated the influence of regulations on sustainable procurement practices as well as the relationship between organisational leadership and culture within Ghanaian organisations. The study used a random sample of 322 public and private sector organisations based on institutional theory. The results of the analysis, which used structural equation modelling (SEM), show that laws have a substantial impact on whether or not sustainable procurement practices are adopted. Furthermore, the significance of organisational leadership in moulding an organization's reaction to these regulations was recognised; proficient leadership cultivates a feeling of exigency and dedication to sustainable procurement. Although the study provides insightful information, it may not adequately capture the unique dynamics of the manufacturing sector's effects on environmental performance due to its broad scope across multiple industries.

Through the application of green production practices (GPP), Baah *et al.* (2021) sought to investigate the ways in which regulatory pressures and organisational stakeholders' impact financial performance (FP), environmental performance (EP), and firm reputation (FR). The authors used a quantitative research design and Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the information gathered from survey questionnaires administered to managers and owners of 320 manufacturing SMEs. According to the findings, the adoption of eco-friendly production practices is positively impacted by regulatory pressures from stakeholders, which enhances their financial performance, environmental performance, and reputation.

Similar results were found by Acquah *et al.* (2021) who investigated the effect of isomorphic pressures on the adoption of environmentally friendly manufacturing techniques. Measures of green manufacturing practices included green procurement, green process innovation, and green product innovation. Based on the institutional theory, the study analysed survey data from 322 managers at manufacturing firms in Ghana using PLS-SEM. Green procurement was found to be significantly and favourably impacted by isomorphic pressures, suggesting that manufacturing companies are becoming more environmentally conscious as a result of pressure from a variety of social entities and stakeholders. Although the social dimension of sustainability was not considered, the results shed light on the factors influencing green manufacturing practices in Ghana and emphasise the need to look into other aspects like sustainable procurement and manufacturing practices as well as the influence of internal stakeholders, especially top management.

Afum *et al.* (2019) assessed how stakeholders felt about reverse logistics (RL) adoption and how it affected supply chain performance in Ghana's manufacturing industry. The study, which was based on the stakeholder theory, included 193 respondents from the Plastics and food and beverage industries in Accra and Kumasi. The researchers used PLS-SEM, and a structured questionnaire to test their theories.

The results showed that the adoption of reverse logistics (RL) was significantly influenced by all stakeholder variables, with the exception of environmental regulations. These factors included top management support, consumer pressure, and corporate citizenship pressure.

Balda and Singh's (2022) study set out to ascertain the driving forces behind sustainable supply chain management (SSCM) strategies and assess the outcomes. 420 respondents, representing 146 large-scale manufacturing companies in Ethiopia across industries like textiles, iron and steel, food and beverages, and tanning and leather, provided data for the study using Likert scale questionnaires. The study's use of correlation and regression analysis showed that controlling reputation and environmental risks, upholding social obligations, cutting expenses, and getting top-level management support are the main internal drivers pushing the adoption of SSCM. The study emphasized several external drivers, including international standards, government regulations, competitive pressures, and customer expectations.

Benjamin, Shee and de Vass (2023) leveraged the natural resource-based view (NRBV) and institutional theory to empirically investigate a theoretical model. The study explored three aspects: the influence of green human resource management practices and external pressures on green supply chain initiatives; the impact of these initiatives on environmental performance; and the subsequent effects on social and economic performance. Using structural equation modelling to analyse cross-sectional survey data from 168 SMEs in Australia's food and beverage sector, the findings show that Green Human Resource Management practices and external pressures positively influence Green Supply Chain Initiatives.

Appiah (2023) utilizes stakeholder theory and the natural resource-based view to propose that absorptive capacity and risk-taking behaviour serve as underlying mechanisms and boundary conditions, respectively, in the relationship between stakeholder engagement and green process innovation. The proposed model is tested using survey data from manufacturing firms in Ghana. Findings indicate that absorptive capacity plays a mediating role in the connection between stakeholder engagement and green process innovation.

Fatima, Abrar and Shahbaz (2024) aimed to empirically explore the factors that predict the intention to adopt green supply chain management (GSCM) practices. The study applied the Technology-Organization-Environment framework as the main theoretical approach, examining technological factors (relative advantage, compatibility, and complexity), organizational factors (corporate social responsibility, organizational readiness, and top management support), and environmental factors (normative, coercive, and mimetic pressures, along with government support). The framework is further extended by incorporating Self-Determination Theory, focusing on intrinsic and extrinsic motivation. Data was gathered through an online survey from employees of manufacturing SMEs in Pakistan, with 409 valid responses used for hypothesis testing. The findings show that all the identified predictors significantly influence the intention to adopt GSCM practices.

The current study comprehensively examines the effect of institutional pressures on the sustainability of supply chain activities that encompass the upstream supply chain (procurement), in-house activities (manufacturing operations) and the downstream supply chain (reverse logistics). Consequently, the following hypotheses were developed:

H₁: *Institutional pressures have a positive effect on sustainable procurement.*
H₂: *Institutional Pressures have a positive effect on sustainable manufacturing operations.*
H₃: *Institutional pressures have a positive effect on reverse logistics.*

2.3.2 Top Management Leadership and Sustainable Supply Chain Management Practices

Top management leadership (TML) refers to the commitment, support, and guidance provided by senior executives and leaders within an organisation towards a course (Kitsis & Chen, 2021). In the adoption of SSCM, top management leadership plays a pivotal role in setting the tone, vision, and strategic direction for SSCM initiatives (Liu *et al.,* 2020). They provide the necessary support, resources, and guidance to embed sustainability principles into the organisation's supply chain processes and practices. When top management demonstrates strong commitment to sustainability, it sets the tone for the entire organisation and motivates employees to embrace sustainable practices (Govindan *et al.,* 2016).

Studies have acknowledged the key role of top management in the adoption of SSCM (Dubey *et al.,* 2017; Graham, 2020; Niemann *et al.,* 2016). Gandhi *et al*. (2018) argue that the commitment of senior management is the single most important factor in the effective rollout of green and lean manufacturing. Similarly, Kumar et al. (2019) contend that top management support is crucial owing to its ability to exert influence on all other aspects of human resources.

Graham (2020) investigated how upstream environmental practices are impacted by internal and external factors, both separately and collectively. The adoption of environmental practices is influenced by both internal (proactive strategy) and external (competitive pressures) factors, but proactive strategy is a more significant driver, according to a study that used multiple hierarchical regression to analyse data from 149 UK food industry manufacturing firms. This shows that pressure from internal stakeholders—managers, directors, and employees—may have a bigger impact on adopting particular practices than pressure from external stakeholders.

Liu *et al.* (2020) sought to shed light on how top management support affects green procurement. Regression analysis was utilised in the study to analyse data from 171 Chinese manufacturing firms according to the perspective of natural resources. The results showed that green procurement and top management support have a positive relationship that is strengthened by green training. These results emphasise how important internal stakeholders—especially upper management—are to the adoption of sustainable practices.

An earlier study by Li *et al.* (2019) found similar results in assessing the causes and results of top management's endorsement of green practices among Chinese firms. Data from 148 Chinese manufacturing companies were subjected

to SEM analysis, which showed that adopting green practices is positively impacted by top management support. The three main factors that determine top management championship were found to be institutional pressure, competitive intensity, and environmental dynamism. These elements have an impact on senior managers' dedication to sustainability and their readiness to promote environmentally friendly practices inside their companies.

The factors that support and impede Mozambique's manufacturing sector from implementing green supply chain management were examined by Niemann *et al.* (2016). Eight senior managers from various organisations participated in semi-structured interviews as part of a descriptive qualitative study that yielded eight barriers and four drivers specific to the Mozambican context. Among other factors, board and upper management support was identified as a major driver of GSCM. The results shed light on the factors that facilitate and hinder the implementation of green supply chain management strategies in developing and emerging nations, but their limited sample size limits their generalisability. Based on this review, the following hypotheses were formulated:

***H₄**: Top management leadership has a positive effect on sustainable procurement.*
***H₅**: Top management leadership has a positive effect on sustainable manufacturing operations.*
***H₆**: Top management leadership has a positive effect on reverse logistics.*

2.3.3 The Mediating Role of Top Management Leadership in the relationship between Institutional Pressures and Sustainable Supply Chain Management Practices

In today's global business environment, a key area of research is the interaction between internal and external stakeholder pressures on the adoption of environmental supply chain practices. A study by Agarwal *et al.* (2018) buttresses this point when it found that external demands from consumers to embrace GSCM are insufficient unless managers internalise them and incorporate them into corporate strategies and policies. The study found a full mediation of internal impetus between market pressures and adoption of GSCM among U.S. manufacturing firms, indicating that these firms only adopt GSCM techniques if there is an internal drive.

Unlike the other internal stakeholders, top management is in a position of power, controlling how resources are allocated, making decisions for the entire organisation and determining the manner in which the organisation responds to external pressures (Graham, 2020; Niemann *et al.*, 2016). Indeed, mention was made by Chen and Kitsis (2017) of the possible mediating role of top management commitment in the relationship between stakeholders' pressures and eco practices and by Agarwal *et al.* (2018) of the mediation role of TML in explaining the relationship between market pressures and GSCM.

Subsequently, scholars have focused on the potential mediating role of high-level management commitment, endorsement, or support in the relationship between external stakeholder demands and sustainable supply chain management (SSCM). The study by Li *et al.* (2019) demonstrated this relationship within the Chinese context when it found that the adoption of green practices is positively impacted by top management championship which is in turn, influenced by institutional pressure, ferocity of competition, and dynamic surroundings.

Likewise, Kitsis and Chen (2021) examined how top management commitment mediates the relationship between green supply chain practices and stakeholder pressures. 206 businesses from a range of US industries were sampled using the stakeholder theory, and the data was then analysed using PLS-SEM. The study discovered a favourable correlation between stakeholder pressures and green supply chain practices. This correlation is enhanced when senior management demonstrates a strong commitment to sustainability. According to the study, organisations with committed top management are more likely to adopt green initiatives and respond favourably to stakeholder pressure. This emphasises how important top management commitment is as a mediator that affects the adoption of environmentally friendly supply chain practices. The following hypotheses were developed after this review:

***H₇**: Top management leadership plays a mediating role in the relationship between institutional pressures and sustainable supply chain management practices.*

2.4 Conceptual Framework

The conceptual framework for this paper was presented in **Figure 1.**

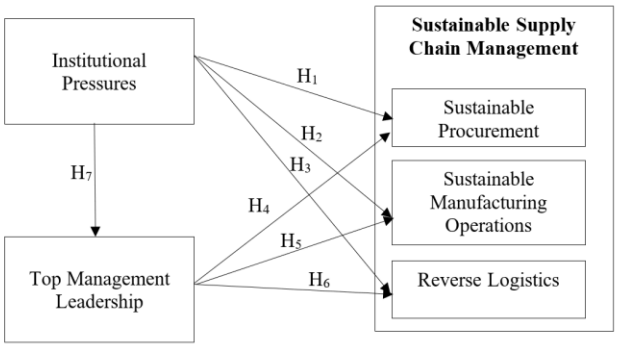

Figure 1 Conceptual framework

The conceptual framework in **Figure 1** illustrates the various hypotheses examined in the study. H_1 evaluated if institutional pressures favourably affect sustainable procurement. H_2 assessed how institutional pressures positively impact on operations related to sustainable manufacturing. H_3 looked into whether institutional pressures have a positive impact on reverse logistics. H_4 investigated the potential positive effect of top management leadership on sustainable procurement. H_5 looked at how top management leadership favourably affects operations related to sustainable manufacturing. H_6 evaluated if reverse logistics is positively impacted by top management leadership while H_7 tested if top management leadership plays a mediating role in the relationship between institutional pressures and sustainable supply chain management practices.

3. METHODS AND MATERIALS

The postpositivist paradigm of scientific inquiry was selected as the suitable philosophical framework for the study (Saunders *et al.*, 2009c; Creswell, 2013). This study

collected and analysed data from large samples using a quantitative research approach, which was appropriate for testing hypothesised relationships. An explanatory research design was chosen in light of the goals and quantitative methodology of this investigation. The seven major manufacturing sectors in Ghana food and beverage production, textiles and apparel, rubber and plastics, pharmaceuticals, wood and wood products, metals and aluminium smelting, and chemicals—were the focus of the study, which included all medium-sized and large-sized (ML) manufacturing companies operating in these sectors. The population size was 548 (Ghana Statistical Service, 2018a). **Table 1** presents a breakdown of these establishments.

From the ten clusters outlined in **Table 1**, the first three clusters with the highest largest population sizes, namely, Greater Accra (244), Ashanti (102), and Western (40) regions, were systematically selected for the study. These three regions collectively account for more than 70% (386) of all medium and large manufacturing establishments across Ghana (Ghana Statistical Service 2018a). As argued by Sedgwick (2014) and Coraggio and Coretto (2023) while each cluster has an equal chance of being selected, if the cluster sizes differ, the probability of selection may be adjusted in proportion to the sizes of the clusters. The operationalisation of variables was presented in **Table 2**.

Table 1 Distribution of population

No.	Category	No. of Firms	Percentage
1	Greater Accra	244	44.53
2	Ashanti	102	18.61
3	Western	40	7.30
4	Eastern	37	6.75
5	Volta	30	5.47
6	Northern	29	5.29
7	Central	25	4.56
8	Brong Ahafo	19	3.47
9	Upper East	11	2.01
10	Upper West	11	2.01
	Total	548	100

Table 2 Measurement of variables

Variable	Measurement	Sources
Institutional Pressures	*Regulatory pressures*	(Baah *et al.*, 2021; Baah *et al.*, 2020; Sarkis et al., 2011; Abdullah & Yaakub, 2017; Zhu *et al.,* 2013)
	National environmental regulations (such as waste emission, cleaner production etc.)	
	Export countries' environmental regulations	
	Environmental protection agency regulations	
	ISO compliance requirement to adopt sustainable practices	
	Customer pressures	
	There is pressure from the public to adopt sustainable practices	
	International market pressures	
	Pressures from local customers	
	Pressures from the news media	
	Competitive pressures	
	The majority of our rivals now use sustainable manufacturing techniques.	
	Our main competitors that have adopted a green strategy are perceived favourably	
	Our main competitors that have adopted a green strategy benefit greatly	
	Environmental friendliness and social responsibility are considered a competitive differentiator in my industry	
Top Management Leadership	Senior managers believe that social responsibility and environmental protection are an important part of corporate strategy	Dai *et al.* (2021), Zhu and Sarkis (2004), Kitsis and Chen (2021) Ye *et al*. (2013)
	Organisational vision/mission statements include environmental improvement	
	Preserving the environment is a central corporate value in our firm	
	Top management actively supports sustainable practices	
	Top management usually satisfies requests for resources necessary for improving sustainability	
	Employees are trained to address sustainability-related problems	
Sustainable procurement	Our firm gives priority to suppliers who comply with environmental and safety regulations	Carter & Rogers (2008), Zhu *et al.* (2013)
	Our firm gives priority to suppliers who have ISO 14000 certification	
	Equitable and ethical labour practices of our suppliers (freedom of association, child labour, discrimination, decent working conditions) are of concern to us	
	Our company procures products that can be recycled or reused	
	We build relationship with our suppliers to promote green products	
	We train our suppliers on sustainable practices	
Sustainable manufacturing operations	Our company has adopted energy-efficient manufacturing technologies	Abdul-Rashid *et al*. (2017); Liu *et al* (2017); Zhu *et al.* (2013); Kitsis and Chen (2020)
	This firm has adopted production processes that avoid raw material waste and high energy consumption	
	There is frequent staff training on green/sustainable practices	
	Our firm practices waste segregation in its operations	
	There is strict implementation of health and safety policies in our firm	
	This firm has an internal environmental management system (EMS)	
Reverse Logistics	There is a laid down procedure for returns of faulty goods	Hazen *et al.* (2011); Ye *et al*. (2013)
	We collect packages after use for reuse/recycling	
	The firm has provided designated locations and telephone numbers to aid customer feedback or returns of reusable packages and faulty products	
	The firm encourages returns of unsold/expired goods from retailers and wholesalers	
	We dismantle unusable returned products to recover renewable and reusable materials	

The questionnaire consisted of three sections: A, B, and C. Except for section C, all items were measured on a 1-7 one-directional scale, where higher scores indicated stronger agreement with the statements, and lower scores indicated weaker agreement. Section A gathered data on sustainable supply chain practices in manufacturing firms, including sustainable procurement (6 items), sustainable manufacturing operations (6 items), and reverse logistics (5 items). Section B included questions on institutional pressures (12 items) and top management leadership (6 items) related to sustainable supply chain management. Section C contained demographic questions. The data processing was done using SmartPLS v.3. the analytical tool was the partial least square structural equation modelling (Hair *et al.*, 2017; Wong, 2013). The process of analysis involved several steps. Initially, a measurement model evaluation was done to confirm the reliability and validity of the study's constructs. This required evaluating the composite reliability, convergent and discriminant validity, and indicator loadings. The data quality was guaranteed by the validation of the measurement model. After that, the structural model was looked at to verify the proposed theories and look into the relationships between the constructs. The strength and significance of these relationships were evaluated by carefully examining the path coefficients and significance levels, which shed light on the proposed connections.

The study used Harman's single factor test, which loads all questionnaire items onto a single factor, to test for common method bias (CMB). The total variance explained by this factor, according to the results, was 43.47%, which is less than the 50% threshold. Consequently, it was determined that the CMB is not likely to pose a significant challenge for this investigation (Kock, 2020). Moreover, the full collinearity assessment (FCA) with variance inflation factors (VIFs) for each latent variable is recommended in order to confirm CMB in PLS-SEM. After analysing each variable's VIF, any that had a value higher than 3.3 was eliminated from the analysis (Kock, 2020).

After the revised questionnaire was reviewed by subject matter experts, some questions were reworded, replaced, or removed based on their feedback. The draft instrument was reviewed by academics with substantial research expertise to establish face and content validity. To ensure the questionnaire's reliability, it was pretested by forty managers from various manufacturing companies located in the Central Region. Making use of the pre-test data, Cronbach's alpha was used to evaluate the internal consistency of the variables. Other measures of validity and reliability carried out by Hair *et al.* (2019) were the Heterotrait-Monotrait ratio, rho_a, rho_c, average variance extracted, and so on.

An emphasis was placed on the voluntary and unpaid nature of participation in the questionnaire. Participants were given assurances that their answers would remain private and anonymous. To prevent any connection to their answers, personal identifiers like names were not gathered. The researchers and participants collaborated to code participant data and aggregate the results. After reviewing the study to ensure it adhered to ethical standards, the Institutional Review Board at the University of Cape Coast gave it ethical clearance with reference number UCCIRB/CHLS/2022/67.

4. RESULTS AND DISCUSSION

4.1 Firm Characteristics of Manufacturing Firms

The firm characteristics of manufacturing firms in the Ashanti, Western Regions, and Greater Accra are presented in this section. Since the study's unit of analysis is the firm, the demographics of the manufacturing firms in the study accurately reflect their firm characteristics. The manufacturing category, ownership type, legal structure of the company, number of employees, age of the company, and ISO qualification status were the main topics of the statistics. These statistics are presented in **Table 3.**

Table 3 Demographic characteristics of manufacturing firms

Characteristic	Category	Frequency	Percent
Sector of Manufacturing	Food and Beverage	126	39.8
	Rubber and Plastics	27	8.5
	Pharmaceuticals	15	4.8
	Wood products	67	21.2
	Textiles	22	7.0
	Metals	41	13.0
	Chemicals	18	5.7
Ownership type	Foreign	96	30.4
	Domestic	194	61.4
	Joint	26	8.2
Age	<10 years	21	6.6
	10-20 years	126	39.9
	21-30 years	123	38.9
	31-50 years	29	9.2
	>50 years	17	5.4
Legal Form	Sole Trader	44	13.9
	Partnership	80	25.3
	Company	192	60.8
Number of Employees	31-100 employees	240	75.9
	>100 employees	76	24.1
Iso 14000 Certified	Yes	241	76.3
	No	75	23.7

4.2 Descriptive Statistics of Constructs

An overview of the respondents' perceptions pertaining to key constructs within the study is also presented in **Table 4** to offer insights into the central tendencies of the various constructs.

Table 4 Descriptive statistics of constructs

Concept /Variable	Mean	STDEV
Sustainable Procurement (SP)	5.26	1.41
Sustainable Manufacturing Operations (SM)	5.12	1.36
Reverse Logistics (RL)	4.95	1.31
Institutional Pressures (IP)	5.14	1.43
Top Management Leadership (TML)	5.06	1.36

4.3 Model Specification

With PLS-SEM, a model is specified by combining the constructs and their assigned indicators using arrows to show the hypothesised relationships (Hair *et al.*, 2014). Regarding the paper, the model was specified with five (5) latent variables, where two (2) of them (IPs and TML) were exogenous constructs and three (3) of them (SP, SM and RL) were endogenous constructs. Aside from being an exogenous variable, TML also played the role of a mediating variable between IP and the three endogenous variables. **Figure 2** presents the raw model where all the constructs and their assigned indicators were combined.

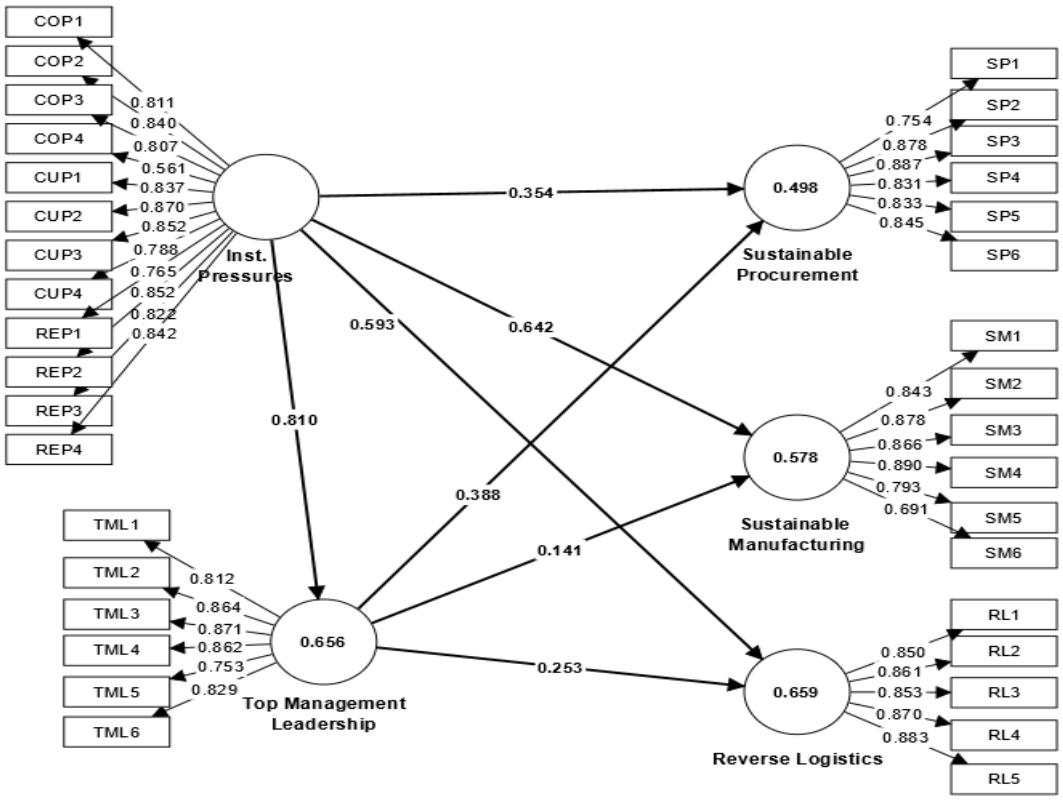

Figure 2 Inner and outer model output

The assessment is based on the rule that item loadings should be ≥ 0.708 for an indicator to truly measure its construct (Hair & Alamer, 2022; Hair *et al.*, 2021). According to Hair and Alamer (2022), items with higher loadings might still be disregarded if incorporating them would jeopardise the reliability, internal consistency, and convergent validity of the model. Regarding institutional pressures, COP3 (0.807), COP4 (0.561), CUP2 (0.870), CUP3 (0.852), REP1 (0.765) and REP2 (0.852) were removed; top management leadership (TML) had TML5 (0.753) and TML6 (0.829) deleted; sustainable procurement (SP) had SP2 (0.878) and SP3 (0.887) removed and sustainable manufacturing operations (SM) also had SM2 (0.878), SM4 (0.890) and SM6 (0.691) eliminated. After deleting the "weak" items and/or "problematic" indicators, the path or reflective model was then assessed in the next section.

4.4 Assesment of Measurement Model

Table 5 presents the general thresholds for the assessments as proposed by Hair *et al.* (2021) and Hair *et al.* (2019). Following the thresholds in **Table 5,** the results of the model's reliability and validity tests are presented in **Table 6.**

All the constructs in **Table 6** had rho-a values that were above the cut-off point, or 0.70 (i.e., in the range of 0.843 and 0.917). The measurement model's composite reliability is demonstrated by the higher than 0.7 Cronbach's alpha values and rhoc values above 0.60 (between 0.897 and 0.936). Convergent validity was achieved by the model, based on the threshold found in **Table 5.** This is because, as **Table 6** demonstrates, the AVEs for each of the constructs were all above 0.50, indicating a close relationship between the items measuring each construct.

Table 5 Measurement criteria thresholds

Measurement criteria	Recommended	Sources
Composite reliability (rho_c)	≥0.60	Hair et al. (2019)
Composite reliability (rho_a)	≥0.70	Dijkstra and Henseler (2015), Hair et al. (2017)
Cronbach's Alpha	≥0.70	Henseler et al. (2015)
Convergent validity (Average Variance Extracted (AVE)	>0.50	Henseler et al. (2015)
Discriminant validity (HTMT)	<0.90	Henseler et al. (2015)
Variance Inflation Factor (VIF)	≤ 3.3	Kock (2015)

Table 6 results of the model's reliability and validity test

Construct	Cronbach's Alpha	Rho_a	Rho_c	AVE
Institutional Pressures	0.915	0.917	0.934	0.702
Reverse Logistics	0.915	0.915	0.936	0.746
Sustainable Manufacturing	0.839	0.843	0.903	0.756
Sustainable Procurement	0.847	0.868	0.897	0.688
Top Management Leadership	0.908	0.912	0.935	0.783

Note: Composite reliability (rho_a and rho_c) and convergent validity (average variance extracted [AVE])

4.5 Assessment of Discriminant Validity

The measurement model was further assessed for discriminant validity (DV), as suggested by Hair *et al.* (2021). These approaches include "Fornell and Larcker (1981), cross-loadings and Heterotrait-Monotrait (HTMT) ratio". However, the study assessed the model's DV using the HTMT ratio due to its robustness compared to the other approaches (Ringle *et al.*, 2022). Unlike the others, HTMT is more robust in detecting DV in basic research. The model's HTMT is shown in **Table 7**.

Table 7 Heterotrait-monotrait ratio (HTMT)

Constructs	IP	RL	SM	SP
RL	0.839			
SM	0.797	0.845		
SP	0.736	0.788	0.890	
TML	0.742	0.692	0.577	0.672

Note: HTMT= Heterotrait-Monotrait Ratio; Institutional Pressures=IP; Reverse Logistics=RL; Sustainable Procurement=SP; Top Management Leadership=TML; Sustainable Manufacturing=SM

From **Table 7,** all the HTMTs values are below the 0.90 threshold, suggesting that discriminant validity is achieved. The HTMTs ranged between 0.577 and 0.890; this indicates that the constructs are distinct from each other.

4.6 Assessment of Structural Model

The model was assessed based on the following indices: multicollinearity, coefficient of determination ([R^2], adjusted R^2), predictive relevance (Q^2) (i.e., Stone-Giesser's test) and effect size (f^2) (Hair *et al.*, 2019; Memon *et al.*, 2021).

From **Table 8,** the adjusted R^2 value shows that IP and TML combine to linearly account for 47.3% of the change in SP. The adjusted R-square of reverse logistics shows that the antecedents, comprising top management leadership (TML) and institutional pressures (IP), account for 61.5% of the change in reverse logistics. Finally, the table revealed that 46.2% of any variation in TML is linearly accounted for by IP.

Table 8 Assessment of structural model

	R-square (R^2)	R-square adjusted	f-square (f^2)	Q^2	VIF
SP	0.475	0.473			
SM	0.493	0.491			
RL	0.617	0.615			
TML	0.464	0.462			
IP -> SP			0.252	0.360	1.864
IP -> SM			0.472	0.253	1.864
IP -> RL			0.564	0.267	1.864
TML -> SP			0.063	0.441	1.000
TML -> SM			0.003	0.369	1.864
TML -> RL			0.057	0.297	1.864

Note: Institutional Pressures=IP; Reverse Logistics=RL; Sustainable Procurement=SP; Top Management Leadership=TML; Sustainable Manufacturing=SM

If the impact of an exogenous construct (f^2) is larger than zero (0), then the exogenous construct influences the endogenous construct. The thresholds that Cohen (1988) proposed to interpret the f^2 are as follows: 0.02 for small, 0.15 for medium, and 0.35 for large. From **Table 8**, all the exogenous constructs had some effects on the endogenous constructs. In terms of size, the effects ranged from small (0.003) to large (0.564). Precisely, TML had the smallest f^2 on SM (0.003), while IP had a large f^2 of 0.472 on SM. This implies that IP affects SM better than TML. Also, IP had a large f^2 of 0.564 on RL, while TML had a small effect size of 0.057 on RL. Finally, IP had a medium f^2 of 0.252 on SP, while TML had a small f^2 of 0.063 on SP.

According to Sarstedt *et al.* (2014), Q^2 describes how well an empirical data can be redeveloped using the model and its PLS parameters. Sarstedt *et al.* (2014) suggested that the Q^2 of a given construct should be > 0 and "$0.02 \leq Q^2 < 0.15$ (weak), $0.15 \leq Q2 < 0.35$ (moderate) and $Q^2 > 0.35$ (strong). From **Table 8,** all the Q^2s were > 0 to suggest that all the exogenous variables can relevantly predict the endogenous variables. A model has no multicollinearity issues if the VIFs are lower than 3.3. From **Table 8,** all the VIFs for the path relationships were well below 3.3. The VIFs ranged between 1.0 and 1.864 to show that the structural model has no multicollinearity issues. The structural model presented in **Figure 3** illustrates how institutional pressures and sustainable supply chain management strategies are mediated by top management leadership.

4.7 Assessment of Path Relationships

The significance levels were evaluated using 5000 bootstraps (Hair *et al.*, 2019) and their t-stats and path coefficients (β-value) were presented and interpreted. The path relationship between the constructs is statistically significant if its t-stat is ≥ 1.96. The β-value describes the

strength and direction of each hypothesis with the following rules: β-value < 0.29 (weak), 0.29 - 0.67 (moderate) and > 0.67 (strong) (Gignac & Szodorai, 2016; Sullivan & Feinn, 2012; Wetzels *et al.*, 2009). **Table 9** presents the results of the path relationships of hypotheses.

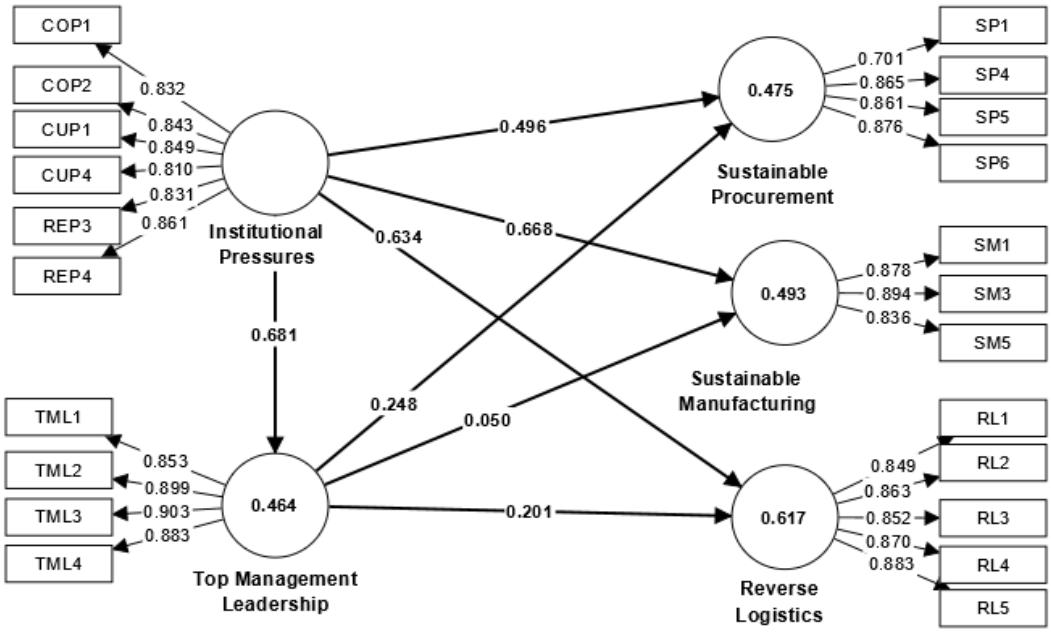

Figure 3 Final model output

Table 9 Results from hypotheses test and decision rule

Structural Path	Path Coefficient (β)	STDEV	T-stat	P value	Decision Rule
Direct Effects					
IP ➔ SP	0.496	0.046	10.789	0.000	H_1 (supported)
IP ➔ SM	0.668	0.043	15.549	0.000	H_2 (supported)
IP ➔ RL	0.634	0.046	13.762	0.000	H_3 (supported)
TML ➔ SP	0.248	0.053	4.639	0.000	H_4 (supported)
TML ➔ SM	0.050	0.046	1.077	0.282	H_5 (unsupported)
TML ➔ RL	0.201	0.049	4.122	0.000	H_6 (supported)
Indirect Effects					
IP ➔TML➔SP	0.169	0.037	4.522	0.000	H_{7a} (supported)
IP ➔TML➔SM	0.034	0.032	1.062	0.288	H_{7b} (unsupported)
IP ➔TML➔RL	0.137	0.034	3.981	0.000	H_{7c} (supported)

4.8 Discussion

4.8.1 Effect of Institutional Pressures on Sustainable Supply Chain Management Practices

The results in **Table 9** for hypothesis one (H_1) implies that institutional pressures arising from regulatory authorities, customer pressures and competitive pressures are key antecedents of sustainable procurement within Ghana's manufacturing industry. This implication supports the institutional theory, which argues that the presence of institutional pressures or environments push organisations to adopt certain practices including sustainable procurement. Empirically, Kausar *et al.* (2017); Gardas *et al.* (2019); Etse *et al.* (2022) and Dai *et al.* (2021) concluded that government policies, competitive pressure, stakeholders' expectations and requirements and regulations play a key role in compelling Ghanaian organisations to adopt sustainable procurement.

On hypothesis two (H_2), the results suggest that institutional pressures compel Ghanaian manufacturing firms to adopt sustainable manufacturing practices. The institutional theory, which contends that organisations are impacted by pervasive institutional pressures to incorporate sustainable practices into their operations and decision-making, is supported by this finding. Empirical studies by Gouda and Saranga (2020), Baah *et al.* (2021), and Balda and Singh (2022) have similarly concluded that pressures from regulatory stakeholders, international standards, government regulations, competitive forces, and customer demands are significant drivers for adopting sustainable manufacturing practices in developing countries. In contrast, firms in developed countries are often motivated by premium incentives (Gouda & Saranga, 2020).

Finally, for hypothesis three (H_3), the results indicate that pressures from regulators, customers, and competitors drive manufacturing firms to implement reverse logistics

practices. This finding aligns with institutional theory, which suggests that external pressure from significant stakeholders plays a major role in the adoption of sustainable supply chain management (SSCM) techniques like reverse logistics. Afum *et al.* (2019), Acquah *et al.* (2021), and Etse *et al.* (2022) discovered that to promote environmentally conscious behaviour in Ghanaian manufacturing SMEs, normative, coercive, and mimetic isomorphic pressures are required.

4.8.2 Effect of Top Management Leadership on Sustainable Supply Chain Management Practices

The results presented in **Table 9** for hypothesis four (H_4) suggest that when top managers in Ghanaian manufacturing firms actively lead and make decisions that support sustainability, it enhances the adoption of sustainable procurement practices. Stakeholder theory lends support to this conclusion by highlighting the critical role that stakeholders especially top managers play in ensuring that businesses incorporate sustainable practices like sustainable procurement. Empirical research by Niemann *et al.* (2016), Rasool *et al.* (2016), and Liu *et al.* (2020) shows how important internal elements like top management are to the advancement of sustainable supply chain management (SSCM) practices.

The results for hypothesis five (H_5) indicate that the adoption of sustainable manufacturing operations by manufacturing firms does not necessarily depend on top management involvement or support. These finding challenges stakeholder theory, which posits that internal forces, such as top management leadership, directly influence organizational practices (Freeman, 1984). This shows that top management leadership may not be as important in encouraging businesses to adopt sustainable operations, even though internal and external stakeholders can.

The findings for hypothesis six (H_6) indicate that senior management's commitment and support are critical to the effective adoption of reverse logistics in Ghanaian manufacturing companies. Adopting reverse logistics practices requires the involvement of top management, since they are the ones who make strategic decisions. This result is consistent with the theories of stakeholders and the natural resource-based view, which contend that companies can gain a competitive edge by implementing sustainable practices, such as reverse logistics, provided that senior management actively promotes sustainability programs (Freudenreich *et al.*, 2020). Along with other stakeholder pressures, empirical studies by Bouzon (2015), Afum *et al.* (2019), and Hong *et al.* (2022) also demonstrate that top management plays a significant positive role in the adoption of reverse logistics.

4.8.3 Mediating Effect of Top Management Leadership in the Relationship between Institutional Pressures and Sustainable Supply Chain Management Practices

Table 9 presents the findings for hypothesis seven (H_7). The testing of this hypotheses was divided into three sub hypotheses (H_{7a}, H_{7b}, and H_{7c}). The findings for H_{7a}, suggests that there is a significant positive partial mediating effect of top management leadership (TML) on the relationship between institutional pressures (IP) and sustainable procurement (SP). This suggests that while external pressures from customers, regulators, and competitors can drive Ghanaian manufacturing firms to adopt sustainable procurement practices, active involvement from top management further enhances this initiative. This result corroborates the findings of Kitsis and Chen (2021) and Etse *et al.* (2022), who also discovered that strong senior management commitment amplifies the influence of stakeholder pressures on green supply chain practices and that leadership support mediates the relationship between institutional pressures and sustainable procurement practices.

However, the findings for H_{7b} show that, in the Ghanaian manufacturing setting, institutional pressures and sustainable manufacturing (SM) are not significantly mediated by TML. This suggests that the adoption of sustainable manufacturing practices may be directly impacted by institutional pressures, such as competitive, regulatory, and customer demands, without necessarily needing top management support. Although this seems to contravene the stakeholder theory, this finding might be highlighting potential conflicts among stakeholders noted by the stakeholder theory. Sustainable manufacturing operations are typically capital intensive, requiring investment in modern technologies and extensive personnel training. The decision to allocate resources for these technologies may, therefore, rest with shareholders, as it can significantly affect their wealth maximization. As a result, top management may have no say in such investments, as they act as stewards of the firm's resources rather than owners.

The findings on H_{7c} demonstrate that TML plays a significant positive partial mediating role in the connection between institutional pressures and reverse logistics (RL). This shows that by actively supporting sustainability initiatives, senior management in Ghanaian manufacturing companies can increase the impact of external pressures from clients, competitors, and authorities. Reverse logistics may be adopted because of this. This study adds to the body of literature by demonstrating how dedicated top management can promote the adoption of sustainable practices like reverse logistics, a nexus that has been scarcely investigated.

5. CONCLUSIONS AND IMPLICATIONS

5.1 Conclusions

The study concluded that institutional pressures, such as regulatory, customer, and competitive forces, play a significant role in driving the adoption of sustainable procurement, sustainable manufacturing, and reverse logistics among manufacturing firms in Ghana. Additionally, the inclusion of sustainability practices within corporate strategies, visions, missions, and training programs under the guidance of top management leadership enhances the effectiveness of sustainable procurement and reverse logistics practices in these firms. Furthermore, top management leadership was found to mediate the influence of institutional pressures on the adoption of sustainable supply chain practices, suggesting that the commitment of leadership is essential in translating external pressures into actionable sustainability initiatives within the manufacturing sector in Ghana. Thus, for sustainable supply chain initiatives to be successful, top management need to get involved and provide the necessary leadership and support.

5.2 Implications

To incentivise manufacturing companies in Ghana to implement sustainable supply chain practices, the government should endeavour to craft and enforce robust environmental and social regulations through entities like the Ghana Standards Authority, Food and Drugs Authority, Environmental Protection Agency, and Ministry of Environment, Science, Technology, and Innovation (MESTI). These rules may include precise goals for cutting greenhouse gas emissions, conserving water and waste, and guaranteeing moral labour standards and ethical raw material procurement.

By demonstrating how various theoretical stances can be combined to explain ideas connected to sustainable supply chain management, this study advances theoretical understanding. It demonstrates how institutional pressures, and the adoption of sustainable practices are mediated by top management, an internal stakeholder, highlighting the complementary nature of stakeholder and institutional theories.

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APPENDIX 1 : DIMENSIONS OF SUSTAINABLE MANUFACTURING PRACTICES

SP	**Sustainable Procurement**
SP1	Our firm gives priority to suppliers who comply with environmental and safety regulations
SP2	Our firm gives priority to suppliers who have ISO 14000 certification
SP3	Equitable and ethical labour practices of our suppliers (freedom of association, child labour, discrimination, decent working conditions) are of concern to us
SP4	Our company procures products that can be recycled or reused
SP5	We build relationship with our suppliers to promote green products
SP6	We train our suppliers on sustainable practices
SM	**Sustainable Manufacturing Operations**
SM1	Our company has adopted energy-efficient manufacturing technologies
SM2	This firm has adopted production processes that avoid raw material waste and high energy consumption
SM3	There is frequent staff training on green/sustainable practices
SM4	Our firm practises waste segregation in its operations
SM5	There is strict implementation of health and safety policies in our firm
SM6	This firm has an internal environmental management system (EMS)
RL	**Reverse Logistics**
RL1	There is a laid down procedure for returns of faulty goods
RL2	We collect packages after use for reuse/recycling
RL3	The firm has provided designated locations and telephone numbers to aid customer feedback or returns of reusable packages and faulty products
RL4	The firm encourages returns of unsold/expired goods from retailers and wholesalers
RL5	We dismantle unusable returned products to recover renewable and reusable materials

APPENDIX 2: ANTECEDENTS OF SUSTAINABLE MANUFACTURING PRACTICES

	Institutional Pressures
REP1	National environmental regulations (such as waste emission, cleaner production)
REP2	Export countries' environmental regulations
REP3	Environmental protection agency regulations
REP4	ISO compliance requirement to adopt sustainable practices
CUP1	There is pressure from the public to adopt sustainable practices
CUP2	International market pressures
CUP3	Pressures from local customers
CUP4	Pressures from the news media
COP1	Our main competitors have adopted sustainable manufacturing practices
COP2	Our main competitors that have adopted a green strategy are perceived favourably
COP3	Our main competitors that have adopted a green strategy benefit greatly
COP4	Environmental friendliness and social responsibility are considered competitive differentiators in my industry
TML	**Top Management Leadership**
TML1	Senior managers believe that social responsibility and environmental protection are an important part of corporate strategy
TML2	Organizational vision/mission statements include environmental improvement
TML3	Preserving the environment is a central corporate value in our firm
TML4	Top management actively supports sustainable practices
TML5	Top management usually satisfies requests for resources necessary for improving sustainability
TML6	Employees are trained to address sustainability-related Problems

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