

Sustainable Supply Chain Practices and Organisational Performance: The Mediating Role of Firm Competition

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Abstract

Environmental issues are becoming major concerns for many supply chain management practitioners. Product disposal regulations have also led to firms adopting sustainable supply chain practices. This study assessed the effect of sustainable supply chain practices on organizational performance with firm competition serving as a mediating factor from an emerging economy perspective using the institutional theory and the ecological modernization theory as underpinning theories. Data from 195 firms were employed and analysed using SPSS (v.25) and the Hayes Macro Process. The results established green packing as the most practiced sustainable supply chain practice in Ghana. Green manufacturing has a positive effect on the environmental performance and the operations performance of manufacturing firms. Green purchasing was also identified to have a positive impact on the environmental but not on the operations performance of manufacturing firms. Green packaging also, has a positive impact on both the environmental performance of manufacturing firms and their operations performance. Furthermore, the result of the study concluded that reverse logistics do not positively influence environmental performance but positively influence the operations performance of manufacturing firms. Firm competition was identified to mediate the relationship between sustainable supply chain practices and organizational performance of manufacturing firms.

Keywords

Sustainable supply chain practices, organisational performance, green purchasing, green manufacturing, green packaging, reverse logistics, firm competition.

1. Introduction

The adoption of sustainable supply chain management practices in the context of manufacturing sector is important due to the negative impact of the manufacturing sector on the environment (Wu, 2013). In emerging economies like Ghana, the conceptualization as well as the implementation standards of sustainable supply chains are relatively immature which results in a lot of uncertainty surrounding sustainable supply chain practices implementation (Geng et al. 2017; Golicic and Smith 2013; Liu et al. 2020). More companies in both developing and the developed economies have resorted to adopting sustainable and green supply chain practices in order to meet the requirements of pressure groups, governments, investors and consumers to be environmentally responsible as well as a means of penetrating new markets and gaining competitive advantage (Agyabeng-Mensah et al. 2020; Khan and Qianli 2017; Wu 2013).

Organizations vary widely in their idea of sustainability. Some view sustainability from a very narrow perspective looking only internally into the organization and its practices. Such organizations may consider themselves sustainable by engaging in practices such as going paperless, upcycling, recycling, monitoring their energy consumption, using green products etc. While others take a broader view of sustainable practices that extends beyond the organizational boundaries to include suppliers and partners. Their notion of sustainability goes much deeper and farther (Chungyalpa 2019). In a competitive environment, where customers are becoming environmentally conscious, adopting sustainable supply chain practices may lead to an improvement in the performance of the firm as consumers prefer to make purchases from firms that adopt the use of sustainable supply chain practices (Agyabeng-Mensah et al. 2020) (Agyabeng-Mensah et al., 2019).

Though studies have been carried out on the impact of sustainable supply chain practices and firm performance, most of the studies used different proxy for firm performance. For instance, a study by Schmidt et al. (2017) adopted social performance and financial performance to measure firm performance. Choi et al. (2017) used environmental performance, technical performance and economic performance as a measure of firm performance. Chiu and Hsieh (2016); Choi et al. (2018) used manufacturing and marketing performance as indicators of firm performance. However, a review of the extant literature shows a paucity of studies focusing exclusively on non-financial performance measures as a measurement of firm performance in relation to sustainable supply chain practices. This is a grey area in the academic literature that needs to be further investigated. The non-financial performance indicators are able to tell the performance of the firm better as compared to the financial performance indicators especially in an era where there is a lot of manipulation of financial data by firms in order to improve their company value.

Also, studies carried out on sustainable supply chain practices have employed different research methods for different industries. Luthra et al. (2017) employed MCDM methods to explore the critical success factors and barriers to sustainable supply chain management in the Indian industry. Mathivathanan et al. (2018) explored the sustainable supply chain practices in the Indian automotive industry using survey/DEMATEL analysis whilst Pinto et al. (2018) studied the sustainable practices of BRICS countries and in Ghana, Adegokeet al. (2021) studied the impact of sustainable supply chain practices on organizational performance and Famiyeh et al. (2018) studied green supply chain management initiatives and operations competitive performance. However, none of these studies considered the mediating role of firm competition indicating a major gap in the literature that needs to be closed. Therefore, to answer this call this study adopts firm competition as a mediating variable. Organizations adopt sustainable practices in order to enhance their image in the marketplace and to effectively compete in the industry. An enhanced image is able to give the organization the edge to remain above the competition in the industry. These gaps motivated the need to carry out further study on how sustainable supply chain practices affect the performance of firms within the manufacturing industry and how the competition in the industry mediates this relationship.

1.1 Objectives

The main objective of the study is to examine the relationship between sustainable supply chain practices and organizational performance and to determine the mediating effect of firm competition on this relationship.

The specific objectives of the study are to:

1. Ascertain the dominant sustainable supply chain practices in the manufacturing industry in Ghana.
2. Determine the relationship between sustainable supply chain practices and organizational performance in the manufacturing industry in Ghana.
3. Assess the mediating role of firm competition in the relationship between sustainable supply chain practices and organizational performance in the manufacturing industry in Ghana.

2. Literature Review

In this section, we elaborate on the institutional and ecological modernization theories and sustainable supply chain practices concepts in Ghana to develop a sound theoretical foundation for the study. Hypotheses have also been developed as a result of the review to determine the associated relationships between the concepts.

Institutional theory posits that organizational behaviour may be impacted by external norms and values as well as rational economic judgments (Sarkis et al. 2010). Coercive pressures are influences applied by authority, primarily from governments, that cause people to comply (Zhu et al. 2013). Organizations strive to be viewed as behaving

properly as a result of normative pressure. External stakeholders usually apply this kind of pressure. Governance pressure is frequently examined as coercive pressure in the SSCM context because firms are forced to comply with government-formulated and enforced laws and regulatory policies (such as environmental regulatory and tax policies) relating to environmental protection and social responsibility (Chu et al. 2018). Institutional theory offers insight into the acceptance of SSCM initiatives through the driving factors of governance, customer, and competitive pressures. Following previous research on environmental management and SSCM (Chu et al. 2018; Zeng et al. 2017; Zhu et al. 2005) this study uses institutional theory to argue that firms engaging in SSCM practices are primarily driven by governance, customer, and competitive pressure.

The ecological modernization theory is based on the assumption that businesses must work together to modify their business operations in order to achieve environmental preservation and protection (Andersen and Massa 2000). It has been proposed that incorporating environmental considerations into supply chain operations provides businesses with a number of options to contribute to the economic, social, and environmental development of the nations in which they operate (Ofori Antwi et al. 2022). Incorporating such techniques into supply chain operations, on the other hand, causes damage to society by releasing dangerous compounds into the environment. Huge amounts of money are spent to remove such pollutants from the environment, money that might have been better spent on other initiatives that would benefit society as a whole. Such businesses are forced to pay large penalties, which have a negative impact on their economic, social, and environmental sustainability (Bergendahl et al. 2018; Dauda 2019; Ewing 2017).

With the growing relevance of sustainability, Supply Chain Management (SCM) researchers are incorporating sustainability into SCM to help advance the subject (Hong et al., 2018). In order to achieve SSCM, a company must establish its values and morals across the whole business, implement flexible and efficient IT systems, and implement corporate strategies that concentrate on long-term growth. Carter and Rogers (2008). Environmentally sustainable design, inventory management, remanufacturing production planning and control, product recycling, reverse logistics, waste management, energy consumption, and decreased emissions are all related with SSCM processes (Ramudhin et al., 2010).

In recent years, managers of manufacturing companies have come to the realization that the benefits of green manufacturing are not limited to short- and long-term cost savings only, but also serve as a significant precursor to improvements in environmental, social, and economic performance. Manufacturing companies that use environmentally friendly manufacturing practices are more likely to experience a win-win relationship, which often translates into enhanced environmental performance (Zhu et al. 2019). In effect, models relating to green supply chain management can be adopted to harness the impact of environmental difficulties and increase environmental performance (El-Kassar and Singh 2019). In addition, Abdul-Rashid et al. (2017) discovered that Malaysian manufacturing companies who implemented sustainable practices had a tendency to increase their overall sustainable performance. There is evidence to support the claim that environmentally responsible manufacturing favourably promotes sustainable performance. Following the findings of a study carried out by Li and Zhang (2018), green manufacturing has a good effect on the environment since it results in a decrease of waste, gases emitted, and the use of virgin resources. Digalwar et al. (2017) hypothesize that successful adoption of environmentally responsible manufacturing practices results in quality improvements as well as cost savings throughout production. Sezen and Çankaya (2013) revealed that eco-innovative processes improve sustainability performance. This is due to the fact that green manufacturing decreases production inefficiencies and lowers the cost of materials. Based on the empirical evidence, it is hypothesized that:

H1a: *Green manufacturing has a positive effect on the environmental performance of manufacturing firms.*

H1b: *Green manufacturing has a positive effect on the operations performance of manufacturing firms.*

Foo (2021) maintains that, the adoption of green purchasing practices has a substantial impact on the overall performance of companies. According to Song et al. (2017), environmentally responsible buying has the potential to improve relationships with suppliers, save costs, and have a less effect on the environment. Al-Ghwayeen and Abdallah (2018) found that Green Supply Chain Management had a favourable and substantial impact on the environmental and export performance of the companies. Another recent research came to a similar conclusion, stating that higher operational and environmental performances may be achieved through the use of environmental management principles (Famiyeh et al. 2018). Al-Ghwayeen and Abdallah (2018) also discovered that GSCM has a favourable and substantial impact on both environmental and operational performance. Famiyeh et al. (2018) came to a similar conclusion, stating that the deployment of environmental management methods leads to higher performance in both the operational and environmental domains. Subsequently, it is hypothesized that:

H2a: Green purchasing has a positive impact on the environmental performance of manufacturing firms.

H2b: Green purchasing has a positive impact on the operations performance of manufacturing firms.

The findings of earlier research on the connection between green packaging and environmental performance might be categorized as being of a mixed quality. For example, one research conducted on Turkish manufacturing companies found that green packaging does not substantially contribute to environment performance (Yildiz Çankaya and Sezen, 2019). This may be related to the fact that green packaging places a lower priority on the improved environmental sustainability of suppliers as well as the inefficient procedure that enterprises follow (Eltayeb et al. 2011). Jawaad and Zafar (2020) observed that there is a positive association between green packaging and environmental performance. Based on the findings of research conducted by Afif et al. (2022), sustainable packaging has a favourable impact on the environmental, social, and economic performance of businesses. Simple changes to the packaging used by a small to medium-sized business might have a significant impact on the company's overall success. Sajuyigbe et al. (2013) came to the same conclusion that packaging has an effect on the performance of an organization. Kumar et al. (2017) bolster the positive connection between environmentally friendly packaging and the performance of businesses. This study focused on environmentally friendly activities for the sustainability of businesses and the creation of value. The investigation provides more evidence to support arguments made in the past that environmentally friendly packaging may assist companies in improving their overall performance (Kumar et al. 2017). Therefore, the study hypothesized that:

H3a: Green packaging has a positive impact on the environmental performance of manufacturing firms.

H3b: Green packaging has a positive impact on the operations performance of manufacturing firms.

Businesses are required to continually monitor and analyse their reverse logistics performance to guarantee that it will be sustainable. However, only a limited number of research analyses the concerns of sustainability from the perspective of reverse logistics and investigate the probable interrelationships between these difficulties. It would be to everyone's advantage to look at the connection between reverse logistics and environmentally responsible growth (Govindan et al. 2015; Govindan and Soleimani 2017). The social dimensions of sustainability, particularly its application to reverse logistics, have received a less amount of investigation, and there is a need for study in this area (Geng et al. 2017; Sarkis et al. 2010; Vahabzadeh and Yusuff 2015). The corporate goals and the strategy for the reverse logistics function need to be linked. Innovation in reverse logistics has been shown to have a good relationship with environmental and economic performance Huang and Yang (2014), and a favourable effect on business performance (Vlachos 2016). It has been discovered that the use of reverse logistics has a beneficial effect on the performance of remanufacturing operations (Bag et al. 2019). The study therefore hypothesized that:

H4a: Reverse Logistics has a positive effect on the environmental performance of manufacturing firms.

H4b: Reverse Logistics has a positive effect on the operations performance of manufacturing firms.

Studies have shown that competition in the business environment plays a significant role in the adoption of sustainable environmental practices by firms (Kagan et al. 2002; Zhu et al. 2005). Carter and Carter (1998) as cited in Zhu et al. (2005) noted that competition have exerted pressure on manufacturers to adopt and implement environmental purchasing which is an aspect of green supply chain management practices. This indicates that competition among firms may lead to firms improving their environmental performance. Duanmu et al. (2018) noted that with increasing foreign competition, firms have been compelled to improve their environmental practices. The review of the literature indicates that sustainable supply chain practices proxied by environmental performance and operation performance is influenced by competition in the industry. Based on the above, the study hypothesized that

H5: Firm Competition mediates the direct relationship between sustainable supply chain management practices and firm performance.

3. Methods

The study adopts quantitative research methods as it seeks to answer the questions to what extent sustainable supply chain practices influence firm environmental performance. The cross-sectional survey design was employed for the data collection from manufacturing firms located in Accra and Kumasi. The choice of Accra and Kumasi is apt because the manufacturing industries in the country are concentrated within these regions. The study adopted the use of Cochran (1977) formula for the calculation of the sample size with an unknown population, the minimum sample size for the study was 384 firms. However, the researchers added 10% of the minimum sample size calculated to cater for unresponsiveness from the study participants hence the total sample size was 423 firms. The convenience sampling (for firms) and purposive sampling (supply chain, procurement or operations managers) techniques were employed to select the participating organisations and the respondents respectively. The data collection was restricted to one

manager per firm hence the total respondents for the study was 423. The study adopted the use of both descriptive statistics and inferential statistics. The ordinary least square (OLS) method was adopted in order to minimize the sum of squares residuals and be able to generalize the findings. Data analysis was carried out using SPSS (v.25.0) and Hayes MACRO-PROCESS (V.4.0). The theoretical regression model for the study was,

$$OP = \beta_0 + GM_{x1i} + GP_{x2i} + GPK_{x3i} + RV_{x4i} + CO_{x5i} + \varepsilon_i$$

Where OP refers to the operational performance of the firm; GM = Green Manufacturing; GP = Green Purchasing; GPK = Green Packaging; RV = Reverse Logistics; CO = Firm Competition; β is the constant term; ε is the error term.

4. Data Collection

As a research instrument, the study adopted the use of a self-administered structured questionnaire. The questionnaire was in four parts. Section A was on the demographic characteristics of the respondents and their firm. Section B of the questionnaire measured the sustainable supply chain practices of the manufacturing firms on a five-point Likert Scale. Section C of the questionnaire measured the performance of the firm; Section D measured the firm competition. The items for the questionnaire were adapted from previous research with high validity of the research scale. The data collection lasted for 8 weeks. Participation on the part of respondents was entirely voluntary. No respondent was coerced into taking part in the investigation. The reliability of the scale adopted Cronbach alpha value apart from the green manufacturing construct, which recorded a Cronbach alpha value of 0.667, all the other constructs were above the 0.70 acceptable level indicating the constructs adopted for the study were reliable. The construct for the green manufacturing was included in the study based on the study of van Griethuijsen et al. (2015) who reported that a Cronbach value of 0.7 to 0.6 is acceptable in a study. 195 questionnaires were properly filled and returned giving a response rate of 46.1%. This response rate is considered sufficient relative to the recommendation of Baruch (1999) who indicated that a response rate of 60%, +/- 20 is considered reasonably acceptable and would not generate validity issues. 24.1 % of the firms have been in existence over the past 21 years. 26.7% of the respondents were Agro-based manufacturing firms. The male respondents formed 70.3% of the total respondents. In terms of the years of experience with the current organization, the results indicated that 51.3% of the respondents have been in their current post within the last five years.

5. Results and Discussion

This section discusses the findings in relation to the objectives of the study. The first objective of the study was to ascertain the dominant sustainable supply chain practices in the manufacturing sector in Ghana.

The mean scores reveal that, of all the sustainable supply chain practices constructs adopted by the study, the most practiced sustainable supply chain practice is the green packaging (3.845). The other methods of sustainable supply chain practices adopted by the study: green purchasing (3.834), reverse logistics (3.817) and green manufacturing practices (3.653) practices are also adopted by manufacturing firms in Ghana. The finding of the study is supported by Feber et al. (2021) who reported that consumers in developing countries perceive sustainable packaging to be a top priority for food-related products. These could be a reason why manufacturing firms in developing economies such as Ghana are much concerned about practicing eco-friendly packaging. Feber et al. (2021) further noted that emerging markets remain the key growth market for many packaging companies to target hence with a strong increase in concern around sustainability by consumers, it is critical to think through the eco-packaging strategy of manufacturing firms operating in developing economies such as Ghana in order to make their operations sustainable. Furthermore, a study by McKinsey (2022) indicated that sustainability in packaging is a mega trend with consumers becoming increasingly worried about the environment and the impact of packaging leakage. Furthermore, the result of the study indicated that the other methods of sustainable supply chain practices adopted by the study which are green manufacturing practices, green purchasing and reverse logistics practices are also adopted by manufacturing firms in Ghana. Sustainable manufacturing seeks to introduce and streamline ways to reduce pollution and waste through green manufacturing practices and materials. Therefore, a company that is operating more sustainably is more likely to have a better reputation, and thus more people will buy from them. As such, manufacturing companies should look to enhance their sustainable supply chain practices. This would highlight how they plan to increase their sustainability, acknowledging that they have a part to play in helping the environment, and will accept this responsibility.

The second objective of the study was to assess the relationship between sustainable supply chain practices and firm performance. This objective led to the development of eight hypotheses. Table 2 below presents their analytical results. The first hypothesis (H1a) of the study (β value of 0.289, and P-value of 0.000 as presented in Table 1 below) indicated that green manufacturing has a positive effect on the environmental performance of manufacturing firms. This hypothesis of the study was confirmed. Over the last couple of decades, there have been an increase in the demand for

a green economy and issues of sustainability which has necessitated the need for manufacturing firms to operate in a sustainable manner. The result of the study supports the work of Yildiz Çankaya and Sezen (2019) who reported a positive relationship between green manufacturing practices and sustainable performance in Turkey. The result of the study further supports the work of Abdul-Rashid et al. (2017) who reported green manufacturing processes had a significant influence on sustainable performance. The implications of this finding on manufacturing firms are that, when they adopt sustainable manufacturing practices, it leads to an improvement in the environment which may trickle down to the overall performance of the firm as consumers are concerned about doing business with firms that are environmentally conscious.

The second hypothesis (H1b) of the study (β value of 0.259 and P-value of 0.002 as presented in Table 1 below) postulated that green manufacturing has a positive effect on the operations performance of manufacturing firms. This hypothesis was confirmed. In a similar finding, Musau and Rucha (2021) concluded from their study that green manufacturing practices enhanced the operations performance of manufacturing companies in Kenya. Furthermore, the result of the study supports the work of Shrivastava and R.L. (2017) who concluded from their study that Indian cement manufacturers were able to improve their operations performance by cutting down costs and waste through the adoption of green manufacturing practices. The result of the study further supports the work of Eshikumo and Odock (2017) who reported that green manufacturing techniques such as using energy-efficient procedures improve the operational performance of the manufacturing firm by lowering costs. The implication of the finding of the study indicates that when manufacturing firms makes the adoption of green manufacturing practices as key components of their processes, the firms turn to improve their operations performance. This may be achieved through a sustainable management of energy and water in their manufacturing processes which may lead to cost reduction and an improvement in their operations' performance.

The third hypothesis (H2a) of the study ($\beta=0.227$ and $p\text{-value}=0.005$ as presented in Table 1 below) postulated that green purchasing will have a positive impact on the environmental performance of manufacturing firms. This hypothesis was supported by the result of the study. The result of the study supports the work of Foo (2021) who reported that the adoption of green purchasing improves environmental performance of the firm. The study result also supports the work of Song et al. (2017) who also reported that adopting responsible environmentally purchasing behavior leads to the firm having less effect on the environment. With most consumers now expecting businesses to act responsibly and to seek to protect the environment, the reputation of the firm is at stake if it chooses not to adhere to green purchasing processes. Long-term sustainable strategies such as green purchasing may help the firm to make greater savings and forecast future costs more accurately.

The fourth hypothesis (H2b) of the study ($\beta=0.083$ and $p=0.380$ as presented in Table 1 below) indicated green purchasing has a positive impact on the operations performance of manufacturing firms. This hypothesis of the study was not supported by the result of the study. This result conflicts with the work of Large and Gimenez Thomsen (2011) who concluded from their study that there is a positive relationship between performance and green purchasing behavior of the firm. The result however supports the findings of Yildiz Çankaya and Sezen (2019) who, similarly, did not find a positive relationship between green purchasing and the performance of the firm, concluding from their study that green purchasing is external to the firm hence requires collaboration between the firm and its suppliers to achieve some meaningful impact. The implication of the study is that when firms adopt green purchasing in their operations, they do not really see a positive impact on their operations performance. This could be due to the fact that green purchasing comes with enormous cost as firms would have to source from suppliers who adhere to similar green purchasing practices. Items sourced from green sources are deemed to come with extra cost in a bid to protect the environment hence most manufacturing firms may adopt such practices in a bid to cut down costs.

The fifth hypothesis (H3a) of the study (β of 0.257 and $p\text{-value}$ of 0.003 as presented in Table 1 below) indicated that green packaging has a positive impact on the environmental performance of manufacturing firms. This hypothesis was supported by the result of the study. The result of the study conflicts with the work of Yildiz Çankaya and Sezen (2019) who reported a negative impact of green packaging on environmental performance. The result of the study is however supported by Jawaad and Zafar (2020) who reported a positive impact of green packaging on environmental performance. To manufacturing firms in Ghana, the result of the study indicates that when green packaging practices are adopted, it helps to protect the environment. Packaging especially plastic is one of the worlds' challenges as they are non-degradable and causes serious environmental concerns for consumers. Consumers are therefore looking for responsible organizations that adopt measures to protect the environment. In light of this, when manufacturing firms adopt green packaging, they tend to safeguard the environment which may improve their reputation among consumers.

The sixth hypothesis (H3b) of the study (β of 0.376 and p-value of 0.000 as presented in Table 1 below) indicated that green packaging has a positive impact on the operations performance of manufacturing firms. This hypothesis was supported by the result of the study. Green packaging is used to demonstrate the company's commitment to environmental sustainability and to increase the brand's popularity. The finding of the study confirms evidence from Ifeanyi et al. (2018) who established that performance of the firm is positively affected by a simple new packaging. This finding further supports the work of Sajuyigbe et al. (2013) who concluded that green packaging has a positive effect on organizational performance. This finding confirms the work of Kumar et al. (2017) who concluded that green packaging positively affects the operations performance of the firm. With green packaging positively impacting the operations performance of manufacturing firms, it can be argued that when manufacturing firms adopt green packaging processes into their operations, they reap positive impacts on their performance.

The seventh hypothesis (H4a) of the study (β value of 0.122 and a p-value of 0.131 as presented in Table 1 below) states that reverse logistics has a positive effect on the environmental performance of manufacturing firms. This hypothesis was not supported. The finding of the study conflicts with the work of Li and Olorunniwo (2008) Shrivastava and R.L. (2017) who reported that reverse logistics positively impacts the environmental performance of firms. The reverse logistics process starts from the customer back to the manufacturer. This reverse process means the manufacturing process is not directly influenced by the manufacturer. As such, they may not be able to take effective control of having customers fully participate in the process to make it effective.

The eighth hypothesis (H4b) of the study states that reverse logistics has a positive effect on the operations performance of manufacturing firms. The result (β value = 0.186 and a p-value = 0.049 as presented in Table 1 below) confirmed the hypothesis. Manufacturing companies that prioritize the deployment of reverse logistics thereby reap significant advantages and improve their overall company performance (Bag et al. 2019; Kirchherr et al. 2017). It is crucial for businesses to successfully manage the reverse logistics loop. This loop includes a variety of processes, including inventory management and selection, various modes of transportation, collection and sorting, as well as activities involving refurbishment and remanufacturing. Effectively managing the reverse logistics process may help to improve the operations performance of the firm.

The ninth objective of the study was to assess the mediating effect of industry competition on the relationship between sustainable supply chain practices and organizational performance in the manufacturing industry in Ghana. The result of the study presented in Table 2 below indicated that competition mediates the relationship between sustainable supply chain practices and organizational performance of manufacturing firms. Competition influences the capacity of an organization to attract customers and build a good image. This finding supports the work of Baah and Jin (2019) who reported that competition indirectly has a significant impact on the sustainable supply chain practices and organizational performance relationship. The mediating effect of competition on the relationship between sustainable supply chain performance and organizational performance also supports the work of (Liu 2019). Firms that are environmentally friendly and responsible have a cost benefit relative to the competition in the industry. As consumers pay attention to global environmental issues, the demand for environmentally friendly products increases and in a fiercely competitive environment, customers are more willing to believe in reputable companies. Hence firms that adopt sustainable supply chain practices do not only reduce the adverse impact of their activities on the environment but meets the needs of the consumers, given the company a good reputation in the market which translates into an improved operational performance. The result of the study shows that the intensity of competition in the industry can regulate the relationship between the sustainability supply chain practices of the firm and its performance.

5.1 Numerical Results

The multiple regression analysis was used in the analysis of the first eight hypotheses of the study which seeks to assess the direct effects of sustainable supply chain practices proxied by green manufacturing, green purchasing, green packaging and reverse logistics on firm performance, proxied by environmental performance and operations performance of manufacturing firms. The results of this test are presented in Table 1 below. Table 2 also presents the result for the mediation analysis. The model summary with environmental performance as the dependent variable was tested on the other independent variables. The results indicate that with an R^2 of 0.453, 45.3% of the variations in the dependent variables were explained by the independent variables. The model was also significant ($P=0.000$) with F calculated at 39.359, an indication that the model is statistically significant and could be used to place a decision on the study hypotheses. In Table 5.13, the model summary with operations performance as the dependent variable was tested on the other independent variables. The results indicate that with an R^2 of 0.382, 38.2% of the variations in the

dependent variables were explained by independent variables of the study. The model was also significant (P=0.000) with F calculated at 29.388, an indication that the model is statistically significant and could be used to place a decision on the study hypotheses (Table 1- Table 2).

Table 1. Hypothesis Testing

Hypothesis	β	P-value	Decision
H1a: Green manufacturing will have a positive effect on the environmental performance of manufacturing firms.	0.289	0.00	supported
H1b: Green manufacturing will have a positive effect on the operations performance of manufacturing firms.	0.259	0.002	supported
H2a: Green purchasing will have a positive impact on the environmental performance of manufacturing firms.	0.227	0.005	supported
H2b: Green purchasing will have a positive impact on the operations performance of manufacturing firms.	0.083	0.380	Rejected
H3a: Green packaging will have a positive impact on the environmental performance of manufacturing firms.	0.257	0.003	supported
H3b: Green packaging will have a positive impact on the operations performance of manufacturing firms.	0.376	0.00	supported
H4a: Reverse Logistics will have a positive effect on the environmental performance of manufacturing firms.	0.122	0.131	Rejected
H4b: Reverse Logistics will have a positive effect on the operations performance of manufacturing firms.	0.186	0.049	Supported
H5: Firm Competition mediates the direct relationship between sustainable supply chain management practices and firm performance.	0.253	0.000	supported

Table 2. Mediation analysis

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OUTCOME VARIABLE:
COM

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      .7309      .5342      7.3321      221.3837      1.0000      193.0000      .0000

Model
      coeff      se      t      p      LLCI      ULCI
constant      7.1040      1.1972      5.9338      .0000      4.7427      9.4653
FP      .4138      .0278      14.8790      .0000      .3589      .4686

*****
OUTCOME VARIABLE:
SSCP

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      .7129      .5083      58.5453      99.2392      2.0000      192.0000      .0000

Model
      coeff      se      t      p      LLCI      ULCI

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constant	25.4496	3.6787	6.9181	.0000	18.1938	32.7054
FP	.8276	.1151	7.1872	.0000	.6005	1.0547
COM	.6135	.2034	3.0161	.0029	.2123	1.0147

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

SSCP

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6964	.4850	61.0015	181.7564	1.0000	193.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	29.8077	3.4533	8.6318	.0000	22.9967	36.6187
FP	1.0814	.0802	13.4817	.0000	.9232	1.2396

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI
1.0814	.0802	13.4817	.0000	.9232	1.2396

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
.8276	.1151	7.1872	.0000	.6005	1.0547

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
COM	.2538	.0974	.0351	.4164

***** ANALYSIS NOTES AND ERRORS *****

6. Conclusion

The study contributes to knowledge, theory and practice in that, the most practiced sustainable supply chain practice among Ghanaian manufacturers is the green packaging. Eco-friendly packaging is beneficial, safe, and healthy for consumers and the communities through the life cycle of the product or package and as such manufacturing firms should invest more in the adoption of eco-friendly packages of their products. It is important for manufacturing firms in their quest to remain competitive to adopt green packaging, green manufacturing, green purchasing and reverse logistics sustainable practices. Manufacturing firms need to invest in the sustainable supply chain practices as it may improve their performance and also gives customers the confidence to do business with the firm as consumers are becoming aware of the need to protect the environment and are willing to do business with firms that are environmentally responsible. Competition in the industry is a good thing as it helps firms to operate sustainably as consumers want to do business with firms who are environmentally responsible, and the competition keeps the firms from behaving responsibly.

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