Corporate social responsibility, sustainable environmental practices and green innovation; perspectives from the Ghanaian manufacturing industry

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Abstract

As the discourse around business ethics and sustainable development intensifies, many organizations are adopting initiatives in corporate social responsibility (CSR) as a strategic tool to satisfy regulatory requirements and also stakeholder expectations. While exploring the relationship between sustainable environmental practices and green innovation, this study identifies four critical stakeholder-centered CSR activities as precursors to sustainable environmental practices using data from 404 manufacturing firms in Ghana. The data was analyzed using the partial least squares method to structural equation modeling (PLS-SEM). The results established a positively significant relationship between employee-centered CSR initiatives and sustainable environmental practices while the relationship between community-centered CSR, consumer-centered CSR and environment-centered with sustainable environmental practices CSR were each not significant. However, sustainable environmental practices were found to advance green innovation. The study further recommended a multi-dimensional stakeholder-centered approach to the practice of CSR as a strategic tool for sustainable environmental development by the leadership of manufacturing firms, policy makers and regulatory bodies.

Keywords Corporate social responsibility, Environmental sustainability, Green innovation, Ghana, Manufacturing industry, Sustainable development

Introduction

In the midst of heightened concerns about environmental degradation, industrial waste and greenhouse gas pollution, global warming and the most extreme forms of climate change, many organizations are having another look at their corporate social responsibility (CSR) initiatives; to make them more stakeholder-friendly and environmentally sustainable. Yu et al., (2017) observed that, this new trend may be largely attributable to recent stakeholder crusades which appear to exert some pressure on organizations to minimize the adverse influences of their production activities on the environment.

Probably the highest waste-generating sector, the manufacturing industry has been widely criticized as a major contributor to the declining state of the ecosystem (Ahuti, 2015; Kraus et al., 2020) and continues to attract attention when it comes to issues of green innovation and environmental sustainability (Chang, 2011). Accordingly, beyond their economic performance, many organizations across the globe are gradually paying attention to their environmental and social performance by adopting socially responsible behaviors, embracing prudent

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innovations, taking up green supply chain arrangements and leading a change from unsustainable consumption patterns (Allen et al., 2021; Seuring and Müller, 2008). While the issues surrounding CSR, sustainable environmental practices and green innovation are not new, exploring these concerns in a single study has become very significant today given the fact that CSR initiatives in organizations continue to attract considerable resource allocation and is fast redefining the manner in which business is being conducted in contemporary times. The Social Investment Forum (SIF) (2014) for instance reported in 2014 that, more than four trillion dollars has been spent on CSR-related initiatives by over 8000 firms across 160 countries although not much attention has been paid to stakeholder-centered CSR within the context of the environment (Kraus et al., 2017). Consequently, this study aims to investigate the relationship between stakeholder-centered CSR commitments, sustainable environmental practices and green innovation in the context of manufacturing firms by seeking answers to the following questions:

i. What is the impact of stakeholder-centered CSR initiatives on sustainable environmental development?

ii. What influence does environmentally sustainable business practices have on green innovation?

Finding answers to these questions does not only deepen the discourse around the key concepts being examined by this study, it also contributes valuable insights to theory building with considerable implications for practitioner-led reforms.

Literature review and hypothesis development
Corporate social responsibility
The increasing need for firms to work at improving their nonfinancial performance has placed expectations on them to prioritize the achievement of climate friendly and sustainable development goals. Particularly when adherence to responsible business standards has been shown to yield many benefits including a positive brand reputation and goodwill, increased sale revenues, customer loyalty, reduced operation costs, employee retention and enhanced productivity, many manufacturing firms are fast adopting strategies and measures aimed at ensuring sustainability and responsibility towards stakeholders (Alhouti & D'Souza, 2018; Panwar et al., 2016; Rhou et al., 2016). Consequently, the growing interest in CSR among both industry and academia may be attributed to the direct and indirect returns it brings to the businesses and their stakeholders (Carroll, 2016; Ruggiero et al., 2018). As firms continue to take on CSR as

a charge to meet societal needs (Chung et al., 2018) and add value to societal development (Carroll, 2016), they become aware of the different needs of their stakeholders and how to satisfy them ethically (Kim et al., 2018).

The CSR concept has been defined widely with a view on responsibility towards various stakeholders. In defining the concept, Hang et al., (2022) for instance described CSR as a voluntary exercise by an enterprise by which environmental, social and economic concerns are incorporated into business activities in order to strengthen a business' affiliation with its interested parties. This definition thus, identifies three stakeholder responsibilities viz responsibility to the economy, environment and society. Perhaps one of the most commonly cited definitions of the concept, Carroll (1979, p.500) submits that, CSR "encompasses the economic, legal, ethical and discretionary (or philanthropic) expectations that society has of organizations at a given point in time". This definition identifies four stakeholder responsibilities including economic, legal, ethical and philanthropic (or discretionary) responsibilities. Identifying some of the key actors that organizations have responsibility towards, Farooq et al., (2014) also categorized four stakeholder responsibilities; responsibility to community (CSRCOM), responsibility to consumers (CSRCON), responsibility to employees (CSREM) and responsibility to the environment (CSREN). While current research findings on the influence of CSR on environmental sustainability is unsettled with some studies finding positive outcomes (Castillo, 2015; Mao & Wang, 2019) and others indicating such commitments hamper on business and stakeholder interests (Gallego-Álvarez et al., 2011), it is important to re-examine this relationship from many angles especially when CSR activities have been used as corrective measures in mitigating environmental devastation.

CSR towards community
The significance of businesses building a positively enduring relationship with the community cannot be overemphasized inasmuch as they rely on the strong support of the community in order to survive (Farooq et al., 2014). Upholding business responsibility towards the community thus provides the opportunity to evaluate the effects of the business' activities on the stakeholder communities and to put in place measures aimed to recompense for same and to enhance the inhabitants' quality of life (Arsic et al., 2017; Chen et al., 2017). Accordingly, there is support for a strong and positive relationship between CSR towards the community and social performance (Darus et al., 2014; Wang & Qian, 2011), environmental

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performance (Zhang et al., 2014) and a positive business reputation and profitability (Horng et al., 2017; Shahzad et al., 2020). Thus, it is hypothesized that;

> H_1: CSR towards the community has a significant association with environmental sustainability practices.

CSR towards consumers

As a substantial source of value to many businesses, consumers are one of the key stakeholders that organizations must relate responsibly with (Hsu & Bui, 2022). Inasmuch as a dissatisfied or unsatisfied customer can boycott their patronage of an organization's goods or services, it is critical that organizations uphold the values of fair pricing, responsible marketing and the provision of safe and quality products or services (Moisescu, 2015; Öberseder, 2013). Some studies have highlighted positive impacts associated with an organization's engagement in customer-centered social responsibility and purchase intentions (Fatma & Rahman, 2015), customer satisfaction (Albort-Morant et al., 2016) and environmental sustainability (Deswanto & Siregar, 2018; Shahzad et al., 2020). In this regard, the following hypothesis is developed:

> H_2: CSR towards consumers has a significant association with environmental sustainability practices.

CSR to employees

CSR toward employees encompass an organization's efforts at fulfilling the worker-centered conditions and work-related needs of their workforce such that, employees feel satisfied and motivated to work. Such undertakings aimed at improving the conditions under which employees live and work, include recognizing their rights, well-being and quality of life (Wang et al., 2017) and safeguarding their social or human outcomes such as employee health, family and community well-being (López-Gamero et al., 2023). Founded on the understanding that employees are an equally important stakeholders of the organization who play a pivotal role in meeting its sustainability objectives (Bao & Yu, 2019; Suganthi, 2019), this approach to CSR emphasizes on more responsive working conditions like flexible work hours, continuous training and development of the workforce, the promotion of occupational health and safety as well as generous leave breaks (López-Gamero et al., 2023). As evidenced by previous literature, such organizational gesture encourages employees' environmentally responsible behaviors (Battaglia et al., 2014; De Roeck & Farooq, 2018) and facilitates their commitment to

environmental sustainability behaviors. In this regard, it is further hypothesized that;

> H_3: CSR towards employees has a significant association with environmental sustainability practices.

CSR to the environment

This concerns a firm's responsibility towards protecting the physical environment and its climatic conditions by working to reduce waste, lowering pollution, cutting down on excessive consumption of natural resources and minimizing emissions (Farooq et al., 2014; Shahzad et al., 2020). CSREN thus helps reduce the environmental burden of business operations by ensuring that, businesses strictly comply with the obligation to make decisions that does not compromise on the sustainability of the environment and its inhabitants' quality of life (Zelazna et al., 2020). While the increasing acceptance of and commitment to environmental responsibility practices is not in doubt (Babiak & Trendafilova, 2011), such initiatives have been found to yield valuable benefits to organizations including organizational competitiveness, cost savings, customer loyalty, employee satisfaction and to the larger society, environmental performance and sustainability (Al-Abdin et al., 2018; Shahzad et al., 2020; Tran & Nguyen, 2020). Consequently, it is hypothesized that:

> H_4: CSR towards the environment has a significant association with environmental sustainability practices.

Environmental sustainability and green innovation

In an era characterized by resource limitations and environmental concerns, the excessive reliance on non-renewable resources may be unsustainable. Particularly within the manufacturing sector, issues such as pollution, poor waste management, high energy consumption and climate change confront most organizations' strategic decisions (Ullah et al., 2022). Many manufacturing businesses are thus fast adopting eco-friendly practices of the circular economy that helps to reduce, reuse, recycle and redesign products and services in a manner that cuts down on intensive virgin resource reliance and finds alternative uses for waste (Zagonari, 2020). Environmental sustainability hence encompasses all activities an entity undertakes to meet the resource and service needs of its current and future generations while safeguarding the health of the ecosystem that provides those resources (Morelli, 2011). Environmental sustainability thus ensures that, manufacturing firms interact with the environment in a more responsible manner such that, they reduce or avoid the depletion or degradation of the

natural environment and thereby preserve the quality of its resources for a longer time.

Closely related to the concept of environmental sustainability is green innovation. Often synonymously referred to as eco-innovation or environmental innovation, green innovation aims at modifying organizational processes in order to avoid or reduce damage to the environment (Kunapatarawong & Martínez-Ros, 2016). The concept of green innovation thus, is a business' way of responding to unsustainable environmental concerns arising out of poor business practices. By adopting the circular business model, many manufacturing companies are creating supply chains to recover or recycle the resources they have used to create new products (Atasu et al., 2021). Previous studies have shown that green innovation practices are growing popular owing to its benefits for firms, stakeholders and the environment (Afridi et al., 2020; Rennings et al., 2004).

Many studies have identified the environmental sustainability practices by an organization as one of the fundamental antecedents of green innovation behavior (Shahzad et al., 2020; Cuerva et al., 2014; Guoyou et al., 2013) and yields both commercial and economic benefits to the organization (Albort-Morant et al., 2016). From this backdrop, a fifth hypothesis is further proposed that;

> H_5: Environmental sustainability practices have a significant association with green innovation.

The study adopts the conceptual model by Shahzad et al., (2020) which identifies different CSR activities (CSR towards the environment, CSR towards employees, CSR towards the community and CSR towards consumers) as antecedents of environmentally sustainable business practices and which in turn is a predictor of green innovation. The model is presented in Fig. 1 in the figure legends section.

Methodology

The study adopted a twenty-eight item scales which were previously validated measurement constructs from different studies. The items measuring CSR activities contained three items measuring CSR towards the environment, two items measuring CSR towards employees, three items measuring CSR towards the community and four items measuring CSR towards the consumer. These scales were adopted from Farooq et al., (2014) and Turker (2009). A six-item scale was again adopted from Bansal's (2005) scale to measure environmentally sustainable business processes and with a further six-item scale adopted from Song and Yu (2018) to measure green innovation. All scales were measured with a five-point Likert-type scale anchored from one (strongly disagree) to five (strongly agree).

The data was collected from a variety of Ghanaian manufacturing firms in subsectors including food and beverage, pharmaceuticals, chemicals and chemical products,
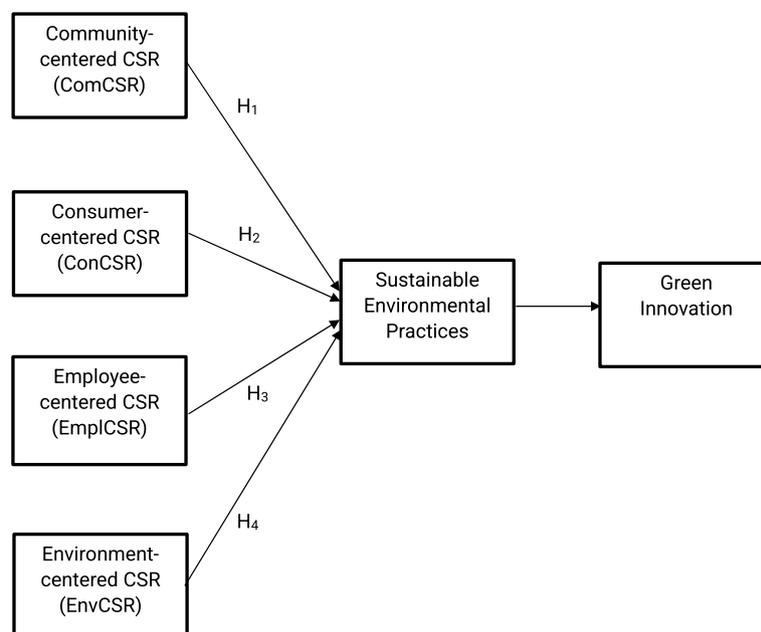
Source: Adapted from Shahzad et al., (2020)

Fig. 1 Conceptual framework. Source: Adapted from Shahzad et al., (2020)

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clothing and textiles, wood and furniture, metal work as well as paper and paper products. Since the total population was unknown, respondents were sampled through a simple random reservoir technique (Bellhouse & Kulperger, 1991) because it offers a realistic basis for making fair generalizations about the population (Babbie & Edgerton, 2023). The instrument was administered to respondents from June until Mid-August, 2023. Although 427 questionnaires were manually distributed to the sampled respondents, only 408 respondents returned a completed questionnaire. After excluding four outliers following a visual inspection and multivariate checks, a total of 404 completed questionnaires were included in the final statistical analysis.

Results and discussions

To test the hypotheses of this study, the partial least square approach to structural equation modeling (PLS-SEM) with SmartPLS 4.0 was used (Ringle et al., 2015). There are two approaches to structural equation modeling (SEM); the covariance-based SEM which requires the data to be normally distributed and the variance-based SEM which does not require multivariate normality (Garson, 2016; Hair et al., 2014). Based on the result of the preliminary analysis, the normally distributed approach with PLS-SEM was employed. The measures were first validated and then the hypothesized model tested (Anderson & Gerbing, 1988; Chin, 1998). The SmartPLS 4.0 software was used to validate the measures and to test the hypothesized model.

Descriptive analysis of respondent and business characteristics

Male respondents dominated (64.1%) the sample as compared to female participants (35.9%). Similarly, the majority of respondents (66.8%) had diploma or technical certificate as their highest attained level of education, compared to those who had a bachelor's degree (21.3%), a high school certificate (6.7%) or a postgraduate degree (5.2%) as their highest level of education. The manufacturing firms that participated in the study were also categorized into seven subsectors including pharmaceuticals, chemicals and chemical products (29%), clothing, textiles and wearing apparel (26.2%), metal manufacturing (17.3%), wood and furniture (8.9%), food and beverages (6.2%), paper and paper products (5.7%) as well as other unclassified groups (5.6%). Table 1 displays the detailed distribution of these demographic characteristics.

Construct reliability and validity

The constructs assessed are *Community CSR, Consumer CSR, Employee CSR, Environment CSR, Environmentally Sustainable Business Practices,* and *Green Innovation*. With regards to *Community CSR*, the construct exhibits high reliability (Cronbach's Alpha > 0.7) and strong composite reliability (rho_a and rho_c > 0.8), indicating internal consistency and reliability in measuring community-related CSR. While in the case of *Consumer CSR*, the Cronbach's Alpha indicates good reliability, its relatively low composite reliability may be attributed to the multidimensionality of consumer-related corporate social responsibility, indicating potential variability in the underlying constructs being measured. Further

Table 1 Respondent and business characteristics

Type of Demography	Frequency (*n*)	Percent (%)
Gender		
Male	259	64.1
Female	145	35.9
Highest Educational Level		
High School or Equivalent	27	6.7
Diploma or Technical Certificate	270	66.8
Bachelor's Degree	86	21.3
Master's Degree or Higher	21	5.2
Manufacturing Sub-Sector		
Food and Beverages	25	6.2
Pharmaceuticals, Chemicals and Chemical Products	120	29.7
Clothing, Textiles and Wearing Apparel	106	26.2
Wood and Furniture	36	8.9
Metal Manufacturing	70	17.3
Paper and Paper Products	24	5.9
Others	23	5.7

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refinement and specification of the measurement items may enhance the construct's internal consistency and consequently elevate its composite reliability.

In terms of *Employee CSR*, the construct exhibits acceptable reliability (Cronbach's Alpha > 0.7) and moderate composite reliability, indicating reasonable internal consistency in measuring employee-related CSR and further with *Environment CSR*, the construct shows high reliability (Cronbach's Alpha > 0.7) and strong composite reliability (rho_a and rho_c > 0.8), suggesting robust internal consistency in measuring the construct.

Regarding *Environmentally Sustainable Business Practices*, the construct demonstrates moderate reliability (Cronbach's Alpha > 0.5) and composite reliability, indicating reasonable internal consistency in measuring environmentally sustainable business processes whereas in the case of *Green Innovation,* the construct exhibits acceptable reliability (Cronbach's Alpha > 0.7) and moderate composite reliability, indicating reasonable internal consistency in measuring that construct.

The reliability and validity analysis provided insights into the robustness of the measurement for each construct, highlighting areas of strong internal consistency and reliability and areas for potential improvement in measurement precision. These findings are crucial for ensuring the accuracy and effectiveness of the constructs used in this study. The analysis of construct reliability and validity measures for various dimensions related to the study is presented in Table 2.

Results of the structural model assessment

The total effect of *Community CSR* on *Sustainable Practices* is -0.021, indicating a negligible negative relationship and with a minor total effect on green innovation also negative at -0.012. *Consumer CSR* however had a small positive total effect of 0.072 on *Sustainable Practices* and 0.041 on *Green Innovation*. In contrast, *Employee CSR* has a substantially higher positive effect

size of 0.668 on *Sustainable Practices* and 0.383 on *Green Innovation*. This aligns with the path analysis results highlighting *Employee CSR* as an influential driver. *Environmental CSR* has a small total effect of 0.169 on *Sustainable Practices* and 0.097 on *Green Innovation*.

Finally, the total effect of *Environmentally Sustainable Business Practices* on *Green Innovation* is 0.573, denoting a strong positive relationship and further validating the path model findings. Essentially, the total effects mirror the path analysis conclusions—employee CSR initiatives and adopting sustainable practices are integral for enhancing green innovation outcomes, while community, consumer and environmental CSR have negligible to minor effects. The large effect size of employee CSR strategies indicates organizations should prioritize this dimension. Fostering environmentally sustainable practices also holds substantial potential to drive green innovation success. Figure 2 presents the total effects of each exogenous variable on the endogenous variables—environmentally sustainable business practices and green innovation.
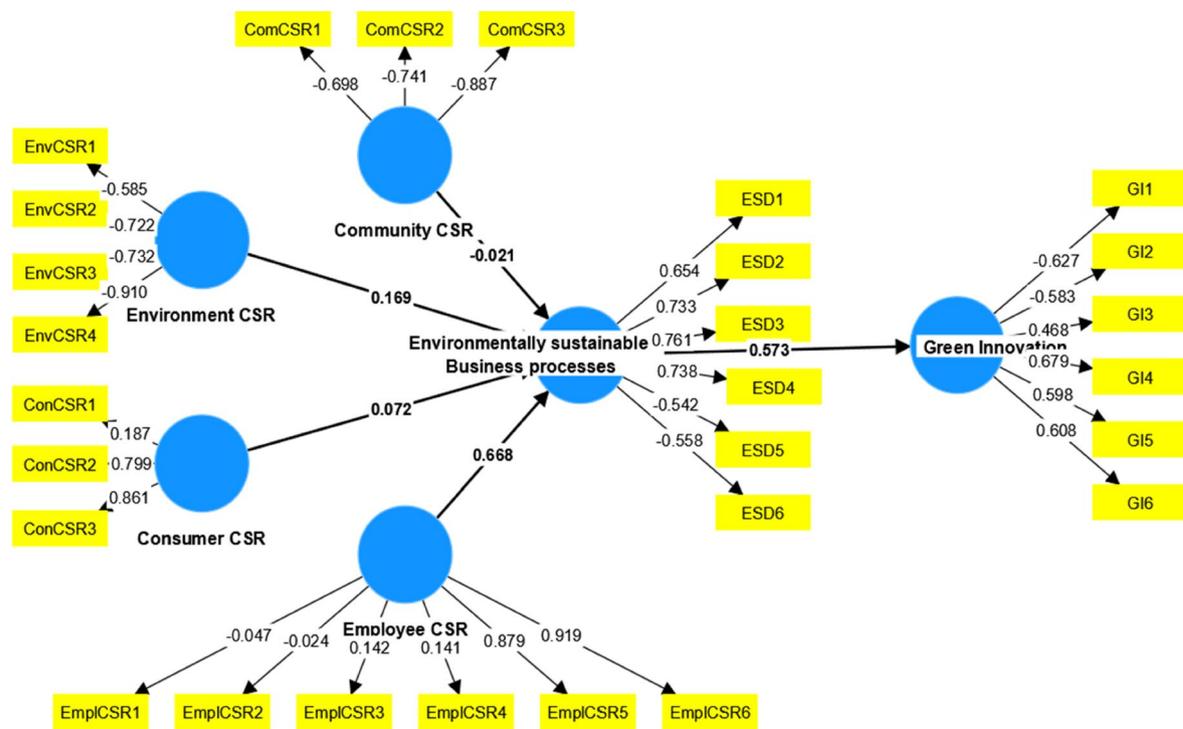
Inner model descriptive

In Table 3, a comprehensive analysis of key constructs on this research is presented. The table encapsulates vital statistical insights for each construct, offering a deeper understanding of their respective distributions and interconnections. The first column represents the constructs under consideration: *Community CSR, Consumer CSR, Employee CSR, Environment CSR, Environmentally Sustainable Business Practices* and Green *Innovation*. The subsequent columns display various statistical measures providing essential insights. The standard deviation column illustrates for each construct, the amount of variability or dispersion present in the data. Noticeably, all constructs have a standard deviation of 1.00, indicating consistent variability within the sample. The third and fourth columns respectively present the excess kurtosis

Table 2 Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Community CSR	0.756	0.883	0.821	0.608
Consumer CSR	0.774	0.100	0.683	0.472
Employee CSR	0.726	0.754	0.482	0.277
Environment CSR	0.754	0.941	0.831	0.557
Environmentally sustainable business practices	0.563	0.760	0.491	0.449
Green Innovation	0.699	0.641	0.253	0.357

Source: Authors (2023)

Source: Authors, (2023).

Fig. 2 Results of the structural model assessment. Source: Authors, (2023)

Table 3 Inner model descriptive

	Standard deviation	Excess kurtosis	Skewness	No. of Observation	Cramér-von Mises test statistic	Cramér-von Mises *p* value
Community CSR	1.00	-0.159	0.667	404	0.643	0.000
Consumer CSR	1.00	0.648	-0.882	404	0.349	0.000
Employee CSR	1.00	0.049	-0.817	404	0.501	0.000
Environment CSR	1.00	0.204	0.661	404	0.441	0.000
Environmentally sustainable business practices	1.00	0.494	-0.349	404	0.104	0.097
Green Innovation	1.00	0.337	0.105	404	0.107	0.088

Source: Authors, (2023)

and skewness outcomes. Excess kurtosis measures the tail heaviness of the distribution; a negative excess kurtosis for *ConsumerCSR* (-0.882) indicates a relatively lighter tail compared to a normal distribution.

Skewness on the other hand measures the asymmetry in the distribution. For *Consumer CSR*, a negative skewness (-0.882) indicates a leftward skew, implying the tail is skewed towards lower values. The column labelled number of observations enumerates the sample size (*N*=*404*). Columns six and seven present the Cramér-von Mises

test statistic and its associated *p-value*. The Cramér-von Mises test assesses the goodness of fit between observed and expected values in the model. The low *p-values* (all near zero) suggest a significant fit, reinforcing the robustness of the model and the relationships within it. In a nutshell, this descriptive analysis offers crucial statistical insights into the inner model, enhancing our understanding of the distributional properties and relationships within the constructs, thus contributing substantially to

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Table 4 Model fit summary

	Saturated model	Estimated model
SRMR	0.161	0.162
d ULS	10.499	10.711
d G	2.966	2.985
Chi-square	1,317.06	1,323.77
NFI	0.257	0.254

Source: Authors, (2023)

our research on CSR and sustainability in the context of green innovation in Ghana.

Model fit summary

Table 4 shows that overall, the estimated model shows a reasonably good fit with the empirical data. The standardized root mean square residual (SRMR) values are identical at 0.162 for both the estimated and saturated models, meeting the cut off criteria of less than 0.08 for acceptable fit. Additionally, the univariate $\chi 2$ value of 10.711 and multivariate kurtosis value of 2.985 for the estimated model are only slightly higher than the saturated model, evidencing minor deviation. Both values satisfy recommended thresholds denoting adequate fit.

The gamma hat statistic is also highly comparable between the estimated (2.985) and saturated (2.966) models. Furthermore, while the overall chi-square is slightly higher for the estimated versus saturated model, this marginal difference still demonstrates reasonable model-data compatibility. The normed fit index of 0.254, despite being below the ideal 0.90 cut off, shows the model replicates observed covariances to a fair degree. Given that other indices indicate good fit, this NFI value is likely a consequence of model complexity rather than poor fit per se. Essentially, the fit statistics meet acceptable criteria thresholds and show minimal divergence between the estimated and saturated models and supports that, the hypothesized model suitably fits the empirical data. While refinements could incrementally improve fit, the

model in its current form already demonstrates adequate fit with the sample data.

Path coefficients for hypothesis testing

Table 5 presents the path coefficients and hypothesis testing results of the structural model. It includes the original sample values, sample means, standard errors, t-statistics, and *p*-values for each path. The path from *Community CSR* to *Environmentally Sustainable Practices* has a coefficient of -0.021. However, with a t-statistic of 0.198 and *p*-value of 0.843, this path is not statistically significant. Thus, the result suggests that, H_1 is not supported. Similarly, the path from *Consumer CSR* to *Environmentally Sustainable Practices* also shows a positive coefficient of 0.072 but is not significant with a t-value of 0.666 and *p*-value of 0.506. Consequently, H_2 is not supported.

In contrast, the path from *Employee CSR* to *Environmentally Sustainable Practices* is positive and significant. The original sample coefficient is 0.668, t-statistic is 4.422 and *p*-value is 0.000. This suggests employee-focused CSR initiatives strongly influence adoption of environmentally sustainable business practices and thus, supports H_3.

With regards to the path from *Environmental CSR* to *Environmentally Sustainable Business Practices* the analysis returned a coefficient of 0.169 but is not significant based on the t-statistic of 0.891 and *p*-value of 0.373 thereby lacking support for H_4. Finally, the path from *Environmentally Sustainable Business Practices* to *Green Innovation* is positive and significant. The original sample coefficient is 0.573, with t-statistic 3.956 and a *p*-value of 0.000. This supports H_5 and leads to the conclusion that, engaging in environmentally sustainable practices strongly impacts green innovation.

The mixed results provide empirical support that employee CSR and the adoption of environmentally sustainable practices are key drivers of green innovation. However, community, consumer and environmental CSR might not significantly influence environmentally sustainable practices based on this Ghanaian sample.

This study applies the conceptual model by Shahzad et al., (2020) to investigate how four stakeholder groups

Table 5 Path coefficients for hypothesis testing

	Original Sample	Sample Mean	STD DEV	T-Statistic	*P*-Value	Result
Community CSR—> Environmentally sustainable practices (H_1)	-0.021	0.015	0.104	0.198	0.843	Not supported
Consumer CSR—> Environmentally sustainable practices (H_2)	0.072	0.036	0.108	0.666	0.506	Not supported
Employee CSR—> Environmentally sustainable practices (H_3)	0.668	0.631	0.151	4.422	0.000	Supported
Environment CSR—> Environmentally sustainable practices (H_4)	0.169	-0.021	0.19	0.891	0.373	Not supported
Environmentally sustainable practices—> Green Innovation (H_5)	0.573	0.595	0.145	3.956	0.000	Supported

Source: Authors, (2023)

(community, consumers, employees and the environment) are affected by the CSR commitments regarding the environmental practices of selected manufacturing firms in Ghana and how such engagements influence green innovation. The results suggest that, three of the stakeholder-based environment-centered CSR practices (CSR towards community, consumers and the environment) were not significant towards environmental sustainability as only CSR towards employees returned a positive and significant relationship with environmentally sustainable practices. This contradicts earlier findings which established a positively significant relationship between all four stakeholder-based CSR practices towards environmentally sustainable practices (Chen et al., 2018; Farooq et al., 2014; Horng et al., 2017; Shahzad et al., 2020) although it is consistent with the findings of Mehralian et al., (2016). Consequently, we fail to accept H_1, H_2 and H_4. In the context of this study, CSR towards employees had the strongest effect on environmentally sustainable practices while CSR towards the environment on environmentally sustainable practices had the weakest. A possible explanation to this development may be the recent strong activism of labor and the collective power of workers' unions for improvements in their work conditions (Obeng-Odoom, 2022) as against the rather weak enforcement regime of environmental laws, poor adherence to corporate responsibility policies towards consumers and little commitment to responsible ecological behavior (Bawua & Owusu, 2018; Andrews, 2016; Domfeh, 2003) coupled with the discretionary and voluntary nature by which CSR activities are regulated in Ghana (Andrews, 2016).

Environmentally sustainable practices had a positive and significant association with green innovation (H_4) and are consistent with previous findings which established environmentally sustainable practices as an antecedent to green innovation (Chang, 2016; Lopes et al., 2017; Shahzad et al., 2020). As a strategic business requirement, the finding suggests that the sampled firms take environmental sustainability more seriously than some of its stakeholder-centered antecedents identified earlier. The importance of upholding environmental sustainability and adhering to green innovation among manufacturing firms has been earlier established and acknowledged (Albort-Morant et al., 2016) especially when previous studies have argued that, by adopting manufacturing execution systems (MES), environmental management systems (EMS) and quality management systems (QMS), businesses are better able to improve and encourage the adoption of green innovation (Hojnik and Ruzzier, 2016; Cuerva et al., 2014).

Conclusions

This study contributes to literature and adds to knowledge in its mixed findings of the relationship between four critical stakeholder-centered CSR antecedents (responsibility towards the community, consumers, employees and the environment) of environmentally sustainability and between environmentally sustainable practices and green innovation within the context of Ghana's manufacturing sector. Focusing on the theory of sustainable development and previous literature, the study tested the model suggested by Shahzad et al., (2020) but found contradictory results; among the four stakeholder-based dimensions of CSR, only employee-centered CSR could predict environmentally sustainable business practices. It however corroborated previous studies that established a positive and significant relationship between environmentally sustainable business practices and green innovation. Consequently, this study offers insights into an understanding of the phenomenon of sustainable development from the perspectives of the environment and within the context of a developing country such as Ghana and helps inform policies towards the efforts at attaining the sustainable development goals.

Implications and recommendations

This study's results show that, among the expectations from four stakeholder categories which the manufacturing firms are expected to meet, they seem to prioritize only the interests of their employees. While this is respected, it is not satisfactory as the other critical stakeholder-centered needs of the environment, customers and community are left out. It is thus recommended that the leadership of manufacturing firms, policy makers, governments, regulatory bodies and other concerned state agencies work to ensure that, the needs of other important stakeholder groups are equally catered for by investing in green and sustainable business innovations and technologies. It is further recommended that, the CSR initiatives of manufacturing firms are centered on satisfying multi-dimensional stakeholder welfare which priorities the needs of critical stakeholders such as the community, customers and the environment.

The research was limited to the manufacturing sector of a developing economy such as Ghana. Its findings may therefore not be generalizable to other sectors or geographic settings. Consequently, different cultural, socio-political and environmental conditions may vary the results. Future studies may perhaps introduce other variables like the financial performance of the firms, adopt a longitudinal approach, vary the methodology or increase the scope to include organizations beyond the manufacturing industry.

Abbreviations

CSR	Corporate social responsibility
PLS-SEM	Partial least squares method to structural equation modeling
SIF	Social Investment Forum
CSRCOM	Corporate social responsibility to community
CSRCON	Corporate social responsibility to consumers
CSREM	Corporate social responsibility to employees
CSREN	Corporate social responsibility to the environment
SEM	Structural equation modeling
SRMR	Standardized root mean square residual
NFI	Normed fit index
MES	Manufacturing execution systems
EMS	Environmental management systems
QMS	Quality management systems

Declarations

Competing interests
The authors declare no conflict of interest.

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