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DOI:
10.1002/bse.2977

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (Harvard):
Adomako, S & Tran, MD 2022, 'Environmental collaboration, responsible innovation, and firm performance: The moderating role of stakeholder pressure', *Business Strategy and the Environment*, vol. 31, no. 4, pp. 1695-1704. https://doi.org/10.1002/bse.2977

Received: 13 November 2021 | Revised: 4 December 2021 | Accepted: 21 December 2021

DOI: 10.1002/bse.2977

RESEARCH ARTICLE

Business Strategy and the Environment

WILEY

Environmental collaboration, responsible innovation, and firm performance: The moderating role of stakeholder pressure

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[Correction added on 9 February 2022, after first online publication: The second affiliation for Samuel Adomako has been included in this version.]

Abstract

Despite the burgeoning literature on environmental strategy, research is scarce on how environmental collaboration influences responsible innovation. Our study closes this gap by investigating the impact of environmental collaboration on firm performance through the mediating mechanism of responsible innovation. Using data collected from 225 firms, the results show that a firm's level of environmental collaboration influences responsible innovation. The findings also reveal that the impact of environmental collaboration on responsible innovation is greater when stakeholder pressure is higher than when it is low. Finally, we find that the relationship between environmental collaboration on firm performance is mediated by responsible innovation. These findings extend the environmental strategy and responsible innovation research and practice.

KEYWORDS
environmental collaboration, environmental policy, firm performance, responsible innovation, stakeholder engagement, sustainable development

1 | INTRODUCTION

Stakeholder pressure on organizations has led to a wide-scale adoption of sustainable practices (Tate et al., 2013). Given that organizations must minimize their impact on the environment and improve their environmental sustainability efforts, organizations are looking for ways collaborate with suppliers and customers to jointly pursue the sustainability agenda. As such, environmental collaboration has recently attracted attention from both academics and practitioners. For example, Boeing's commitment to environmental stewardship is an important consideration for environmental collaboration (Boeing, 2013). Indeed, environmental collaboration has the ability to help firms capitalize on future markets and achieve first-mover advantage that could lead to sustainable advantage and ultimately firm performance (Grekova et al., 2016; Hollos et al., 2012). By collaborating with key stakeholders such as suppliers to address environmental problems, firms stand to gain opportunities from environmental activities (Adomako, 2020). For example, firms that engage in environmental collaborating are likely to gain support from stakeholders to minimize the total impact on their products to create sustainable products and processes (Darnall et al., 2008).

Although previous studies have improved our understanding of environmental collaboration (e.g., Adomako, 2020; Gimenez & Tachizawa, 2012; Grekova et al., 2016), we still lack a solid understanding of its performance outcomes. For example, to date, it is not clear how a firm's level of environmental collaboration fosters responsible innovation. Although many researchers have argued that firms' engagement in environmental collaboration can improve their performance (Adomako, 2020; Grekova et al., 2016), the mechanism through which environmental collaboration fosters firm performance

Abbreviations: AVE, Average variance extracted; CEO, Chief executive officer; CR, Composite reliability; VIF, Variance inflation factor.

is lacking. Thus, our study closes these gaps in the environmental management literature.

By closing these empirical gaps, our study makes several contributions. First, we explain the effect of environmental collaboration on responsible innovation. This is an important contribution given that previous studies have not explicitly examined this linkage. Second, we know litttle about the specific condition under which environmental collaboration drives responsible innovation. We contribute the literature by showing that stakeholder pressure conditions the impact of environmental collaboration on responsible innovation. Third, while previous studies have shown that environmental collaboration fosters firm performance, the mechanism through environmental collaboration predicts firm performance is not clear (Adomako, 2020; Grekova et al., 2016). Our study contributes to the literature by demonstrating that responsible innovation is a mediating mechanism of the relationship between environmental collaboration and firm performance. Finally, our new scale for measuring responsible innovation shows excellent psychometric properties with a high Cronbach's alpha and the individual items loading well onto a single factor in this study. Thus, we contribute the literature by making an effective scale for measuring responsible innovation.

2 | LITERATURE BACKGROUND AND HYPOTHESIS DEVELOPMENT

Environmental collaboration can be viewed as the involvement of a firm with its suppliers in planning and executing a joint strategic approach to environmental management (Grekova et al., 2016; Klassen & Vachon, 2003). This is considered an important mentoring culture that guides and supports a firm's suppliers in their environmental management efforts. A firm's environmental collaboration approach is viewed as a concerted effort to devote financial resources to help their suppliers' environmental management strategies. Thus, environmental collaboration reflects a holistic understanding of suppliers' environmental responsibilities and capabilities (Grekova et al., 2016; Hollos et al., 2012). Previous studies have examined the effect of environmental collaboration on several outcomes such as firm performance (Large & Thomsen, 2011), environmental capabilities (Lee & Klassen, 2008), and purchasing performance (Large & Thomsen, 2011). These studies have substantially contributed to our understanding of the impact of environmental collaboration. Relatedly, past research has examined the antecedents of environmental collaboration (e.g., Hollos et al., 2012; Holt & Ghobadian, 2009). The findings from these studies suggest that environmental commitment and attitude are a major driver of environmental collaboration.

Apart from these outcomes of environmental collaboration as evident by empirical research (Grekova et al., 2016), it can be argued that the adoption of environmental collaboration with supply partners could yield responsible innovation. The idea of responsible innovation reflects the notion that new products should not hurt the health of consumers and the public. It also denotes that those new processes for producing goods and services should be safe and that these processes should not pollute the environment (Voegtlin & Scherer, 2017). The UN sustainable development goals seek to protect the Earth's life-support system and improving living conditions (Griggs et al., 2013). Innovation, which is considered as "the generation, acceptance and implementation of new ideas, processes, products or services" (Thompson, 1965, p. 2), is an important mechanism for achieving these goals. Thus, it has been suggested that business organizations that are considered important source of innovation have a social responsibility to adequately address environmental issues (Scherer & Palazzo, 2007; Voegtlin & Scherer, 2017). In this study, we focus on the antecedents and outcomes of responsible innovation.

2.1 | Environmental collaboration and responsible innovation

Firms' collaborative effort towards environmental sustainability has received increased interests among scholars, policy makers, business practitioners, and other environmental constituents (Hartman et al., 1999). Environmental collaboration reflects a joint effort by organizations and their stakeholders to device strategies to reduce environmental impacts (Vachon & Klassen, 2008). This effort is considered a relational activity across organizational boundaries and can involve various stakeholders such suppliers, buyers, and governments. Given that environmental collaboration that supports the natural environment is an essential part of environmentally sustainable strategies for firms (Vachon & Klassen, 2008), researchers have started to explore how collaborative efforts by firms could influence a firm's level of sustainable innovation (Adomako, 2020). The concept of responsible innovation calls for firms to lead the transformation of values and behaviors of societal members towards socio-ethical issues (Ceicyte & Petraite, 2018). While the idea of responsible innovation is not new, "the major novelty and practical relevance of responsible innovation is in integrating existing approaches and in making an explicit link between innovation and responsibility" (Genus & Iskandarova, 2018, p. 2). It has been suggested that environmental collaboration involves firms' effort to develop environmental solutions with their partners to reduce the environmental impact of products in the supply chain (Adomako, 2020; Vachon & Klassen, 2008). Thus, it can be argued that when a firm accesses suppliers' knowledge and ideas about environmental management and responsibility, the firm can foster responsible development of innovation. This can be done by including the wider society to help the outcomes of innovation to be (ethically) acceptable, sustainable, and socially desirable (Von Schomberg, 2013). Further, it has been argued that environmental collaboration with external stakeholders can help the firm reduce the life-cycle costs of the product (Hart, 1995). In addition, previous research has established that environmental collaboration improves sustainable innovation (Adomako, 2020; Hellström, 2007), facilitates environmental innovation (Grekova et al., 2016; Hall, 2000), and improves green capabilities (Paulraj, 2011). Collectively, we argue that:

Hypothesis 1. Environmental collaboration is positively related to responsible innovation.

2.2 | The moderating role of stakeholder pressure

This study further argues that stakeholder pressure improves the relationship between environmental collaboration and responsible innovation. First, as stakeholder green pressures and environmental values become pervasive, it is likely that more and more companies will start subscribing to environmental logics. The stakeholder approach to strategic management (Freeman et al., 2018) suggests that organizations may adopt proenvironmental practices strategically to respond to their stakeholders' expectations by formulating and implementing processes that satisfy their demands. Thus, when firms perceive an increased alignment of their stakeholders, investment in responsible innovation activities can be an insurance-like protection for the relationship-based intangible assets of a company (Godfrey, 2005) or a risk-mitigation strategy (Ioannou & Serafeim, 2015). In Africa, not only primary stakeholders including governments, shareholders, and media are demanding environment protection but also secondary stakeholders such as nongovernmental organizations, local communities, and tribal leaders are also increasingly embracing environmental logics, whereby concerned about the negative impacts of industrial activity in the natural environment, and expect firms to respond to their concerns with improved environmental protection (Adomako et al., 2021). Thus, a social context where all key stakeholders strongly pressure for the implementation of environmental practices will provide support for organizational actors championing the responsible innovation and improve the positive impact of environmental collaboration on responsible innovation. Moreover, when groups of stakeholders converge around an emerging logic, in this case, a concern with responsible innovation, they may elicit collective action to diffuse and amplify the salience of environmental management efforts (Ansari et al., 2013), demanding the implementation of actions reducing the negative impacts of corporate activity in the environment (Liston-Heyes & Brust, 2016). Thus, we suggest that:

Hypothesis 2. Environmental collaboration has a stronger, positive relationship with responsible innovation when stakeholder pressure is high than when it is low.

2.3 | The mediating role of responsible innovation

In addition to the above hypotheses, we argue that responsible innovation mediates the relationship between environmental collaboration and firm performance. First, firms' concerted efforts to take care of the future through collective stewardship of science and innovation can help them gain sustainable competitive advantage (Ramus & Steger, 2000; Stilgoe et al., 2013). Second, by engaging in interactive processes with stakeholders such as buyers, firms become mutually responsive to each other with a view to the acceptability, sustainability, and societal desirability of the innovation process (Voegtlin & Scherer, 2017). Through responsible innovation, firms stand to progress toward attaining admiration for its products and services. In this direction, firms can attain a more efficient way of protecting the natural environment (European Commission, 2012). In addition, responsible innovation in products can improve the brand image of the focal firm by highlighting the firm's responsible innovation activities to their consumers. Thus, it can be argued that there is a greater chance for the firms to obtain market gains which could be translated into higher performance outcomes. Also, given that environmental collaboration stimulates knowledge creation in the firm (Inkpen, 1996), it is likely that firms that collaborate with their suppliers can develop environmental solutions through responsible innovation to reduce environmental impact in supply chains (Grekova et al., 2016; Vachon & Klassen, 2008). For example, previous research shows that environmental collaboration with suppliers with suppliers has a positive impact on buyer's innovation (Corsten & Felde, 2005). Accordingly, we suggest that environmental collaboration could foster responsible innovation which in turn can improve firm performance. This is likely to create sustainable-oriented benefits that can generate sustainable competitive advantage (Barney, 1991; Hart, 1995). Thus, we suggest that responsible innovation can serve as a mediating variable that can influence the positive effects of environmental collaboration on firm performance. Accordingly, we state that:

Hypothesis 3. Responsible innovation mediates the relationship between environmental collaboration and firm performance.

3 | RESEARCH METHOD

3.1 | Sample and data collection procedure

We collected the data from the database held by Ghana Business Directory. Our sample met the following criteria: (1) firms classified as independent with no link to any company group; (2) firms owned and controlled by entrepreneurs or a team of entrepreneurs; (3) manufacturer of physical products; (4) firms established in 2009 or later; and (5) firms that had less than 250 employees as of January 1, 2019. A sample of 600 manufacturing ventures was randomly selected from a database held by Ghana Business Directory. The database contained 17,200 firms. We focused on manufacturing ventures because they are the major focus of the Ghanaian government development agenda (World Bank, 2017).

We collected data in two waves with a questionnaire delivered in person such that all independent and control variables were measured in the first wave (T1), whereas the dependent variable was measured 6 months in the second wave (T2). In January 2019, a questionnaire assessing environmental collaboration, stakeholder pressure, and responsible innovation was sent in person to the chief executive officers (CEOs) of the 600 firms in our sample. After several visits to the head offices of the firms, we received responses from 233 firms.

To reduce potential problems associated with a single informant and common method bias (Podsakoff et al., 2012), we temporally separated the measurement of the independent variable and the moderating variable from the measurement of the dependent variables by 6 months. Accordingly, a second questionnaire was delivered in person to finance managers of the 233 firms to assess the extent of their firms' performance. We received 230 surveys with information for the variables of interest. After discounting missing values, we obtained 225 matched responses from the first and second surveys, representing a 42.5% response rate. The sample contains firms with a mean age of 8.65 (SD = 3.00) years and mean size of 13.55 (SD = 11.46) full-time employees.

To evaluate nonresponse bias, the early and late were compared for the final sample by assuming that late responses are more similar to nonresponses (Kanuk & Berenson, 1975). Using Pearson's chi-square test for categorization (Greenwood & Nikulin, 1996), results indicate that the early respondents were not significantly different from the late respondents in terms of firm age, firm size, and industry. Thus, nonresponse bias is not considered a serious threat to our results.

3.2 | Measures

Unless otherwise noted, we used a seven-item scale with anchors ranging from 1 = *strongly disagree* to 7 = *strongly agree*. Table 1 displays the specific items, validity and relaibility of the study's constructs.

3.2.1 | Environmental collaboration

We measured environmental collaboration with five items from Paulraj et al. (2014). The items capture how firms collaborate with suppliers to meet environmental objectives.

TABLE 1 Measures and results of validity tests

Responsible innovation: $\alpha = .89$; CR = .90; AVE = .76; HSV = .19	
Our company produces new products/services that demonstrate a willingness to add value to customers' well-being	0.77 (1.00)
On average, each year, we introduce new products/services that provide social welfare needs of our customers	0.767 (11.98)
Industry experts would say that we are more prolific when it comes to launching products that aim at implementing resource conservation and environmental protection	0.90 (15.22)
Our new product offerings offer solutions for a better future	0.83 (14.77)
Our company has introduced new products/services that capture the responsible side of innovation	0.79 (13.33)
Our company is good at introducing responsible solutions to a meaningful problem	0.77 (12.56)
Stakeholder pressure: $\alpha = .80$; CR = .80; AVE = .56; HSV = .12	
Government/regulators put pressure on our company to pursue sustainable environmental practices	0.75 (1.00)
Customers/suppliers put pressure on our company to pursue sustainable environmental practices	0.85 (16.77)
There are pressures on our company from employees to embark on sustainable environmental practices	0.88 (17.34)
Competitors put pressure on our company to pursue sustainable environmental practices	0.87 (16.76)
Nongovernmental organizations/activists put pressure on our company to pursue sustainable environmental practices	0.90 (18.56)
The media put pressure on your company to pursue sustainable environmental practices	0.92 (19.23)
Environmental collaboration: $\alpha = .79$; CR = .80; AVE = .58; HSV = .11	
We cooperate with our suppliers to achieve environmental objectives	0.88 (1.00)
We encourage our suppliers to develop new source reduction strategies	0.72 (.13.22)
We cooperate with our suppliers to improve their waste reduction initiatives	0.91 (19.23)
We collaborate with our suppliers to provide materials, equipment, parts, and/or services that support our environmental goals	0.86 (18.34)
We work with our suppliers for cleaner production	0.84 (17.04)
Firm performance: $\alpha = .88$; CR = .89; AVE = .74; HSV = .16	
Growth in market share	0.93 (1.00)
Growth in sales	0.92 (24.66)
Growth in profitability	0.91 (23.23)
Growth in number of employees	0.88 (19.34)
Overall performance	0.86 (18.67)

Note: *t* values are shown in parentheses. r = reverse coded.
Abbreviation: AVE, average variance extracted; CR, construct reliability; HSV, highest shared variance with other constructs.

3.2.2 | Stakeholder pressure

We followed Shubham et al. (2018) to measure primary stakeholder pressure using six items.

3.2.3 | Responsible innovation

The six items that were used to measure responsible innovation were developed specifically for this study. Based on extensive literature review, we developed some themes by conducting interviews with 15 managers in charge of product design. We then generated seven items to capture the responsible innovation construct. We employed exploratory factor analysis (EFA) with direct oblimin rotation specifying one factor for the responsible innovation scale. One item was deleted due to cross loadings. The use of oblimin rotation allows an item to freely load on multiple factors, hence showing its true impact across all factors.

3.2.4 | Firm performance

Finance managers were asked to compare their firms' (1) growth in market share, (2) growth in sales, (3) growth in profitability, (4) growth in number of employees, and (5) overall performance compared with that of industry competitors (Sorenson, 1999). Using perceptual performance measures is advantageous over objective indicators because managers' perception of performance or failure has critical managerial implications (Dess & Robinson, 1984).

3.2.5 | Control variables

We controlled for firm size, firm age, new product spending, and industry type. Firm size was measured as the number of full-time employees while firm age was the number of years since the firm was established. Firm size and age were controlled for because larger and older firms are more resourceful to embark on R&D which could translate into new product success (Story et al., 2015). New product spending was measured as the percentage of total revenue spent on the new product program (Du et al., 2016). We controlled for new product expenditure because firms that spend more are more likely to succeed in responsible innovation. Finally, we added industry dummy measured as 0 = low technology; 1 = high technology. Industry was controlled for because high technology industry firms tend to engage in R&D activities that could yield greater innovation success (Weingarten et al., 2012).

3.3 | Common method bias, validity, and reliability assessment

We investigated the potential threat of common method variance influencing our data by employing two main procedures. First, we followed Lindell and Whitney's (2001) approach and identified an item (i.e., I like the red color) that has no conceptual ties with any of the constructs used in our study. We recorded nonsignificant correlations ranging from −.01 to .01. Second, we followed Podsakoff et al.'s, 2012 approach and included a single common latent factor in the model. The model without common method factor yielded the following results: $\chi^2/df = 1.19$, CFI = .94, RMSEA = .05, and TLI = .96, while the model with common method factor produced the following results: $\chi^2/df = 1.15$, CFI = .95, RMSEA = .06, and TLI = .97. When the two models are compared, the results show that the path coefficient of the main model did not change after the inclusion of the model without a common method factor. In addition, the items loaded more strongly on the respective constructs than on the latent common method factor. Overall, we are confident that our results are not substantially affected by common method bias.

Subsequently, the reliability and validity of the measures were assessed with Cronbach's alpha, average variance extracted (AVE), and composite reliability (CR). As reported earlier, the Cronbach's alpha and CR were greater than the suggested cut-off value .70 for all measures (Fornell & Larcker, 1981). All values for CR were significantly larger than .60, the level considered as evidence for convergent validity (Bagozzi & Yi, 2012).

The discriminant validity was assessed by running a series of comparison tests to investigate differences in chi-square of the main model against a series of restricted models. The results confirmed that each model is distinct. Also, we utilized the approach suggested by Fornell and Larcker (1981) to assess discriminant validity. Thus, we inspected whether AVE was larger than the highest shared variance (HSV) for each pair of constructs. Results show that for each construct, the AVE exceeded the HSV between each pair of constructs, suggesting discriminant validity for our constructs.

4 | RESULTS

4.1 | Analytical procedure and findings

Table 2 presents the descriptive statistics and correlations of the variables. The variables involved in the interaction were mean centered to minimize the threat of multicollinearity (Aiken & West, 1991). The largest variance inflation factor (VIF) value of the regression models was 3.60, suggesting that multicollinearity is not a major concern in our study (Neter et al., 1996). The hierarchical regression was used to test the hypotheses.

Table 3 reports the regression results. In Models 1–4, the dependent variable is responsible innovation. Model 1 includes all the control variables. Model 2 includes environmental collaboration, and the result in Model 2 suggests that environmental collaboration has a significant influence on responsible innovation ($\beta = .28$, $p < .01$). This finding provides support for Hypothesis 1. When stakeholder pressure was added to the regression equation in the model, the effect of environmental collaboration on responsible innovation did not change ($\beta = .26$, $p < .01$). Model 4 added the interaction term between

TABLE 2 Descriptive statistics and correlations

Variables	1	2	3	4	5	6	7	8
Firm size (employees)								
Firm age (years)	.06							
New product spending	.08	.17*						
Industry type	−.01	.06	.09					
Stakeholder pressure	−.14*	−.06	.09	.00				
Environmental collaboration	.03	.11	.02	−.01	.19**			
Responsible innovation	.11	.10	.07	.25**	.14*	.25**		
Firm performance	−.12	−.14	.09	.12	.14*	.33**	.35**	
Mean	13.55	8.65	1.49	0.46	4.60	4.45	4.66	4.56
Standard deviation	11.46	3.00	1.37	0.39	0.77	1.04	0.99	1.01

*$p < .05$.
**$p < .01$.

TABLE 3 Regression results

	Models 1–4: Responsible innovation				Models 5–8: Firm performance			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Control variables								
Firm size (employees)	0.12*	0.10*	0.09*	0.06	−0.13**	−0.13**	−0.11*	−0.11*
Firm age	0.10*	0.07	0.06	0.06	−0.11*	−0.11*	−0.12*	0.12*
Industry	0.19***	0.17***	0.16***	0.16***	0.06	0.05	0.05	0.05
New product spending	0.04	0.02	0.03	0.03	0.07	0.06	0.05	0.06
Independent variable								
Environmental collaboration (EC)		0.28***	0.26***	0.26***		0.34***	0.05	0.04
Moderator								
Stakeholder pressure (SP)			0.14**	0.13**	0.12**	0.12*	0.11*	0.11*
Interaction								
EC * SP				0.44***				0.39***
Mediator								
Responsible innovation							0.39***	0.37***
Model fit statistics								
F ratio	1.66	3.90***	5.76***	6.19***	1.53	3.69***	5.70***	6.88***
R^2	.09	.13	.15	.18	.11	.14	.16	.19
ΔR^2	-	.04	.02	.03	-	.03	.02	.03
Largest VIF	1.91	3.19	1.78	1.81	1.70	2.09	2.59	3.60

Note: $N = 225$. Standardized coefficients are shown.
*$p < .10$.
**$p < .05$.
***$p < .01$.

environmental collaboration and stakeholder pressure. The result in Model 4 and Figure 1 shows that the interaction is positive and significant ($\beta = .44$, $p < .01$), suggesting that the effect of environmental collaboration on responsible innovation is stronger when stakeholder pressure is high than when it is low. This finding provides support for Hypothesis 2.

In Models 5–8, the dependent variable is firm performance. Models 5–8 test the mediating hypothesis of responsible innovation. The mediating hypothesis was tested by following the procedures recommended by Zhao et al. (2010). First, the independent variable and the mediating variable should have a significant relationship. As previously observed in Model 2, environmental collaboration (independent variable) is positively and significantly related to responsible innovation (mediating variable) ($\beta = .28$, $p < .01$). Second, the mediating variable and the dependent variable should be significantly related to each other. The result in Model 7 shows that responsible innovation is positively related to firm performance ($\beta = .39$, $p < .01$). Third, the effect of the independent variable on the dependent variable

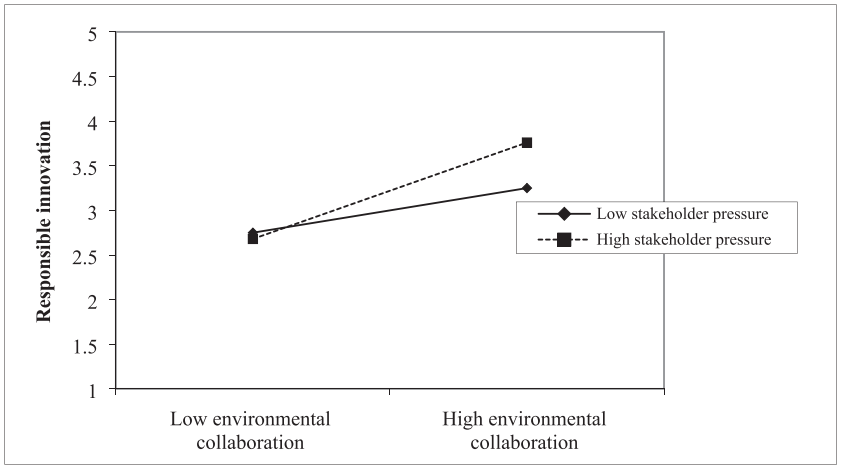

FIGURE 1 Interaction of environmental collaboration and stakeholder pressure on firm performance

TABLE 4 Test of conditional indirect effects at values of stakeholder pressure (moderator)

	Firm performance				
Moderator	**Level**	**Conditional indirect effect**	**SE**	**LL 95% CI**	**UL 95% CI**
Stakeholder pressure	Low (−1.09)	−0.01	0.04	−0.02	0.07
	High (1.09)	0.05	0.03	0.04	0.13

Note: $N = 225$. Results are based on 10,000 bootstrap sample.

should be nonsignificant or weaker when the mediating variable is included in the regression equation. The result in Model 7 shows that when both environmental collaboration and responsible innovation are included in the equation, responsible innovation was positively related to firm performance ($\beta = .39$, $p < .01$). However, the influence of environmental collaboration on firm performance becomes nonsignificant ($\beta = .05$, ns). These findings suggest that responsible innovation mediates the relationship between environmental collaboration and firm performance. Thus, Hypothesis 3 is supported.

To establish the validity of the moderation hypothesis, we investigated the conditional indirect effect of environmental collaboration on firm performance (via responsible) at values of stakeholder, using PROCESS macro (cf. Preacher et al., 2007). Accordingly, stakeholder pressure was set at high and low levels at one standard deviation above and below the mean score of pressure. The results in Table 4 show that the indirect influence of environmental collaboration on firm performance through responsible innovation was conditional on the level of stakeholder pressure. The results demonstrate that the indirect effect was stronger (0.05) and significant at a high level of stakeholder pressure (CI ranging from 0.04 to 0.13) but was weaker (−0.01) and insignificant at a low level of stakeholder pressure (CI ranging from −0.02 to 0.07). Therefore, Hypothesis 3 was confirmed.

4.2 | Robustness tests

To establish the robustness of the findings, additional analyses were performed. First, the same hierarchical regression approach that was used to the hypotheses was repeatedly run with randomly selected subsets of the sampled firms from 90% of the sample down to 50% of the sample (Slevin & Covin, 1997). All the results relating to Hypotheses 1–3 retained their statistical support at the $p < .05$ level or better, indicating that the findings reflect robust relationships in the data set. Second, we re-estimated our model with financial performance as a dependent variable. We use three items to measure financial performance (i.e., return on investment, return on assets, and profit). The results confirmed findings reported above for all the hypotheses relating to financial performance as a dependent variable.

5 | DISCUSSION AND CONCLUSION

In this study, we sought to understand how a firm's level of environmental collaboration affects firm performance through responsible innovation. Consequently, our major aim was to explain the effects of environmental collaboration on firm performance through the mediating mechanism of responsible innovation. The findings showed a strong positive influence of environmental collaboration on responsible innovation. In addition, the findings revealed that increases in environmental collaboration and greater degrees of stakeholder pressure are associated with increases in responsible innovation. The results also reveal that the impact of environmental collaboration firm performance is mediated by responsible innovation. These results allow us to make some important contributions to the environmental management literature.

5.1 | Theoretical contributions

First, unlike previous studies that examined the effect of environmental collaboration on firm performance (Grekova et al., 2016) and venture growth (Adomako, 2020), the current paper explains how environmental collaboration improves firm performance through the mediating mechanism of responsible innovation. This advancement is crucial, as firms in developing countries are typically constrained by resources to engage to improve responsible innovation activities (Owen et al., 2013; Vasen, 2017). This paper, therefore, contributes to studies that identify how firms can develop environmentally responsible products (Blok & Lemmens, 2015; Halme & Korpela, 2014) by identifying environmental collaboration as an antecedent of responsible innovation activities. In addition, this study contributes to the literature on innovation management and on sustainability by explaining the role of environmental collaboration in responsible innovation and discussing the implications of responsible innovation in firm performance. Second, we contribute further to the environmental management literature (Machado et al., 2020; Sharma et al., 2020) by examining how stakeholder pressure conditions the effect of environmental collaboration on responsible innovation. Consequently, this paper contributes to the emerging stream of research that examines how the influence of environmental collaboration depends on stakeholder pressures (Konadu et al., 2020; Tran & Adomako, 2021). Thus, by introducing stakeholder pressure as a moderating factor in the relationship between environmental collaboration and responsible innovation, this paper extends the stakeholder management literature beyond the developed markets. More specifically, this paper draws on the contextual idiosyncrasies of developing countries to explain how stakeholder pressure moderates the effect of environmental collaboration on responsible innovation. Third, we add to the responsible innovation literature by developing new scale that captures responsible innovation. Our new scale for measuring responsible innovation demonstrates excellent psychometric properties with a high Cronbach's alpha and the individual items loading well onto a single factor in our study. This makes it an effective scale for measuring responsible innovation. It is hoped that this scale is useful to scholars in continuing research on responsible innovation.

5.2 | Managerial implications

This paper provides some practical contributions. Our findings show that high levels of environmental collaboration are particularly beneficial for responsible innovation. This finding is important for managers as this finding is likely to improve sustainable practice improvements (Grekova et al., 2016; Hall, 2000). For example, previous research has revealed that environmental collaboration can improve sustainable process improvements on the side of the focal firm (Chiou et al., 2011). Second, managers can generate important implications from our findings given that it highlights a condition under which environmental collaboration yields greater responsible innovation. This suggests that the result of environmental collaboration on responsible innovation depends on stakeholder pressure. This finding is likely to induce environmentally sustainable innovations in the focal firm. Third, the finding that the influence of environmental collaboration on levels of responsible innovation is stronger under conditions of greater stakeholder pressure is crucial for managers if they are inclined to improve responsible innovation. Thus, managers are encouraged to pay attention to stakeholder management as focusing on stakeholders can be a source of opportunity for improving the role of environmental collaboration. Moreover, based on our results, responsible innovation is an effective way to improve firm performance. Therefore, managers should actively carry out responsible innovation practices. Finally, given that our results show that responsible innovation is critical for firm performance under condition of high stakeholder pressure, it is important to integrate key stakeholders into the firms' decision-making process.

6 | LIMITATION AND FUTURE RESEARCH

This study has some limitations that offer opportunities for future research. First, the findings of the study are based on a Ghanaian sample which does not address the role of environmental collaboration, responsible innovation, and firm performance in other environments. Ghana has the strong values of a collectivistic culture that offers assertiveness and independence for managers to collaborate stakeholders. Therefore, the findings must be interpreted based on a collectivistic culture where families and communities have a central role in environmental management. Accordingly, future studies can be conducted using a multicountry setting (Europe, Latin America, and Africa) to capture the unique and varied contextual idiosyncrasies within which environmental collaboration drives firm outcomes such as exploration and exploitation of opportunities. Second, environmental collaboration was measured by using self-reported data. Measuring environmental collaboration in this way may be affected by social desirability bias in responses. Future studies may, therefore, employ triangulated methods to capture relevant expenditures on environmental management in each firm.

Despite these limitations, our results indicate that high levels of environmental collaboration yield greater levels of responsible innovation and ultimately firm performance. The results also show that levels of stakeholder pressure moderate the impact of environmental collaboration on responsible innovation. Overall, the outcomes from this study extend the environmental strategy literature in several ways. In the main, the study contributes to environmental strategy research by providing a clearer illustration of the specific drivers of responsible innovation and the conditions in which firm-level capabilities, such as environmental collaboration, positively impact firm performance within a developing market context.

ACKNOWLEDGMENT

This research was supported by the University of Economics Ho Chi Minh City, Vietnam.

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How to cite this article: Adomako, S., & Tran, M. D. (2022). Environmental collaboration, responsible innovation, and firm performance: The moderating role of stakeholder pressure. *Business Strategy and the Environment*, 1–10. https://doi.org/10.1002/bse.2977