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Linking Corporate Environmental Performance to Financial Performance of Pakistani Firms: The Roles of Technological capability and Public awareness

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Abstract: This research investigates the corporate environmental performance (CEP) literature toward its financial performance of the firm. CEP is defined as the exercise and practices of companies to choose sensible measures to save and develop environment-friendly green activities. The influence of CEP on the financial performance of the firm via technological capability was examined. Furthermore, public awareness was hypothesized to moderate the impact of CEP on technological capability indicating moderation mediation. When public awareness was high, the relationship between the CEP and technological capability should be stronger. Content analysis was used for data collection. The model was tested using a sample of 1491 observations from the manufacturing companies of Pakistan. The data were collected between the period 2008 and 2017 from the annual reports of the companies, State Bank of Pakistan, and Pakistan Stock exchange. A hierarchical regression analysis was used for data analysis. Using bootstrap analysis, we used model 8 in Stata to examine conditional direct and indirect effects. Results supported the indirect effect of CEP on financial performance through strengthening technological capability. Both direct and indirect effects were significant. Consistent with theoretical assumptions, the indirect effect becomes stronger with high public awareness and diminished with low public awareness. Both theoretical and practical contributions are discussed based on the outcomes.

Keywords: corporate environmental performance (CEP); technological capability; public awareness; financial performance of the firm; moderated mediation; the manufacturing sector

1. Introduction

In the current period, global awareness concerned with the stability of financial growth and environmentally friendly green activities as environmental pollution issues appears continuously [1,2]. As a result of increased green awareness, companies have become increasingly crucial in tackling environmental issues [3,4]. With the growing importance of green sustainability from investors, companies are making efforts to incorporate green concerns into their business environment and decision-making processes in an attempt to be environmentally friendly [5]. Therefore, green sustainability measures have begun by many new companies as an outcome of the corporate environmental performance (CEP) concept [6]. Several studies focused on associated issues in environmentally friendly business works. As for businesses in Pakistan is concerned, the environmental breakdown has caused due to the development of the economy in recent times. Therefore, the balance of financial growth and environmentally friendly green activities is too urgently needed [7].

Corporate social responsibility (CSR) as defined as a business strategy that makes a firm voluntarily responsible for itself, its public, and the stakeholders [8]. The idea of CSR is widely investigated and

deeply acknowledged in earlier studies. The CSR studies now changing from integrating ideas to specific aspects, primarily the green dimension due to environmentally friendly degradation [3,9]; developing CEP is an essential topic for both theoretical and business literature [10]. Companies have, therefore, started to integrate environmentally friendly green practices into CSR, enabling them to improve their performance [11]. As a result, the effect of environmentally friendly green practices on corporate thinking is increasing day by day. CEP is the responsibility and exercise of companies to choose responsible measures to improve and maintain a green-friendly environment [12]. It represents efforts by companies that are good for the environment rather than just dealing with laws and regulations relevant to it [13]. It also plays a crucial role in developing an environmentally friendly framework that includes waste product reduction, full-cost accounting, company plan for environmentally friendly practices, and demand-side management [9,10]. Because of the link between environmental management and CSR, a study has been conducted by Baughn, et al. [14] specifies that U.S. companies rating higher than anticipated in CSR relative to companies in other countries, but rating lower than expected in CEP. However, prominent positions of CSR do not consistently bring better CEP, while green performance on environmental waste and emissions reduction has drawn significant attention from practitioners and has now considered as a vital academic issue.

Although research examinations on CEP and financial performance have studied, some questions remain unresolved. Firstly, existing studies on CEP and financial performance have developed mixed outcomes. For example, several types of research have established that CEP positively impacts firm financial performance [15–18]. However, some research works have described a negative or non-significant effect of CEP [19–22]. Researchers typically contend that implementing CEP can boost profitability, allowing companies to gain a competitive advantage [23] by diminishing green costs, increasing sales profits, and producing financial profit such as return on assets. Some researchers propose that different outcomes have been developed due to the absence of specific studies that examine context-specific mediating variables or moderating variables as a result of which CEP influences firm financial performance [24,25]. Therefore, the specific mechanism that CEP influences firm financial performance needs to be further considered for different results.

Regardless of several studies conducted by the association between CEP-financial performance and business using different estimates (economic, environmental, and marketing), the research still lacks exploring mechanisms between CEP and financial performance through some specific organizational variables such as the technological capability of the firm and public awareness of the firm. A rationale might be that many of the studies do not examine the relationship's borderline conditionality. From a conceptual point of view, being green environmentally friendly is a channel for technological capability, handling green regulations involve the production and acquisition of new technologies to make beneficial environments for companies to achieve financial performance [26]. That is why the CEP should be closely linked with the technological capability of the firm. Technological Capability as defined as the degree to which a company commits resources toward knowledge search and developments of expertise, technological innovation, and awareness of future technological needs [27]. Besides, according to the resource-based view (RBV), the resources of a company are rare, valuable, non-substitutable, and imitable [28]. For example, such company resources, such as CEP, enable the company to involve in various capabilities (Technological capability) [13]. If these resources are allocated to CEP, then such resources will boost the technological capability and increase the financial performance of the firm [29]. However, little studies investigated the role of technological capability as a mediator and explored the relationships [30] as Cheng and Yang [31] pointed out the mediation effect of the technological capability of a company in the connection between business ties and company performance. Previous studies had included it in the regression model as a control variable [32]. In the present study, we advanced the literature by examining the mediating role of technological capability in the relationship between CEP and financial performance of the firm rather than considering it as a control variable in the regression model. Considering both the RBV and existing studies on the

associations among CEP, technological capability, and financial performance, we suggest the mediating role of technological capability between CEP and financial performance of the firm.

Moreover, we investigate a moderating variable that affects the association between CEP and technological capability. In specific, we emphasize the moderating effect of public awareness, which as defined as the degree to which companies' activities are recognized by the general public or serve as a pre-requisite for public response to company actions. Furthermore, as stakeholder theory suggest, companies are not independent but based on different shareholders for a continuous resource supply [33]. The growing level of green consciousness generates the need for companies to respond to the demands of stakeholders. Asymmetry of information occurs when stakeholders do not have as much knowledge about the CEP activities of companies. As stakeholders regularly interact with companies, they depend on the performance and create a public vision of the CEP disclosure of companies. Companies can also give meaning to their stakeholders by developing a public vision and mobilize them to support supply and commit to resources. Therefore, the connection between CEP and the technological capability of the firm might be contingent on a public vision between stakeholders and companies. Public awareness is a crucial way for companies to build a public vision with stakeholders. This study, therefore, further explores the relationship between the company's CEP and the technological capability of the firm using public awareness as a moderating variable.

Given the study gaps discussed earlier, the present research design four nearly interrelated variables, that is, CEP, technological capability, public awareness, and financial performance, and examine the relationship between these variables. A moderated mediation framework was suggested and examined, based on the earlier studies. It hypothesized the mediation effect of technological capability in the relationship between CEP and financial performance of the firm; besides, public awareness moderated the mediation effect in that high level of public awareness magnifies the mediation effect of technological capability.

In the present research, we contribute precious knowledge to earlier studies in various forms. Firstly, we examine the mediating role of the technological capability in the relationship between CEP and financial performance, which enlarges our knowledge of the connection linking CEP and financial performance. Secondly, we designate the moderating effect of public awareness on the link between CEP and the technological capability of the company. Compared to previous studies, this study adds up a new review of the CEP on financial performance. The results demonstrate that public awareness has indirect effects on the connection between CEP and financial performance through technological capability. Thirdly, this research focuses on the Pakistan environment. Most previous studies grounded on developed economies and little-explored the connection between CEP and financial performance in the Pakistan environment.

2. Hypotheses Development

2.1. Corporate Environmental Performance (CEP) and Technological Capability

The idea of CSR was extensively examined and thoroughly accepted in earlier studies. The CSR studies changing now from combining ideas to particular aspects, mainly the green dimension because of global temperature change and environmentally friendly degradation [3,9], establishing CEP is a significant subject for both theoretical literature and the business community [10]. Therefore, companies began to include environmentally friendly green practices into CSR, allowing them to increase their efficiency, whereas, it also diminishes wastage and volumes of emission to reduce the effect on generation after generations [11]. As a result, the impact of environmentally friendly green activities on corporate thinking increases. The growing emphasis that arises from environmentally friendly organizations and governments and their related safety standards on environmentally friendly protection measures that increase pressure on companies to protect the environment [34]. Some scholars contend that CEP covers the environmental impacts of a company's products, operations, and facilities. Productivity increases with the emission of less amount of carbon dioxide and energy waste, whereas, it also

decreasing resource utilization to reduce the impact on the coming generations [11]. CEP regarded as environmentally friendly green activities, which also take up influence for external adverse responsibilities of their processes, apart from considering the essentials of environmentally friendly rules [35].

According to RBV, CEP could be seen as a particular resource that gives advantages to companies [36]. According to the view, an outstanding company's culture is typically a valuable and special one that cannot be replicated and substituted, and that can be considered as one of its essential resources [37]. CEP emphasizes the value of positive measures to tackle environmentally friendly issues and allows the development of technological working practices, facilities, and procedures [38]. Therefore, CEP is seen to become a form of ethical culture of the company that separates one company from others in terms of achieving economic advantages and long-term growth. It can be inferred from the RBV that CEP will promote the active environmental behavior of companies that can improve the capacity of companies to innovate and further encourage the technological capabilities of the companies as Russo and Fouts [39] figured out that RBV provides a strong basis underlying the claim that environmentally friendly success relates positively to the performance.

From the viewpoint of stakeholders, the CEP refers to the promise and support of companies for essential activities selecting environmentally friendly actions and development, or waste reduction practices in the companies' process to increase the productivity of their inputs and to reduce the means of adversely affecting emerging generations in the country [40]. Earlier studies [41,42] indicate three main stakeholder categories that can serve as a motive force to motivate companies to start CEP, including company stakeholders, which are media, partners, and employees, public stakeholders like industry unions, and philanthropic companies, governmental stakeholders like legislatures and government. The public stakeholders and governmental stakeholders are the key stakeholder groups giving awareness to companies' execution of CEP [43]. Global environmental issues have generated growing challenges for companies that pursuing rapid development at the value of large scale resource utilization and environmentally friendly degradation. Therefore the variations in stakeholder values from profit-oriented to environmentally friendly, CEP is thus gaining a strong position. In order to achieve the needs of stakeholders, today's companies are often bound to be more environmentally sensitive.

Subsequently, it may be dependent upon previous arguments that companies with greater importance on CEP matters may obtain more responses from stakeholders, especially from public stakeholders, for example, non-benefit environmental groups and administrative ones. Environmentally-friendly companies may collect useful information and knowledge about the environmental needs, priorities, and timely notice of community stakeholders about changes in environmental values [44]. Knowledge and information understood through corporate communication with the public can help companies accomplish technological efficiency. The companies can communicate this knowledge and information in processes of technological capability [45]. However, most authors believe in the positive effect of CEP on technological capability investment [46,47]. Moreover, various stakeholders have different interests in companies [48]. Jacobs, et al. [49], for example, a strong reaction to the market correlated with the declaration of environmental donations. Wei, et al. [50] contend that CEP indicates a company's efforts to accommodate corporate stakeholder pressure. Thus, CEP indirectly impacts the financial performance of the firm through corporate legitimacy. These outcomes validate the argument that companies executing CEP would establish a public association that would further enhance their technological capability.

Companies must improve their technological capabilities in order to satisfy the diverse needs of their stakeholders. Companies may depend on their competitiveness through technological capabilities to produce innovative results with reasonable confidence to provide competitive goods and services to customers while growing market share and to increase business income [51], and they are delivering a higher reward for workers. Therefore, companies can expand current methods and enhance resource utilization through technological capabilities while reducing resource consumption and

relieve environmental pressure [52,53]. _ENREF_31Porter and Van der Linde [54] find that firms that incorporate CEP into technological capabilities would take measurements in the market, which is one of the reasons companies can achieve a competitive advantage. However, most researchers believe that governmental stakeholders, community stakeholder groups, have the authority to direct resources and funds toward or away from a company [55]. Company stakeholders, such as governing stakeholders, together with interrelated incentive systems, have developed overall environmentally friendly norms and protection codes. Companies determine that their compliance with these codes and standards can contribute to enhancing their legitimacy for governmental stakeholders [56]. Therefore, companies that restrict their adverse environmentally- friendly influences may receive financial resources and manage political support from governing stakeholders such as interest-free or government lending, support financing, tax exemption, project subsidy, and relaxed government compliance. Both financial and governmental support is crucial for companies pursuing to build their technological capabilities, execute their technical ventures, and improve their R&D workers' skill level with the possibilities to initiate better technological capabilities. Earlier studies also suggest the effect of CEP on governmental legitimacy that can be used as an indicator to support our opinions. For example, Babiak and Trendafilova [57] specify that in order to achieve legitimacy, environmentally friendly green management initiatives in business are essential. Hence, we develop the following hypothesis:

Hypothesis 1 (H1). *CEP has a positive influence on technological capability.*

2.2. The Mediating Effect of Technology Capability

The mediation effect of the technological capability of the company is theoretically grounded on the RBV. The RBV suggests that a company's activities and resources, for instance, environmentally friendly CSR, critically affect many activities of the company (Technological capability), which significantly predict the financial performance of the firm [36]. According to this view, an adequate organization's culture is typically a valuable and distinctive one that is unable to be replicated and substituted and deemed to be one of its essential vital resources [37]. CEP reinforces the significance of effective measures to address green issues and needs the advancement of technological capabilities strategies, goods, facilities, procedures, and extend their demands to workforces, improve consumer and customer confidence and thus enhance the financial performance of the firm [38,58]. Grounded on the RBV, we suggest that CEP can perform as the responsibility of an excellent firm's culture, which indirectly affects the firm's financial performance via intermediating mechanisms such as the technological capability of the company.

So far, concerning CEP is concerned, it has been related to better technological capability and hence, the better financial performance of the firm [54]. Therefore, it seems usual to adopt better technical capability efficiency as the transmission mechanism of CEP positively influences the financial performance. Of course, previous studies extensively examined the importance of technological capability. For example, McWilliams and Siegel [59] pointed out that a company's research and development activities and corporate social performance are positively correlated since many aspects of CSR create either product innovation, a process innovation, or both. Furthermore, following a few previous research results showing that both CSR and technology-related activities contribute to the intangible resources of the firms [58,60]. Similarly, Surroca, Tribó and Waddock [58] contend that companies could take advantage of CEP by employing activities and resources such as technological capability, the culture of the company, reputation, and human capital, which can strengthen firm performance [9]. Flammer [3] considers that environmentally friendly responsible experience of companies can increase the technological capability and stock prices, where those behaving environmentally unfriendly activities can face a significant decrease in its share price and capabilities. However, most authors believe in the positive effect of CEP on technological capability investment [46,47]. Moreover, firms with higher technological capability investments would generally pay more importance to their CEP activities and finally increase their financial performance [61].

Therefore, to achieve green environmentally friendly protection, companies will invest a more significant amount in CEP, strengthening technological capabilities to solve environmentally friendly problems. Furthermore, when a company spends in CEP, they can improve their technical skills, helping the company make a sustainable competitive advantage, thus enhancing its financial performance. Grounded on the above reasoning and RBV of the firm, we argued that a firm invests more in CEP would lead to improving their technological capability and financial performance of the firm. Thus, we postulate the hypothesis as follows:

Hypothesis 2 (H2). *The technological capability will mediate the relationship between CEP and the financial performance of the firm.*

2.3. Moderating Effect of Public Awareness

We suggest a contingent role of public awareness in the association between CEP and technological capability. The recent literature indicates that public awareness of companies can draw more attention nowadays, public awareness as defined as the degree to which companies' activities are noticed by the general public or serves as a pre-requisite for public response to company actions. For example, public awareness can also assist governing stakeholders to evaluate whether companies' CEPs fulfill their requirements [62]. Companies with considerable public awareness may specify regulating conformity burdens and demonstrate that they are taking into consideration the green effects on other classes rather than just thinking of the perceived benefit [63,64]. It is more probable that the better the public awareness, the more governing stakeholder groups recognize the lawfulness of companies and the stronger level of company legal status. Thus, companies with a stronger level of public awareness can better shape, sustain, or improve relations with numerous governing stakeholders. Therefore, it is more convenient for them to approach financial funds and particular governmental assistance [65]. By performing in this way, companies can incorporate technological capabilities to generate new ways of operating, new procedures, and new products.

The stakeholder theory suggests that companies' survival depends on the ability to include CSR desires, special interest groups into their corporate strategy [66]. Whereas general stakeholders, primarily the public, are currently very concerned about CEP, so companies expected to recognize CEP and work in environmentally friendly ways. For example, recognition of the CEP of companies enhances not only the acknowledgment of public stakeholders but also public stakeholders' willingness to contribute their capital for the benefit of the company [67]. As public awareness increases, companies that are accountable for their marketplace behavior can attract more public stakeholders' full attention [68]. In this case, companies can make more well-organized data networks and receive information [69]. The more spontaneous flows of knowledge thus allow the transformation of CEP into technological capability [70].

Despite this fact, researchers do not pay adequate importance to the awareness part of CSR. There exists simply a couple of research studies that observe how awareness influence the applications of CSR. For example, Brammer and Millington [71] observe a positive association among the visibility part of CSR and philanthropy activities. Park [72] examines the contingent effect of visibility on the association between CSR and company reputation. The results of this moderation analysis show a positive effect, which merely increases the company's exposure to the community. Servaes and Tamayo [73] study show that for companies with high customer awareness, the connection between CSR practices and company value is higher as a result of advertising and marketing expenses. Wang and Qian [74] also concluded that exposure affects the responses of stakeholders to company philanthropy, which regulates the difference between company philanthropy and financial performance of the firm. It can be concluded, from empirical findings and theoretical arguments that the better public awareness that companies maintain, the better gains they will get from CEP. Therefore, we hypothesize the following hypotheses:

Hypothesis 3 (H3). *Public awareness positively moderates the relationship between CEP and the technological capability of the company.*

Hypothesis 4 (H4). *The indirect effect of CEP through technological capability on the financial performance of the firm is predicted to be stronger for those with a higher level of public awareness and weaker for those with a low level of public awareness.*

3. Methodology

3.1. Procedure for Data Collection

Data were obtained from listed manufacturing companies in Pakistan stock exchange, Pakistan, over the period 2008–2017. The primary source of Pakistan's pollution was the manufacturing companies, which was more appropriate to the purpose of our study [9]. Sarkis [75] points out the essential environmental impacts of the manufacturing sector. Regardless, the manufacturing industry comprises energy-intensive and polluting industries such as chemicals, pharmaceuticals, food products, textiles, sugar, paper, steel, cement, and electronics. As the company activities and resources become gradually rare and environmentally friendly, hurdles to global business become rigorous, the usage of environmentally friendly production to boost competitive advantage is an essential component for the sustainable procedure of the processing and manufacturing sector. We selected a sample of 150 firms from the manufacturing sector of Pakistan and then searched their respective websites for the necessary information about each company. CEP data were collected from the companies' annual reports, sustainability reports, and companies' websites. The return on assets (ROA), research and development spending (R&D), advertising expenditures, firm size, leverage, sales growth, and capital intensity data come from the State Bank of Pakistan, Pakistan stock exchange website, sustainability reports, and companies' annual reports from their respective websites. Moreover, this study deleted a few companies due to their lack of complete yearly observations. After eliminating the companies, the finishing data sample contained 1491 company-yearly observations.

3.2. Variables Measurement

3.2.1. Financial Performance of the Firm

The most reliable measurement technique of the financial performance is Return on Assets (ROA), which used widely in previous studies. Such as Mishra and Suar [76] considered ROA as a substitution of the financial performance of the company when investigating the influences of CSR. Similarly, Clarkson, et al. [77] also used ROA to evaluate financial performance and identified a positive impact on ROA from corporate environmental disclosure.

3.2.2. Corporate Environmental Performance (CEP)

Databases such as Council on Economic Priorities (CEP), Kinder, Lydenberg, Domini Research & Analytics (KLD), and Toxic Release Inventory (TRI), were mostly used in CEP empirically studies [78]. All of these databases available only in developed countries, whereas in Pakistan, there is no appropriate database for data availability. As a substitute, researchers used the content analysis method to compute CEP by examining particular environmentally friendly green activities information reveal in annual reports of companies [9,79].

To measure CEP through content analysis, thirteen items such as garbage disposal, water efficiency, beneficial products and services, sustainable packaging, environmental investment, resources recycling, environmental management system, process improvement, renewable energy, emission reduction, pollution prevention, energy-saving, and environmental innovation were used. According to the following standards, each item was scored. Such as 3 for items quantitatively or monetarily described,

2 for items specifically described, 1 for a general description, 0 for no relevant information disclosed, [80]. Ultimately, this study got the total score of CEP for each observation by summing up each item score.

3.2.3. Moderating Variable

Public awareness was calculated by company advertising strength, which was measured as the ratio of General, administrative, and selling expenses to sales [74]. Therefore, a company's advertising strength can be a substitute measure of its public awareness.

3.2.4. Mediating Variable

Research and development (R&D) expenses to total assets are widely used to measure technological capability [17,58]. This study adopted R&D spending as the evaluation measure for investment in technological capability. Disclosure of the technological capability investment data of the companies mainly appears in the annual reports of the companies.

3.2.5. Control variables

Four control variables, such as firm size, leverage, sales growth, and capital intensity, were added in this study to describe the firm financial performance. The firm size, which plays an essential role in the relationship between the social and financial activities of the firm, was measured using log assets [81]. Leverage frequently employed as a substitute variable for the risk of companies. If the leverage of a company is high, it may undermine the financial performance of the company [82]. This study also used sales growth as a control variable because it was defined by earlier research [83]. We also included capital intensity in the model since it also affects a company's financial performance [84].

4. Analysis and Results

The statistical software package STATA 14.0 analyzed all the essential variables of the study, such as CEP, public awareness, technological capability, and financial performance of the firm. In order to obtain the results, Hierarchical regression was used. In two steps, we checked our proposed model. Firstly, we used the Baron and Kenny [85] approach to analyze the intervening effect of examining the relationship between CEP, technological capability, and financial performance of the firm. Secondly, we incorporated public awareness as a contingent variable into the model, and empirically examined the moderation hypothesis (H3) and moderation mediation hypothesis (H4). This hypothesis of moderation mediation so-called as conditional indirect effects [86], testifies whether or not the expected simple relationships of mediation, as suggested in the above hypothesis (H2), will differ as a result of the corresponding moderating variable of the study. In our research analysis, the moderation mediation role shows the indirect effect of CEP on financial performance through technological capability, which varies in strength by high and low levels of public awareness. Therefore, based on Hayes [87], SEM command method in STATA, estimates of the model coefficients corresponding to the different paths defined in this research analysis were obtained. We calculated the paths of our proposed moderated mediation model, as suggested in the study. Besides, we examined the differentiation in the conditional indirect effect of CEP on the financial performance using the technological capability (at low and high levels of public awareness) by confidence intervals resulting from 5000 bootstrapping samples estimation of each pathway. The high and low levels of public awareness have been functionalized as one standard deviation below and one above the mean score of public awareness.

Table 1 shows a summary of the descriptive statistics of all the variables used in this research. In addition to the correlation among all the study variables, the mean and standard deviation of each variable are shown separately in the columns. Overall, It can be observed that no correlations between variables were sufficiently high to raise significant multicollinearity issues as all of the variables were positively and significantly correlated with each other, which may give an understanding into our central conceptual position.

Table 1. Descriptive Statistics.

Variable	Mean	SD	1	2	3	4	5	6	7
Firm size	15.107	1.823	1						
Leverage	0.639	0.485	−0.223 **	1					
Capital Intensity	0.342	0.086	−0.005	−0.055 *	1				
Sales growth	0.336	0.157	0.033	−0.009	0.025	1			
CEP	22.789	2.900	0.020	0.021	0.041	−0.006	1		
TC	0.047	0.204	−0.075 **	0.403 **	−0.045	−0.017	0.063 *	1	
Public Awareness	0.185	0.106	−0.101 **	−0.043	0.040	−0.019	0.023 *	0.058 *	1
ROA	0.068	0.248	0.161 *	0.329 **	0.072 **	0.049	0.051 *	0.743 **	0.074 **

Note: * $p < 0.05$, ** $p < 0.01$, TC = Technological capability, ROA = return on assets, CEP = Corporate environmental performance.

To confirm the absence of multicollinearity in the study, we also measured the variance inflation factor (VIF) for all predictor variables. After the regression analysis, we could use the vif command in Stata to test for multicollinearity. As a rule, a variable with VIF values above ten might be worth more investigation [88]. The VIF values for all predictor variables were well below 10, which shows that the data are free of multicollinearity. Table 2 highlights the details of the VIF analysis.

Table 2. Variance inflation factor statistic.

Variable	VIF	1/VIF
Leverage	1.26	0.793164
Firm size	1.05	0.954284
Capital	1.01	0.991227
Sales growth	1.00	0.997629
CEP	1.01	0.992686
TC	1.23	0.811453
Public awareness	1.02	0.978303

Note: CEP = Corporate environmental performance, TC = Technological capability.

For panel data, there are three estimators: fixed effects (FE), random effects (RE), and ordinary least squares (OLS). We first introduced the Hausman test to examine which model is more suitable, FE or RE, to conduct the empirical analysis. Therefore, we used a random effects model after processing the results of the Hausman test, which showed a level of significance ($p > 0.05$) for each model. The random effects results (Wald χ^2) for each model are outlined in Table 3.

Table 3 provides evidence of hierarchical regression analysis. Model 1 measures the relation among control variables of the research model and dependent variable. The independent variable CEP was included in Model 2. The mediating variable, such as the technological capability, was added in Model 3. Then the technological capability as a dependent variable was added in Model 4, and at last, the 2-way interaction terms between CEP and public awareness were combined in Model 5.

We can know from Table 3, that CEP is a powerful predictor of technological capability. The coefficient in Model 4 ($\beta = 0.057$, $p < 0.05$) is consistently positively significant. H1 is thus supported. In model 3, the coefficient of the involving technological capability and return on assets is both together positive ($\beta = 0.744$, $p < 0.01$) and significant.

Table 3. Hierarchical regression analysis results of technological capability and firm financial performance.

Variable	Firm Financial Performance			Technological Capability	
	Model 1	Model 2	Model 3	Model 4	Model 5
Firm size	0.088	0.090	0.079	0.014	0.094
Leverage	−0.309	−0.308	0.001	0.041 ***	0.016
Capital intensity	0.057	0.059	0.040	0.025 **	0.038
Sales growth	−0.056	−0.057	−0.066	−0.012	−0.064
CEP		0.052 **	0.010	0.057 **	0.065 **
TC			0.744 ***		
Public Awareness					0.066 **
CEP × Public Awareness					0.065 **
R ²	0.121	0.124	0.576	0.182	0.593
ΔR ²	0.118	0.120	0.574	0.179	0.591
F	49.34 ***	40.47 ***	323.92 ***	63.74 ***	259.64 ***
Wald Chi ²	198.03 ***	203.21 ***	953.08 ***	320.03 ***	338.20 ***

Notes: ** $p < 0.05$, *** $p < 0.01$, TC = technological capability, CEP = Corporate environmental performance.

The second hypothesis, H2, suggested that technological capability mediates the relationship between CEP and financial performance. The mediation analysis was, therefore, carried out using Baron and Kenny [85] analysis techniques. Four steps are necessary according to their approach. The independent variable, such as CEP, must have a positive relationship with the dependent variable financial performance and the mediator variable technological capability in the first and second steps. The mediator variable, for instance, technological capability, should have a positive relationship with the dependent variable financial performance in the third step. The last step indicates that the effect of the independent variable on the dependent variable must be smaller, partial, or negative when the mediator variable involves.

The findings of this research showed that (1) CEP was very significant with technological technology in Model 4 ($\beta = 0.057$, $p < 0.05$); (2) Technological capability was extremely significant with financial performance of the firm in Model 3 ($\beta = 0.744$, $p < 0.01$); (3) CEP was significant with financial performance of the firm in Model 2 ($\beta = 0.052$, $p < 0.05$); and (4) the direct effect of CEP had become negligible in Model 3 ($\beta = 0.010$, $p = 0.556$) when technological capability was regressed concurrently among CEP and financial performance that showed full mediation effect. Moreover, these findings supported our H2.

Moreover, these four conditions were analyzed in order to test the moderating mediated effect (H4) [86,89]. (1) A positive relationship between CEP and financial performance; (2) a positive connection among CEP and the public awareness that estimate the technological capability; (3) the positive relationship of technological capability with financial performance; and (4) the CEP indirectly influences the financial performance through technological capability at high and low levels of public awareness. The last condition is necessary to test a moderation mediation effect.

Table 4 provides unstandardized coefficient estimates of the moderation mediation model. The analysis in Table 3 showed that CEP was positively significant with firm financial performance in Model 2 ($\beta = 0.052$, $p < 0.05$), meeting condition 1 for moderating mediation. The interaction between CEP and public awareness was significant in predicting technological capability in Model 5 ($\beta = 0.065$, $p < 0.05$), proving condition 2. The findings suggest that when the level of public awareness was high, the relationship between CEP and technological capability was stronger than it was weak. Therefore, we can assume that there was support for hypothesis 3. The technological capability in Model 3 was significantly associated with financial performance ($\beta = 0.744$, $p < 0.01$), fulfilling condition 3. Therefore, we calculated the conditional indirect effect of CEP on the financial performance through technological capability at higher levels (+1 standard deviation) and lower (−1 standard deviation) of public awareness using [87] SEM command method in STATA for condition 4.

Table 4. Bootstrap test of moderating mediation effects.

Moderator	Level	Mechanism of Indirect Effect	SE	95% CI LL	95% CI UL
Public Awareness	High	0.004 *	0.002	−0.0007	0.010
	Medium	−0.0003	0.001	−0.002	0.002
	Low	−0.005	0.004	−0.014	0.003

Note: * $p < 0.10$, ** $p < 0.05$, $n = 1491$, SE = standard error, CI = confidence interval, Bootstrap samples = 5000.

To examine the conditional indirect effect of CEP on financial performance through technological capability at different levels of public awareness, we applied the Model 2 (Hayes, 2017, Model 8) in STATA using bootstrap analysis with a bootstrap sample of 5000 and confidence interval (CI) of 95% [87]. The findings of Table 4 showed that the indirect effect of CEP on the financial performance through technological capability was significant with high public awareness (conditional indirect effect = 0.004, SE = 0.002, $p < 0.10$), while the effect diminished with a low level of public awareness (indirect effect = −0.005, SE = 0.004, $p = 0.206$), confirms moderated mediation. Thus the condition supported hypothesis 4.

For descriptive purposes, we initially plotted predicted technological capability against the CEP, separately for high public awareness and low public awareness (one standard deviation above and one standard deviation below the mean). The slope test in Figure 1 clearly shows the relation between CEP and technological capability is stronger for those with a high level of public awareness. However, the relationship was weaker or insignificant at a low level of public awareness.

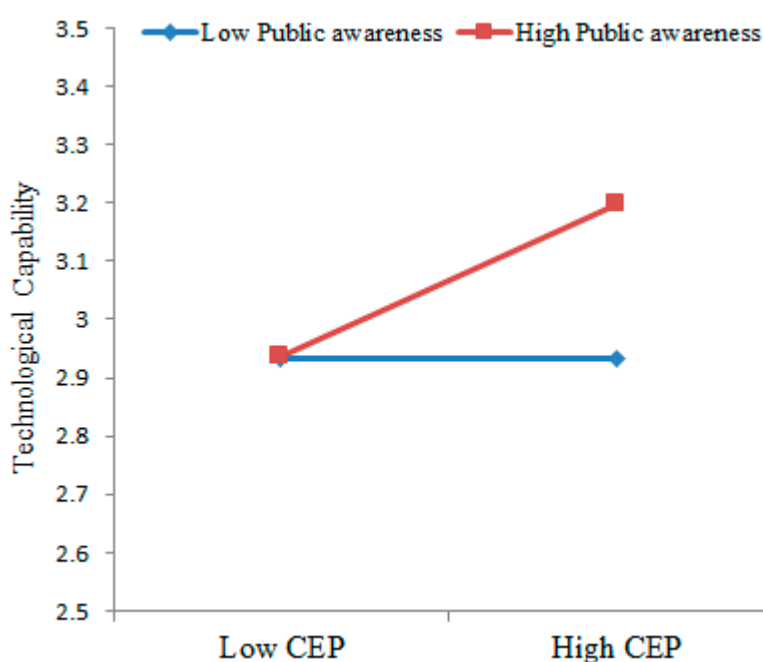


Figure 1. Interaction effect of corporate environmental performance (CEP) and public awareness on technological capability.

Moreover for endogeneity controls, an instrument variable (IV) by two-stage least square method (2SLS) was introduced to solve endogeneity due to simultaneity, reverse causality, and omitted variables. According to the research paper published in Econometrica concerning the selection and development of IV [90], (Firm Financial performance-the mean of firm financial performance)*(CEP-the mean of CEP) and (Technological capability-the mean of technological capability)*(CEP-the mean of CEP) were used as the IV of CEP.

The null hypothesis that the equation is underidentified, the results at the level of 1% and 5% reject the null hypothesis that further indicates there is a significant correlation between the endogenous variables and the IV. The findings, therefore, reject the null hypothesis at the level of 1% and 5%, indicating that the 2SLS is valid and accurate.

The 2SLS findings for endogeneity controls are shown in Table 5, which demonstrates that the magnitude and significance of the coefficients are identical to the results of the previous regression model shown in Table 3 when controlling endogenous. Consequently, the findings support H1–H3 as well.

Table 5. Endogeneity controls.

Variable	Firm Financial Performance	Technological Capability	
	Model 6	Model 7	Model 8
Firm size	0.015 ***	0.077 **	0.081 **
Leverage	0.005	0.087	0.080
Capital intensity	0.261 ***	0.415 **	0.131 **
Sales growth	−0.117 **	0.218	0.156
CEP	0.092 ***	0.566 **	0.502 **
TC	0.809 ***		
Public awareness			0.634 **
CEP × public awareness			0.479 **

Notes: ** $p < 0.05$, *** $p < 0.01$, TC = technological capability, CEP = Corporate environmental performance.

5. Discussion

The present research focused on inspecting the interchange of CEP, technological capability of the firm, public awareness, and financial performance among manufacturing companies of Pakistan. Our results showed a positive relationship between CEP, technological capability, and financial performance. Besides, the study showed that technological capability mediates the relationship between CEP and financial performance, justifying a full mediation model. However, with a high level of public awareness, this mediation effect was stronger but weaker with a low level of public awareness. We then discuss the findings that we think can contribute to the literature significantly.

The outcomes of all hypotheses endorse the findings of earlier studies since the first hypothesis indicates a positive relationship between CEP and the technological capability of firms. The numerical analysis shows a positive association of the CEP with technological capability. That is similar to an earlier study of Ambec, et al. [91]. This relationship shows that when a company has a higher CEP, it will also invest more in technological capability. As Buysse and Verbeke [92] have pointed out, companies that place greater importance on environmental concerns would allocate more resources in environmentally friendly management. The intervening role of technological capability between CEP and financial performance is also parallel with previous studies [31,93]. Companies implement environmentally friendly activities through developing new ways of production and best technological practices, which can always lead to enhance financial performance [94]. The results also support the proposed role of public awareness concerning the relationship between CEP and technological capability, which is consistent with the study of Flammer [3]. Results suggest that a high level of public awareness, the relationship between CEP and technological capability, was stronger. However, in contrast, the relationship was weaker at a low level of public awareness. The moderation results also contribute to the stakeholder theory of the firm. Through disclosing environmental information, public awareness initiatives willingness will notify the successful green strategy of the stakeholder company and give the public free access to notice their CEP activities.

5.1. Theoretical Contributions

This study provides significant literature contributions. The first theoretical contribution of our research is the mediating effect of technological capability among CEP and financial performance.

The establishment of this mediation relationship is also an extension of the RBV. Integrating the RBV, we examined the mediating effect of the technological capability between CEP and financial performance. Therefore, the technological capability is necessary to assess better impacts of CEP and financial performance. As a result, new development is considered in the manufacturing industry. Literature regarding the mediating effect of the technological capability of the company and its relationship with financial performance has remained relatively limited, especially in the manufacturing context of Pakistan.

The second contribution revolves around the moderating role of public awareness on the link of CEP with the technological capability of the company. This research added a new innovative examination of CEP on financial performance as compared to previous researches. The results demonstrate that public awareness has an indirect effect between CEP and financial performance through technological capability. We tested the indirect effect of CEP, as well as public awareness as a moderator between CEP and the technological capability of the company. We examined the result of the CEP on financial performance through technological capability was positively stronger when there is higher public awareness. The moderation results of our research also contribute to the stakeholder theory of the firm.

Third, this research emphasizes the Pakistan environment. Earlier studies have been based on developed nations, and there is hardly any exploration of the relationship between CEP and financial performance in Pakistan. Pakistan is increasingly opposed to alarming environmental issues with a well-defined political environment, which is of remarkable significance for checking the accuracy of existing theories. This study provides additional suggestions for CEP in developing economies where CEP implementations are inadequate relative to developed nations.

5.2. Practical Contributions

This study has some practical importance as well. Firstly, this study is essential for the government of Pakistan (GOP). Due to this, the GOP should further upgrade green environmental measures, insist on companies to manage CEP activities. Decision-makers should not only focus on the strict management of CEP operations but should also give added value to more well-balanced, environmentally friendly green practices. The GOP should increase support for companies doing CEP and even lower their environmentally friendly costs.

Secondly, companies would consider into deliberation the requirements of the society where they work their company activities and evolve an excellent process to resolve the issues of the local area peoples. CEP activities should improve by companies involving the community and workers. The GOP should support those companies that operate lawfully and disclose all CEP measures to the public. Therefore, the GOP should initiate well-balanced laws and observe the CEP green activities of the companies continuously. Non-governmental organizations (NGOs) and the community, besides to government, should also play a role in supporting companies to accurately carry out environmentally-friendly green activities in Pakistan.

Thirdly, the results of the study would assist industries and administrators in identifying present CEP growth conditions and potential CEP issues in Pakistan. The findings that help the financial sector, the administration of GOP, and the community in establishing potential CEP programs. This study refers to different specialized corporations and other companies targeted outside national markets. Besides, advanced CEP programs will assist in achieving long-lasting projected performance in terms of the socio-economic image of the company, devoted customers, and worker pride.

Pakistan is located in South Asia, bordering with China, India, Iran, and Afghanistan. Pakistan is one of the 'Next 11' developing economies. The 'Next 11' is a list of countries that were identified as potentially leading financial powers in the 21st century. These eleven countries in regards to the BRICS (Brazil, Russia, India, China and South Africa). Pakistan is the world's largest economic country and it ranks 143rd in the gross domestic product (GDP). Sustainable development requires balanced and equitable economic growth. A prosperous, integrated economy whose rewards all members of

the society share equitably is an essential roadmap to prosperity for all. This growth, in effect, is a critical key to a country's people's wellbeing and environmental protection. So, consolidating a robust economic structure such as effective monetary policy decisions and enhanced levels of trade and investment is the pathway to a growing economy. Pakistan needs an emphasis on sustainable, balanced development to tackle the problems of industrial environmental pollution and rapidly increasing population. That will exploit its potential to become a more economically prosperous, economically efficient and resilient country while at the same time making progress. Therefore, to protect the natural environment, the GOP introduces green and environmental regulations on the industrial sector [95].

6. Limitations and Future Research Directions

This research contains a few limitations which require to be recognized. Still, these limitations can provide a pathway for future studies. First, this research study the associations among CEP and financial performance through technological capability as a mediator and public awareness as moderator, but ignores several variables of mediators and moderators, for example, business model innovation and communication channels. Future studies could, therefore, study the procedure and boundaries of CEP and financial performance deeply. Second, the research data obtained from listed manufacturing companies in Pakistan. However, different countries have conducted different technological capability practices [96]. For instance, some countries emphasize intellectual property while some on comparative advantage; therefore, these different exercises may lead to various outcomes. To contribute to our research further, future studies will be conducted in more developing countries to find how technological capability connected to CEP and financial performance. Third, the measurement of CEP based on content analysis, which itself increases problems that have been commonly discussed in business and management literature. So, it is proposed that future researchers set a new scale for CEP in developing countries to further explain our study. Finally, it was possible to reverse causality in our research model from the financial performance of the firm to the explanatory variables. Therefore, future researchers could also conduct the reverse causality study for this relationship as well.

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References

1. Kock, C.J.; Santaló, J.; Diestre, L. Corporate governance and the environment: What type of governance creates greener companies? *J. Manag. Stud.* **2012**, *49*, 492–514. [[CrossRef](#)]
2. Xu, X.; Zeng, S.; Zou, H.; Shi, J.J. The impact of corporate environmental violation on shareholders' wealth: A perspective taken from media coverage. *Bus. Strategy Environ.* **2016**, *25*, 73–91. [[CrossRef](#)]
3. Flammer, C. Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Acad. Manag. J.* **2013**, *56*, 758–781. [[CrossRef](#)]
4. Fransen, L. The embeddedness of responsible business practice: Exploring the interaction between national-institutional environments and corporate social responsibility. *J. Bus. Ethics* **2013**, *115*, 213–227. [[CrossRef](#)]
5. Jayachandran, S.; Kalaigannam, K.; Eilert, M. Product and environmental social performance: Varying effect on firm performance. *Strateg. Manag. J.* **2013**, *34*, 1255–1264. [[CrossRef](#)]
6. Song, H.; Zhao, C.; Zeng, J. Can environmental management improve financial performance: An empirical study of A-shares listed companies in China. *J. Clean. Prod.* **2017**, *141*, 1051–1056. [[CrossRef](#)]
7. Chen, B.; Cheng, Y.-S. The impacts of environmental regulation on industrial activities: Evidence from a quasi-natural experiment in Chinese prefectures. *Sustainability* **2017**, *9*, 571. [[CrossRef](#)]

8. Dahlsrud, A. How corporate social responsibility is defined: An analysis of 37 definitions. *Corp. Soc. Responsib. Environ. Manag.* **2008**, *15*, 1–13. [\[CrossRef\]](#)
9. Wong, C.W.; Miao, X.; Cui, S.; Tang, Y. Impact of corporate environmental responsibility on operating income: Moderating role of regional disparities in China. *J. Bus. Ethics* **2018**, *149*, 363–382. [\[CrossRef\]](#)
10. Shah, K.U.; Arjoon, S.; Rambocas, M. Aligning corporate social responsibility with green economy development pathways in developing countries. *Sustain. Dev.* **2016**, *24*, 237–253. [\[CrossRef\]](#)
11. Mazurkiewicz, P. Corporate environmental responsibility: Is a common CSR framework possible. *World Bank* **2004**, *2*, 1–18.
12. Holtbrügge, D.; Dögl, C. How international is corporate environmental responsibility? A literature review. *J. Int. Manag.* **2012**, *18*, 180–195. [\[CrossRef\]](#)
13. Trumpp, C.; Endrikat, J.; Zopf, C.; Guenther, E. Definition, conceptualization, and measurement of corporate environmental performance: A critical examination of a multidimensional construct. *J. Bus. Ethics* **2015**, *126*, 185–204. [\[CrossRef\]](#)
14. Baughn, C.C.; Bodie, N.L.; McIntosh, J.C. Corporate social and environmental responsibility in Asian countries and other geographical regions. *Corp. Soc. Responsib. Environ. Manag.* **2007**, *14*, 189–205. [\[CrossRef\]](#)
15. Hart, S.L.; Ahuja, G. Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. *Bus. Strategy Environ.* **1996**, *5*, 30–37. [\[CrossRef\]](#)
16. Albertini, E. Does environmental management improve financial performance? A meta-analytical review. *Organ. Environ.* **2013**, *26*, 431–457. [\[CrossRef\]](#)
17. Guenther, E.M.; Hoppe, H. Merging limited perspectives: A synopsis of measurement approaches and theories of the relationship between corporate environmental and financial performance. *J. Ind. Ecol.* **2014**, *18*, 689–707. [\[CrossRef\]](#)
18. Li, D.; Cao, C.; Zhang, L.; Chen, X.; Ren, S.; Zhao, Y. Effects of corporate environmental responsibility on financial performance: The moderating role of government regulation and organizational slack. *J. Clean. Prod.* **2017**, *166*, 1323–1334. [\[CrossRef\]](#)
19. Waddock, S.A.; Graves, S.B. The corporate social performance–financial performance link. *Strateg. Manag. J.* **1997**, *18*, 303–319. [\[CrossRef\]](#)
20. Dixon-Fowler, H.R.; Slater, D.J.; Johnson, J.L.; Ellstrand, A.E.; Romi, A.M. Beyond “does it pay to be green?” A meta-analysis of moderators of the CEP–CFP relationship. *J. Bus. Ethics* **2013**, *112*, 353–366. [\[CrossRef\]](#)
21. Grewatsch, S.; Kleindienst, I. When does it pay to be good? Moderators and mediators in the corporate sustainability–corporate financial performance relationship: A critical review. *J. Bus. Ethics* **2017**, *145*, 383–416. [\[CrossRef\]](#)
22. Hang, M.; Geyer-Klingenberg, J.; Rathgeber, A.; Stöckl, S. Economic Development Matters: A Meta-Regression Analysis on the Relation between Environmental Management and Financial Performance. *J. Ind. Ecol.* **2018**, *22*, 720–744. [\[CrossRef\]](#)
23. De Roeck, K.; Delobbe, N. Do environmental CSR initiatives serve organizations’ legitimacy in the oil industry? Exploring employees’ reactions through organizational identification theory. *J. Bus. Ethics* **2012**, *110*, 397–412. [\[CrossRef\]](#)
24. Endrikat, J.; Guenther, E.; Hoppe, H. Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. *Eur. Manag. J.* **2014**, *32*, 735–751. [\[CrossRef\]](#)
25. Ramanathan, R. Understanding complexity: The curvilinear relationship between environmental performance and firm performance. *J. Bus. Ethics* **2018**, *149*, 383–393. [\[CrossRef\]](#)
26. Lioui, A.; Sharma, Z. Environmental corporate social responsibility and financial performance: Disentangling direct and indirect effects. *Ecol. Econ.* **2012**, *78*, 100–111. [\[CrossRef\]](#)
27. Reed, F.M.; Walsh, K. Enhancing technological capability through supplier development: A study of the UK aerospace industry. *IEEE Trans. Eng. Manag.* **2002**, *49*, 231–242. [\[CrossRef\]](#)
28. McWilliams, A.; Siegel, D. Corporate social responsibility: A theory of the firm perspective. *Acad. Manag. Rev.* **2001**, *26*, 117–127. [\[CrossRef\]](#)
29. Khojastehpour, M.; Johns, R. The effect of environmental CSR issues on corporate/brand reputation and corporate profitability. *Eur. Bus. Rev.* **2014**, *26*, 330–339. [\[CrossRef\]](#)
30. Wu, J.; Ma, Z.; Liu, Z. The moderated mediating effect of international diversification, technological capability, and market orientation on emerging market firms’ new product performance. *J. Bus. Res.* **2018**. [\[CrossRef\]](#)

31. Cheng, C.; Yang, M. Enhancing performance of cross-border mergers and acquisitions in developed markets: The role of business ties and technological innovation capability. *J. Bus. Res.* **2017**, *81*, 107–117. [\[CrossRef\]](#)
32. Fujii, H.; Iwata, K.; Kaneko, S.; Managi, S. Corporate environmental and economic performance of Japanese manufacturing firms: Empirical study for sustainable development. *Bus. Strategy Environ.* **2013**, *22*, 187–201. [\[CrossRef\]](#)
33. Tantaló, C.; Priem, R.L. Value creation through stakeholder synergy. *Strateg. Manag. J.* **2016**, *37*, 314–329. [\[CrossRef\]](#)
34. Berry, M.A.; Rondinelli, D.A. Proactive corporate environmental management: A new industrial revolution. *Acad. Manag. Perspect.* **1998**, *12*, 38–50. [\[CrossRef\]](#)
35. Portney, P.R. *The (Not So) New Corporate Social Responsibility: An Empirical Perspective*; Oxford University Press: Oxford, UK, 2008.
36. McWilliams, A.; Siegel, D.S. Creating and capturing value: Strategic corporate social responsibility, resource-based theory, and sustainable competitive advantage. *J. Manag.* **2011**, *37*, 1480–1495. [\[CrossRef\]](#)
37. Barney, J.B.; Ketchen, D.J., Jr.; Wright, M. The future of resource-based theory: Revitalization or decline? *J. Manag.* **2011**, *37*, 1299–1315. [\[CrossRef\]](#)
38. Gallego-Alvarez, I.; Manuel Prado-Lorenzo, J.; García-Sánchez, I.-M. Corporate social responsibility and innovation: A resource-based theory. *Manag. Decis.* **2011**, *49*, 1709–1727. [\[CrossRef\]](#)
39. Russo, M.V.; Fouts, P.A. A resource-based perspective on corporate environmental performance and profitability. *Acad. Manag. J.* **1997**, *40*, 534–559.
40. Rahman, N.; Post, C. Measurement issues in environmental corporate social responsibility (ECSR): Toward a transparent, reliable, and construct valid instrument. *J. Bus. Ethics* **2012**, *105*, 307–319. [\[CrossRef\]](#)
41. Berman, S.L.; Wicks, A.C.; Kotha, S.; Jones, T.M. Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *Acad. Manag. J.* **1999**, *42*, 488–506.
42. Henriques, I.; Sadorsky, P. The relationship between environmental commitment and managerial perceptions of stakeholder importance. *Acad. Manag. J.* **1999**, *42*, 87–99.
43. Kassinis, G.; Vafeas, N. Stakeholder pressures and environmental performance. *Acad. Manag. J.* **2006**, *49*, 145–159. [\[CrossRef\]](#)
44. Rodrigue, M.; Magnan, M.; Boulianne, E. Stakeholders' influence on environmental strategy and performance indicators: A managerial perspective. *Manag. Account. Res.* **2013**, *24*, 301–316. [\[CrossRef\]](#)
45. Grigoriou, K.; Rothaermel, F.T. Organizing for knowledge generation: Internal knowledge networks and the contingent effect of external knowledge sourcing. *Strateg. Manag. J.* **2017**, *38*, 395–414. [\[CrossRef\]](#)
46. Bocquet, R.; Le Bas, C.; Mothe, C.; Poussing, N. Are firms with different CSR profiles equally innovative? Empirical analysis with survey data. *Eur. Manag. J.* **2013**, *31*, 642–654. [\[CrossRef\]](#)
47. González-Ramos, M.I.; Donate, M.J.; Guadamillas, F. Technological posture and corporate social responsibility: Effects on innovation performance. *Environ. Eng. Manag. J. EEMJ* **2014**, *13*, 2497–2505. [\[CrossRef\]](#)
48. Jia, X.; Liu, Y.; Liao, Y. Stakeholder pressure, corporate social responsibility and corporate value. *Chin. J. Manag.* **2016**, *13*, 267.
49. Jacobs, B.W.; Singhal, V.R.; Subramanian, R. An empirical investigation of environmental performance and the market value of the firm. *J. Oper. Manag.* **2010**, *28*, 430–441. [\[CrossRef\]](#)
50. Wei, Z.; Shen, H.; Zhou, K.Z.; Li, J.J. How does environmental corporate social responsibility matter in a dysfunctional institutional environment? Evidence from China. *J. Bus. Ethics* **2017**, *140*, 209–223. [\[CrossRef\]](#)
51. Laforet, S. Organizational innovation outcomes in SMEs: Effects of age, size, and sector. *J. World Bus.* **2013**, *48*, 490–502. [\[CrossRef\]](#)
52. Cavallo, E.; Ferrari, E.; Bollani, L.; Coccia, M. Strategic management implications for the adoption of technological innovations in agricultural tractor: The role of scale factors and environmental attitude. *Technol. Anal. Strateg. Manag.* **2014**, *26*, 765–779. [\[CrossRef\]](#)
53. Brandão Santana, N.; Rebelatto, D.A.D.N.; Périco, A.E.; Moralles, H.F.; Leal Filho, W. Technological innovation for sustainable development: An analysis of different types of impacts for countries in the BRICS and G7 groups. *Int. J. Sustain. Dev. World Ecol.* **2015**, *22*, 425–436. [\[CrossRef\]](#)
54. Porter, M.E.; Van der Linde, C. Toward a new conception of the environment-competitiveness relationship. *J. Econ. Perspect.* **1995**, *9*, 97–118. [\[CrossRef\]](#)
55. Delmas, M.A.; Montes-Sancho, M.J. Voluntary agreements to improve environmental quality: Symbolic and substantive cooperation. *Strateg. Manag. J.* **2010**, *31*, 575–601. [\[CrossRef\]](#)

56. Marquis, C.; Qian, C. Corporate social responsibility reporting in China: Symbol or substance? *Organ. Sci.* **2013**, *25*, 127–148. [\[CrossRef\]](#)
57. Babiak, K.; Trendafilova, S. CSR and environmental responsibility: Motives and pressures to adopt green management practices. *Corp. Soc. Responsib. Environ. Manag.* **2011**, *18*, 11–24. [\[CrossRef\]](#)
58. Surroca, J.; Tribó, J.A.; Waddock, S. Corporate responsibility and financial performance: The role of intangible resources. *Strateg. Manag. J.* **2010**, *31*, 463–490. [\[CrossRef\]](#)
59. McWilliams, A.; Siegel, D. Corporate social responsibility and financial performance: Correlation or misspecification? *Strateg. Manag. J.* **2000**, *21*, 603–609. [\[CrossRef\]](#)
60. Lee, J.; Kim, S.-J. Curvilinear relationship between corporate innovation and environmental sustainability. *Sustainability* **2017**, *9*, 1267. [\[CrossRef\]](#)
61. Brammer, S.; Millington, A. Does it pay to be different? An analysis of the relationship between corporate social and financial performance. *Strateg. Manag. J.* **2008**, *29*, 1325–1343. [\[CrossRef\]](#)
62. Amores-Salvador, J.; Martín-de Castro, G.; Navas-López, J.E. Green corporate image: Moderating the connection between environmental product innovation and firm performance. *J. Clean. Prod.* **2014**, *83*, 356–365. [\[CrossRef\]](#)
63. Torugsa, N.A.; O'Donohue, W.; Hecker, R. Proactive CSR: An empirical analysis of the role of its economic, social and environmental dimensions on the association between capabilities and performance. *J. Bus. Ethics* **2013**, *115*, 383–402. [\[CrossRef\]](#)
64. Godfrey, P.C.; Merrill, C.B.; Hansen, J.M. The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strateg. Manag. J.* **2009**, *30*, 425–445. [\[CrossRef\]](#)
65. Zhao, M. CSR-based political legitimacy strategy: Managing the state by doing good in China and Russia. *J. Bus. Ethics* **2012**, *111*, 439–460. [\[CrossRef\]](#)
66. Bridoux, F.; Stoelhorst, J. Microfoundations for stakeholder theory: Managing stakeholders with heterogeneous motives. *Strateg. Manag. J.* **2014**, *35*, 107–125. [\[CrossRef\]](#)
67. Aguinis, H.; Glavas, A. What we know and don't know about corporate social responsibility: A review and research agenda. *J. Manag.* **2012**, *38*, 932–968. [\[CrossRef\]](#)
68. Lyon, T.P.; Maxwell, J.W. Corporate social responsibility and the environment: A theoretical perspective. *Rev. Environ. Econ. Policy* **2008**, *2*, 240–260. [\[CrossRef\]](#)
69. Martín-de Castro, G. Knowledge management and innovation in knowledge-based and high-tech industrial markets: The role of openness and absorptive capacity. *Ind. Mark. Manag.* **2015**, *47*, 143–146. [\[CrossRef\]](#)
70. Berchicci, L. Towards an open R&D system: Internal R&D investment, external knowledge acquisition and innovative performance. *Res. Policy* **2013**, *42*, 117–127.
71. Brammer, S.; Millington, A. Firm size, organizational visibility and corporate philanthropy: An empirical analysis. *Bus. Ethics A Eur. Rev.* **2006**, *15*, 6–18. [\[CrossRef\]](#)
72. Park, S. Corporate social responsibility, visibility, reputation and financial performance: Empirical analysis on the moderating and mediating variables from Korea. *Soc. Responsib. J.* **2017**, *13*, 856–871. [\[CrossRef\]](#)
73. Servaes, H.; Tamayo, A. The impact of corporate social responsibility on firm value: The role of customer awareness. *Manag. Sci.* **2013**, *59*, 1045–1061. [\[CrossRef\]](#)
74. Wang, H.; Qian, C. Corporate philanthropy and corporate financial performance: The roles of stakeholder response and political access. *Acad. Manag. J.* **2011**, *54*, 1159–1181. [\[CrossRef\]](#)
75. Sarkis, J. Manufacturing strategy and environmental consciousness. *Technovation* **1995**, *15*, 79–97. [\[CrossRef\]](#)
76. Mishra, S.; Suar, D. Does corporate social responsibility influence firm performance of Indian companies? *J. Bus. Ethics* **2010**, *95*, 571–601. [\[CrossRef\]](#)
77. Clarkson, P.M.; Fang, X.; Li, Y.; Richardson, G. The relevance of environmental disclosures: Are such disclosures incrementally informative? *J. Account. Public Policy* **2013**, *32*, 410–431. [\[CrossRef\]](#)
78. Clarkson, P.M.; Li, Y.; Richardson, G.D.; Vasvari, F.P. Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Account. Organ. Soc.* **2008**, *33*, 303–327. [\[CrossRef\]](#)
79. Du, X.; Jian, W.; Zeng, Q.; Du, Y. Corporate environmental responsibility in polluting industries: Does religion matter? *J. Bus. Ethics* **2014**, *124*, 485–507. [\[CrossRef\]](#)
80. Zeng, S.; Xu, X.; Dong, Z.; Tam, V.W. Towards corporate environmental information disclosure: An empirical study in China. *J. Clean. Prod.* **2010**, *18*, 1142–1148. [\[CrossRef\]](#)

81. Orlitzky, M. Does firm size comfound the relationship between corporate social performance and firm financial performance? *J. Bus. Ethics* **2001**, *33*, 167–180. [[CrossRef](#)]
82. Yu, Y.; Umashankar, N.; Rao, V.R. Choosing the right target: Relative preferences for resource similarity and complementarity in acquisition choice. *Strateg. Manag. J.* **2016**, *37*, 1808–1825. [[CrossRef](#)]
83. Coad, A.; Rao, R. Innovation and firm growth in high-tech sectors: A quantile regression approach. *Res. Policy* **2008**, *37*, 633–648. [[CrossRef](#)]
84. Acquaah, M.; Chi, T. A longitudinal analysis of the impact of firm resources and industry characteristics on firm-specific profitability. *J. Manag. Gov.* **2007**, *11*, 179–213. [[CrossRef](#)]
85. Baron, R.M.; Kenny, D.A. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Personal. Soc. Psychol.* **1986**, *51*, 1173. [[CrossRef](#)]
86. Preacher, K.J.; Rucker, D.D.; Hayes, A.F. Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivar. Behav. Res.* **2007**, *42*, 185–227. [[CrossRef](#)]
87. Hayes, A.F. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*; Guilford Publications: New York, NY, USA, 2017.
88. Cassidy, H.J. *Using Econometrics: A Practical Guide*; Addison-Wesley: Boston, MA, USA, 1997.
89. Muller, D.; Judd, C.M.; Yzerbyt, V.Y. When moderation is mediated and mediation is moderated. *J. Personal. Soc. Psychol.* **2005**, *89*, 852. [[CrossRef](#)]
90. Lewbel, A. Constructing instruments for regressions with measurement error when no additional data are available, with an application to patents and R&D. *Econometrica* **1997**, *65*, 1201–1213.
91. Ambec, S.; Cohen, M.A.; Elgie, S.; Lanoie, P. The Porter hypothesis at 20: Can environmental regulation enhance innovation and competitiveness? *Rev. Environ. Econ. Policy* **2013**, *7*, 2–22. [[CrossRef](#)]
92. Buysse, K.; Verbeke, A. Proactive environmental strategies: A stakeholder management perspective. *Strateg. Manag. J.* **2003**, *24*, 453–470. [[CrossRef](#)]
93. Dibrell, C.; Craig, J.; Hansen, E. Natural environment, market orientation, and firm innovativeness: An organizational life cycle perspective. *J. Small Bus. Manag.* **2011**, *49*, 467–489. [[CrossRef](#)]
94. Bansal, P. Evolving sustainably: A longitudinal study of corporate sustainable development. *Strateg. Manag. J.* **2005**, *26*, 197–218. [[CrossRef](#)]
95. Memon, Z.A.; Naqvi, I.B.; Khattak, M.A.O.; Memon, M.R. Corporate social responsibility practices in Pakistan: Insights from literature and policy. *Int. J. Technol. Manag. Sustain. Dev.* **2019**, *18*, 147–173. [[CrossRef](#)]
96. Choi, D.G.; Lee, Y.-B.; Jung, M.-J.; Lee, H. National characteristics and competitiveness in MOT research: A comparative analysis of ten specialty journals, 2000–2009. *Technovation* **2012**, *32*, 9–18. [[CrossRef](#)]



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