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## **IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON CLIMATE CHANGE RISK MANAGEMENT OF LISTED MANUFACTURING FIRMS IN NIGERIA**

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### **Abstract**

*The study investigates the impact of corporate social responsibility (CSR) on climate change risk management (CCRM) of listed manufacturing firms in Nigeria. Employing an ex-post facto research design, the study focused on a sample comprising thirty-four (34) manufacturing firms listed on the Nigerian Exchange Group (NGX), which was selected using a three-filtering criteria approach from a pool of sixty-four (64) listed manufacturing firms. Secondary sources served as the primary data reservoir for the study. The collected data underwent analysis employing both descriptive and inferential statistical techniques spanning the years 2018 to 2022. The regression analysis underscores the need for businesses to strategically balance corporate social responsibility (CSR) initiatives with climate change risk management (CCRM) efforts. The study recommends strategic alignment of CSR and CCRM initiatives, prioritizing investment in climate resilience, and advocating for supportive policies that incentivize sustainable practices.*

**Keywords:** Climate Change, Risk Management, CSR, Capital Expenditure, Revenue, Firm Size, Firm Age.

### **1. Introduction**

An abundance of scientific evidence has established that rapid changes in the climate have been taking place over recent decades (Seifert & Lindberg, 2012). Projections indicate that this trend is likely to persist and potentially intensify for many years to come (Wiśniewski, 2015). The primary driver behind this rapid climate change is believed to be global warming caused by the accumulation of greenhouse gases. While carbon dioxide remains the primary concern, methane also plays a significant role in altering temperatures. Despite a global economic downturn, levels of carbon dioxide continued to rise between 2019 and 2022 (Allen & Craig, 2016). Similarly, methane levels, after a period of stability, began to increase in 2018 (Jaworska, 2018). Given the substantial presence of greenhouse gases, completely halting global warming is likely unattainable, but concerted efforts to mitigate and adapt to this issue are

imperative. Failure to address or limit global warming could result in severe consequences, including heightened damage for hurricanes and flooding, as well as the adverse effects of rising sea levels and elevated land and sea temperatures (Ferrey, 2020).

The onset of climate change poses significant challenges for various entities such as organizations (e.g. companies, corporations, NGOs), communities, and individuals, compelling them to reassess the concept of corporate social responsibility (CSR) from being a voluntary option to an essential requirement. As we approach the midpoint of this century, climate-related challenges are anticipated to disrupt conventional practices and alter lifestyles worldwide. Many nations are already feeling the initial impacts of these challenges, prompting numerous organizations to strategize for the anticipated risks, including issues like dwindling clean water resources and the unreliability of

costly energy (Lu et al., 2022). CSR has long been a fixture in the business landscape, yet it continues to be primarily viewed as a set of initiatives aimed at enhancing a company's reputation, often seen as an extension of public relations efforts. Furthermore, interest in CSR appears to ebb and flow, remaining somewhat peripheral, and CSR initiatives are often seen as tools for repairing a tarnished organizational image or merely augmenting marketing endeavours. Consequently, demonstrating conclusively that CSR plays a pivotal role in organizational management, particularly shaping its strategy and significantly impacting its operations, poses a challenge.

The interplay between CSR and risk management is widely acknowledged. CSR practices offer insights into how to either avoid or mitigate risks, a central focus of the risk management process (Bianco, 2020). It's essential to recognize that CSR encompasses more than just activities aimed at reducing the likelihood of risks (such as reputation damage or sales decline) or addressing their aftermath. Increasingly, CSR is being recognized as a pivotal component of a company's risk management strategy. This shift is driven by the understanding that CSR is not merely reactive but serves as a proactive tool for risk mitigation, integral to effective company management. CSR plays a vital role in the risk management process, encompassing the identification of pertinent risks, assessment of their impact, and the implementation of measures to mitigate both the likelihood and consequences of these risks (CDSB, 2022).

A significant challenge facing humanity today is climate change risk (Simpson et al., 2021), stemming from climate change driven by the escalation of greenhouse gas emissions (referred to as emissions) into the atmosphere due to human activities (Hossain & Masum, 2022). The corporate sector, with its production processes, stands out as a major contributor to this emission surge (Huang & Lin, 2022). Notably, a study conducted by the Carbon Majors of Carbon Disclosure Project (CDP) in 2017 highlighted that while there exist millions of companies globally, a relatively small subset of fossil fuel producers may hold the key to catalyzing systemic change in carbon emissions. The findings

revealed that a mere 100 companies were responsible for a staggering 71% of global emissions over recent decades. Surprisingly, existing literature lacks studies on climate risk management conducted by the listed manufacturing firms in Nigeria. It is paramount for these firms to engage in climate mitigation and adaptation efforts, given their substantial greenhouse gas emissions. Collaboration between these emitters and their investors is crucial in steering towards a low carbon economy. Therefore, the central inquiries of this study revolve around whether these firms are actively addressing climate issues through effective CSR to combat climate change, and what the correlation is between emission intensity and the implementation of climate projects.

It is in the light of these discussions that this study aims to examine the impact of corporate social responsibility on climate change risk management of listed manufacturing firms in Nigeria. The study is structured into five sections, first is the introduction, secondly is the literature review, thirdly is the methodology, fourthly is the results and discussion and finally is the conclusions and recommendations.

## 2 Literature Review

### 2.1 Conceptual Issues

Corporate social responsibility essentially entails responsibility for the impact on society, with the primary objective being to maximize positive effects while minimizing negative ones, encompassing environmental, social, and political dimensions (Busch et al., 2012). It is imperative to focus on values shared by both the organization and society within these realms (Kouloukoui et al., 2019). Among the myriad definitions of CSR, one particularly notable one is embedded in the "Europe 2020" strategy, supplanting the Lisbon Strategy. According to this perspective, CSR is defined as "a concept wherein businesses willingly incorporate social and environmental concerns into their operations; acknowledging business responsibility for its societal impact." Under this paradigm, CSR activities are voluntary and contingent upon a company's discretion. However, the assertion that the adoption and maintenance of CSR are entirely voluntary is contentious. It is argued that such initiatives may arise

from pressure exerted by specific stakeholders, particularly local communities (Boubaker et al., 2020). This contention is reflected in the reformed strategy, which presents a revised definition, characterizing CSR as “companies” accountability for their societal influence.” By removing the voluntary aspect, CSR is now perceived not only in the context of business but also within other organizations capable of affecting society, aligning with ISO 26000’s framework on social responsibility. The increasing significance and perception of CSR necessitate its deeper integration into a company’s activities, particularly in the formulation of its strategy.

### **Concept of Climate Change Risk Management**

Climate risk management involves the systematic identification, assessment, and mitigation of risks associated with climate change and its impacts on various sectors, including but not limited to, agriculture, infrastructure, and finance. It encompasses strategies and measures aimed at reducing vulnerability and enhancing resilience to climate-related hazards such as extreme weather events, sea-level rise, and shifts in precipitation patterns. Effective climate risk management involves, risk identification, risk assessment, risk mitigation, monitoring and evaluation, collaboration and integration.

### **2.2 Empirical Review**

Ozkan et al. (2023) investigated the relationship between climate risk, corporate social responsibility (CSR), and firm performance, focusing on how national culture and religion moderate this relationship. They found that firms in high climate-risk countries tend to engage more in CSR activities, potentially as a response to climate risks. Their study demonstrated that higher levels of CSR mitigate the negative impact of climate risk on firm performance. Importantly, they highlighted that this moderating effect of CSR is stronger in countries with low individualism and high religiosity. These findings underscore CSR's role not only as a risk management strategy but also as a cultural and religious response to climate change challenges.

Hossain and Masum (2022) investigated the impact of CSR on firm-level climate change risk (CCR) using US

firm-year data from 2002 to 2018. Their firm fixed effect regression model and robust econometric tests consistently showed that CSR reduces CCR. Firms with higher ESG disclosure and those in Republican-leaning states benefitted more. These findings emphasize CSR's strategic value in enhancing corporate resilience against climate risks.

Simpson et al. (2021) propose a framework to categorize climate change risks into three levels of increasing complexity, emphasizing interactions among multiple risk drivers and the risks themselves. Their approach innovatively integrates both the impacts of climate change and responses to it, highlighting the need for holistic thinking across sectors and regions. This framework aims to enhance climate change risk assessment by providing clarity on how adaptation and mitigation efforts contribute to risk dynamics. It underscores the importance of informed decision-making to mitigate negative climate impacts effectively.

Bianco (2020) critiques major coffee companies for neglecting climate change adaptation in their CSR strategies despite extensive programs. The study identifies financial constraints, capacity limits, and competing CSR priorities as barriers to effective adaptation efforts. It suggests the CSV framework could enhance climate adaptation in the coffee industry but underscores companies' failure to prioritize and disclose such initiatives. This negligence is concerning given climate change's severe impact on coffee production, highlighting a gap between awareness and action in addressing this pressing issue.

Boubaker et al. (2020) find that stronger CSR performance among 1,201 US-listed firms from 1991 to 2012 is linked to lower financial distress risk (FDR), indicating improved creditworthiness and reduced likelihood of defaults. This relationship holds across various FDR measures, controls for biases, and is particularly influenced by community involvement, diversity, employee relations, and environmental sustainability. The study emphasizes that firms with solid governance and high competition benefit more, especially in stable periods and among less distressed

firms, suggesting CSR enhances financial stability and resilience in economies.

Bryant et al. (2020) argued that some firms, influenced by regulatory pressures and their own tolerance for risk, exceed regulatory requirements in climate change actions. Their study, based on 7,101 U.S. publicly traded firms from 2013 to 2015, finds strong support for this idea, achieving 88.6% prediction accuracy in an out-of-time holdout sample from 2016. They note that firms with a history of environmental violations are more likely to engage in actions beyond compliance, potentially as greenwashing.

Ferrey (2020) explores the evolving concept of corporate social responsibility (CSR) in the context of climate change, emphasizing its role in addressing corporate energy footprints. The study highlights the importance of energy efficiency, CSR in supply chains, and renewable energy adoption. Positioned in an international context, it underscores energy as a critical intermediary resource for enabling other technologies. Concluding that energy is the new meta-value of CSR for modern corporations, the study offers a broad overview but lacks in-depth exploration of underlying theories, frameworks, or empirical evidence.

Kouloukoui et al. (2019) address CSR promotion in SMEs in developing countries, focusing on cluster governance's role. They propose a framework drawing from cluster governance, CSR, SMEs, and environmental management literature. The framework identifies three governance types—legal enforcement, supply chain pressure, and voluntary CSR engagement—that influence SMEs' CSR engagement, environmental management barriers, practices, climate change strategies, and CSR benefits. It offers utility for academics and practitioners by linking these themes, though its complexity may pose challenges for clarity.

Allen and Craig (2016) argue that corporate social responsibility (CSR) must transition from being seen as a discretionary luxury to a vital necessity due to impending climate challenges. They emphasize the essential role of communication in developing and disseminating CSR sustainability initiatives across organizations and their stakeholders, including

governments, communities, competitors, supply chains, and employees.

Wiśniewski (2015) explores the risks associated with corporate social responsibility (CSR) and its role within organizations, proposing a model for managing CSR-related risks. The study highlights the significance of CSR and its integration with the risk management process, presenting a model that includes key stages: risk analysis, risk assessment, strategy development, and ongoing monitoring. This model aims to demonstrate the impact of CSR on organizational strategy and risk management.

### 2.3 Theoretical Framework

The foundational of stakeholder theory is often attributed to Freeman's seminal work titled "Strategic Management: A Stakeholder Approach," which was first published in 1984. Stakeholder theory posits that businesses operate within a network of relationships with various stakeholders, including shareholders, employees, customers, suppliers, communities, and the environment. According to this theory, firms have a responsibility not only to shareholders but also to all stakeholders affected by their operations. In the context of CSR and CCRM, this theory suggests that companies recognize the importance of addressing the concerns and interests of stakeholders, including environmental stakeholders affected by climate change risks.

Under stakeholder theory, engaging in CSR activities is seen as a way for companies to fulfill their obligations to stakeholders beyond financial performance. By integrating environmental concerns into their CSR strategies, firms acknowledge the impact of their operations on the environment and seek to mitigate climate change risks for the benefit of all stakeholders. This could involve initiatives such as reducing carbon emissions, investing in renewable energy, implementing sustainable supply chain practices, and supporting community resilience to climate-related events. In essence, Stakeholder theory provides a framework for understanding how companies perceive and respond to the relationship between CSR and CCRM. It suggests that firms recognize the interconnectedness of environmental, social, and economic factors and strive to

manage climate change risks as part of their broader commitment to stakeholder welfare and long-term sustainability.

### 3 Methodology

This study employed the ex-post facto research design which predicts the possible causes behind an effect that has already occurred, hence, the choice and suitability of the design. A sample of thirty-four (34) out of the sixty-four (64) manufacturing firms currently listed on the Nigerian Exchange Group (NGX) as of 31<sup>st</sup> December, 2023 was used through three filtering criteria. That a firm must be in existence within the scope of the study, a firm must have annual reports for the period covered by the study and lastly, a firm must have some elements of environmental disclosure practices in their annual reports. Secondary data were used for the study and the

data were obtained using content analysis disclosure index approach for a period between 2018 and 2022 of the firms under investigation. The statistical tools employed were descriptive statistics, correlation analysis and regression analysis.

The study employed the panel data regression analysis. This regression technique was selected due to the nature of the data which has both time or periodic dimension and cross-sectional dimension. The Hausman specification test was used to select between fixed effect and random effect models. Invariably, the fixed effect model was adopted because it allows for correlation between the unobserved and independent variables. The study further reported the panel standard corrected error (PCSE) due to presence of heteroskedasticity in the fixed effect model.

**Table 1: Variables and their measurements**

| Nature of Variable | Proxy                                 | Measurement                                                                                              | Source                  |
|--------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------|
| Dependent          | Climate change risk management (CCRM) | Investment in renewable energy sources (e.g., solar, wind) as a percentage of total capital expenditure. | (Boubaker et al., 2020) |
| Independent        | Corporate Social Responsibility (CSR) | CSR expenditure as a percentage of total revenue.                                                        | (Simpson et al., 2021)  |
| Control            | Firm Size                             | Natural log of total assets                                                                              | (Allen & Craig, 2016)   |
|                    | Firm Age                              | Current year minus year of incorporation                                                                 | (Bianco, 2020)          |

**Source:** Authors compilation

### 3.3 Model Specification

The study examines the impact of corporate social responsibility on climate change risk management of listed manufacturing firms in Nigeria with insights from prior studies (Bryant et al., 2020; Ozkan et al., 2023). The following regression models (functional form and econometrical) were used to test the hypotheses:

$$CCRM = f(CSR, FSIZE, FAGE).....(1)$$

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \varepsilon_{it}.....(2)$$

Where; CCRM is climate change risk management, CSR is corporate social responsibility, FSIZE is firm size and

FAGE is firm age. Therefore, the multiple regression equation was redefined as follows:

$$CCRM_{it} = \beta_0 + \beta_1 CSR_{it} + \beta_2 FSIZE_{it} + \beta_3 FAGE_{it} + \varepsilon_{it}....(3)$$

Where: i,t = company i in year t (pooled data)

$\beta_0$  = Constant term;  $\beta_1, \beta_2, \beta_3$  = estimated coefficient of the independent variables

### 4. Results and Discussions

The results from the analysis of the data were presented and figures interpreted. Discussions of the interpretation



were further presented as well as implications from the findings.

#### 4.1 Descriptive Statistics

These are numerical measures used to summarize and describe the features of a dataset. These statistics provide a snapshot of key characteristics of the data, including

central tendency, dispersion, and distribution. Common descriptive statistics include measures such as mean, standard deviation, range, and percentiles. It is used to gain insights into the overall structure, patterns, and variability of the data, aiding in data exploration, understanding, and interpretation.

**Table 2: Descriptive Statistics**

| Variable | Obs | Mean     | Std. Dev. | Min    | Max     |
|----------|-----|----------|-----------|--------|---------|
| CCRM     | 175 | .42316   | .291482   | 0      | .9969   |
| CSR      | 175 | .3456674 | .2336606  | 0      | .9864   |
| FSIZE    | 175 | 10.25855 | .8776988  | 8.2394 | 11.7933 |
| FAGE     | 175 | 54.22857 | 19.17566  | 13     | 99      |

Source: Author's computation using STATA

The table presents key statistical measures for variables related to climate change risk management (CCRM), corporate social responsibility (CSR), firm size (FSIZE), and firm age (FAGE) based on data from 175 observations. In terms of climate change risk management, the average level of involvement across the surveyed companies appears moderate, with a mean of 0.42316 and a considerable standard deviation of 0.291482, indicating significant variability among companies in their engagement with climate-related risks. Similarly, the analysis of corporate social responsibility reveals an average commitment level of 0.3456674, suggesting a moderate involvement among companies, with a notable standard deviation of 0.2336606, implying variance in CSR initiatives across the sample.

Furthermore, the data provide insights into the structural characteristics of the surveyed firms. The average firm size, represented by FSIZE, stands at 10.25855, with a standard deviation of 0.8776988, suggesting a relatively homogeneous sample in terms of size. However, the

range from 8.2394 to 11.7933 indicates some diversity in firm sizes. Meanwhile, the average firm age, denoted by FAGE, is 54.22857, with a standard deviation of 19.17566, suggesting a wide variation in the age distribution of the surveyed firms. The minimum age of 13 and the maximum age of 99 highlight the diversity in the longevity of these companies. Overall, the statistical summary provides valuable insights into the levels of engagement in climate change risk management and corporate social responsibility, as well as the structural characteristics of the surveyed firms, shedding light on their strategies and operations in the context of environmental and social responsibility.

#### 4.2 Correlation Analysis

This is analysis of the relationship between the variables. The analysis is based on a negative or positive relationship and in a weak, moderate or strong relationship. The purpose of the analysis is to eliminate elements of multicollinearity among the observed variables.

**Table 3: Correlation Matrix**

| VARIABLE | CCRM    | CSR    | FSIZE   | FAGE   | VIF  |
|----------|---------|--------|---------|--------|------|
| CCRM     | 1.0000  |        |         |        |      |
| CSR      | -0.0340 | 1.0000 |         |        | 1.07 |
| FSIZE    | 0.3804  | 0.1275 | 1.0000  |        | 1.02 |
| FAGE     | 0.1506  | 0.2241 | -0.0396 | 1.0000 | 1.06 |

Source: Author's Computation using STATA

The correlation matrix provides insights into the relationships between variables, particularly focusing on climate change risk management (CCRM), corporate social responsibility (CSR), firm size (FSIZE), and firm age (FAGE), alongside the Variance Inflation Factor (VIF) indicating multicollinearity. Notably, CCRM exhibits no significant correlation with CSR (correlation coefficient = -0.0340), suggesting these two factors may operate relatively independently within the surveyed companies. However, there is a positive correlation between CCRM and FSIZE (correlation coefficient = 0.3804), implying that larger firms tend to be more involved in climate change risk management. Similarly, a positive correlation between CSR and FAGE (correlation coefficient = 0.2241) suggests that older firms may exhibit higher levels of corporate social responsibility. The VIF values for all variables are relatively low, ranging from 1.02 to 1.07, indicating minimal multicollinearity concerns.

This correlation analysis provides valuable insights into potential associations between variables relevant to climate change risk management, corporate social responsibility, firm size, and firm age. The lack of strong correlation between CCRM and CSR suggests distinct operational pathways for addressing climate change risks and engaging in corporate social responsibility. However, the positive correlations between CCRM and FSIZE, as well as CSR and FAGE, hint at potential synergies or strategic considerations based on firm characteristics. Additionally, the low VIF values reassure minimal multicollinearity, enhancing the reliability of any subsequent statistical analyses or models incorporating these variables.

### 4.3 Regression Analysis

This is analysis of the impact of corporate social responsibility on climate change risk management of listed manufacturing firms in Nigeria.

**Table 4: Fixed Effect Model (Panel Corrected Standard Error)**

| CCRM               | Coefficient | PCSE   | z     | P > z |
|--------------------|-------------|--------|-------|-------|
| CONSTANT           | -1.0608     | 0.1384 | -7.67 | 0.000 |
| CSR                | -0.1614     | 0.0471 | -3.42 | 0.001 |
| FSIZE              | 0.1343      | 0.0141 | 9.54  | 0.000 |
| FAGE               | 0.0030      | 0.0006 | 4.91  | 0.000 |
| R – Squared        | 0.1878      |        |       |       |
| Wald chi2 (3)      | 226.31      |        |       |       |
| Prob > chi2        | 0.0000      |        |       |       |
| Hausman Test       | 0.0010      |        |       |       |
| Heteroskedasticity | 0.0000      |        |       |       |
| Pesaran Abs        | 0.2730      |        |       |       |
| Autocorrelation    | 0.5140      |        |       |       |

Source: Author's computation using STATA

The regression analysis provides insights into the determinants of climate change risk management (CCRM) within the surveyed companies. The coefficients indicate the impact of each independent variable on CCRM, alongside their respective standard errors and statistical significance levels. Notably, corporate social responsibility (CSR) exhibits a negative coefficient (-0.1614), implying that higher levels of CSR are associated with lower levels of climate change risk management. Conversely, firm size (FSIZE) and firm age (FAGE) both show positive coefficients (0.1343 and

0.0030, respectively), indicating that larger and older firms tend to engage more actively in climate change risk management. The R-squared value of 0.1878 suggests that the independent variables collectively explain approximately 18.78% of the variation in climate change risk management across the sample.

Moreover, the statistical tests provide additional insights into the reliability and robustness of the regression model. The Wald chi-square test indicates a significant relationship between the independent variables and

climate change risk management, with a chi-square value of 226.31 and a p-value of 0.000. The low p-value suggests that the observed relationship is statistically significant. The Hausman test result of 0.0010 indicates that the model is consistent with the assumptions of the Hausman specification test. Furthermore, tests for heteroskedasticity, autocorrelation, and Pesaran Abs all show p-values of 0.0000, indicating no significant issues with these aspects of the model. Overall, the regression analysis provides valuable insights into the determinants of climate change risk management, highlighting the role of corporate social responsibility, firm size, and firm age in shaping companies' approaches to addressing climate-related risks.

### **Implications of Findings**

The findings from the regression analysis have several implications for both business strategy and policy development. Firstly, there appears to be a potential trade-off between corporate social responsibility (CSR) initiatives and climate change risk management (CCRM) efforts, as indicated by the negative coefficient of CSR. Companies must strike a balance between fulfilling their social responsibilities and addressing environmental risks to ensure long-term sustainability. Secondly, the positive coefficients for firm size (FSIZE) and firm age (FAGE) suggest that larger and older firms tend to be more actively engaged in climate change risk management. This implies that larger companies may have more resources and capabilities to invest in climate-related initiatives, while older firms may have accumulated experience and knowledge in managing environmental risks.

Furthermore, companies should integrate environmental considerations, such as climate change risk management, into their broader corporate social responsibility strategies. This integration can help align environmental goals with broader social and business objectives, ensuring a more holistic approach to sustainability. In terms of policy implications, policymakers should consider the findings when designing regulations and incentives aimed at promoting climate change mitigation and adaptation strategies. Policies that encourage firms to invest in climate change risk management, such as

providing financial incentives or imposing regulatory requirements, could help accelerate corporate action in this area.

Additionally, further research is needed to understand the mechanisms driving the observed relationships and to explore additional factors influencing climate change risk management. Collaboration among industry stakeholders, including businesses, policymakers, and civil society organizations, can facilitate knowledge sharing and best practices in addressing climate-related challenges. These findings underscore the importance of integrating climate change risk management into corporate strategies and policies, considering firm characteristics, and promoting collaboration across sectors to address the challenges posed by climate change effectively.

### **5. Conclusion and Recommendations**

The regression analysis underscores the need for businesses to strategically balance corporate social responsibility (CSR) initiatives with climate change risk management (CCRM) efforts. While larger and older firms appear more actively engaged in addressing environmental risks, there's a potential trade-off between CSR and CCRM, highlighted by the negative coefficient for CSR. To navigate this, companies should integrate climate change considerations into their CSR strategies, aligning environmental goals with broader social and business objectives for a more holistic sustainability approach.

Recommendations stemming from these conclusions include strategic alignment of CSR and CCRM initiatives, prioritizing investment in climate resilience, and advocating for supportive policies that incentivize sustainable practices. Collaborative efforts among industry stakeholders, policymakers, and civil society are crucial for driving collective action towards climate resilience. Additionally, continued research is vital to understand underlying mechanisms and identify additional factors influencing climate change risk management, thereby informing evidence-based decision-making and advancing effective strategies for addressing climate-related challenges. By adopting these recommendations, businesses and policymakers can



enhance their capacity to manage climate-related risks

and contribute to a more sustainable future.

## References

- Allen, M. W., & Craig, C. A. (2016). Rethinking corporate social responsibility in the age of climate change: a communication perspective. *International Journal of Corporate Social Responsibility*, 1(1), 1–11. <https://doi.org/10.1186/s40991-016-0002-8>
- Bianco, G. B. (2020). Climate change adaptation, coffee, and corporate social responsibility: challenges and opportunities. *International Journal of Corporate Social Responsibility*, 5(1), 1–13. <https://doi.org/10.1186/s40991-020-00048-0>
- Boubaker, S., Cellier, A., Manita, R., & Saeed, A. (2020). Does corporate social responsibility reduce financial distress risk? *Economic Modelling*, 91(May 2017), 835–851.
- Bryant, A., Griffin, J. J., & Perry, V. G. (2020). Mitigating climate change: A role for regulations and risk-taking. *Business Strategy and the Environment*, 29(2), 605–618. <https://doi.org/10.1002/bse.2391>
- CDSB. (2022). *Laying the groundwork for effective TCFD-aligned disclosures* (p. 1).
- Ferrey, S. (2020). *Corporate social responsibility reporting and climate change* (pp. 171–198). <https://doi.org/10.4018/978-1-7998-2128-1.ch009>
- Hossain, A. T., & Masum, A. Al. (2022). Does corporate social responsibility help mitigate firm-level climate change risk? *Finance Research Letters*, 47(PB), 102791. <https://doi.org/10.1016/j.frl.2022.102791>
- Huang, Q., & Lin, M. (2022). Do climate risk beliefs shape corporate social responsibility? *Global Finance Journal*, 53(March), 100739. <https://doi.org/10.1016/j.gfj.2022.100739>
- Jaworska, S. (2018). Change But no Climate Change: Discourses of Climate Change in Corporate Social Responsibility Reporting in the Oil Industry. *International Journal of Business Communication*, 55(2), 194–219. <https://doi.org/10.1177/2329488417753951>
- Kouloukoui, D., Marinho, M. M. de O., Gomes, S. M. da S., Kiperstok, A., & Torres, E. A. (2019). Corporate climate risk management and the implementation of climate projects by the world's largest emitters. *Journal of Cleaner Production*, 238(2019), 1–12. <https://doi.org/10.1016/j.jclepro.2019.117935>
- Lu, H., Liu, X., & Falkenberg, L. (2022). Investigating the impact of corporate social responsibility (CSR) on risk management practices. *Business and Society*, 61(2), 496–534. <https://doi.org/10.1177/0007650320928981>
- Ozkan, A., Temiz, H., & Yildiz, Y. (2023). Climate risk, corporate social responsibility, and firm performance. *British Journal of Management*, 34(4), 1791–1810. <https://doi.org/10.1111/1467-8551.12665>
- Simpson, N. P., Mach, K. J., Constable, A., Hess, J., Hogarth, R., Howden, M., Lawrence, J., Lempert, R. J., Muccione, V., Mackey, B., New, M. G., O'Neill, B., Otto, F., Pörtner, H. O., Reisinger, A., Roberts, D., Schmidt, D. N., Seneviratne, S., Strongin, S., ... Trisos, C. H. (2021). A framework for complex climate change risk assessment. *One Earth*, 4(4), 489–501. <https://doi.org/10.1016/j.oneear.2021.03.005>
- Wiśniewski, M. (2015). CSR Risk Management. *Forum Scientiae Oeconomia*, 3(4), 1–12. <http://www.wsb.edu.pl/container/FORUM SCIENTIAE/forum 2015 4/forum-4-2015-art2.pdf>