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Green Supply Chain Effectiveness and Corporate Accountability as Drivers of Climate Change Mitigation: Mediating Role of Sustainable Practices and Moderating Influence of CSR Activities

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KEYWORDS

Climate Change, CSR, Program, Policies, towards environmental sustainability, CO_2, greenhouse gas

ABSTRACT

Corporate Social Responsibility (CSR) is a critical tool that helps mitigate the changing dynamic of climate. This article explores the role of CSR initiatives while addressing different environmental challenges, as well as their effectiveness, strategies, impact, and implementation. The introduction provides an overview of the relationship between climate change and CSR. The study background delves into the evolution of CSR in response to environmental concerns. The objectives of the study are to explore the effectiveness of several initiatives while exploring how corporations focus on integrating environmental considerations into their core operations. The literature review assists in examining previous research while highlighting key gas and findings through current understanding. The methodology section details the primary research methods, including surveys and case studies of corporations with notable CSR programs. The discussion mainly interprets the statistical data and links it to a broader range of implications and trends. The conclusion of the findings offers an insight into the CSR, which is leveraged effectively in the rebellion against climate change.

1. INTRODUCTION

The corporate sector is the most critical contributor to the global emissions of carbon dioxide and other greenhouse gases. Corporate Social Responsibility (CSR) evolved under a circumferential concern of a central component of a corporate strategy in the environmental sustainability factors. As global temperatures arise and climate-related disasters are occurring frequently, their business has also started to be concerned about the changing dynamic of climate and its related issues. Adaptation of strategies of CSR recognises that the change in the environment is not only a future threat, but it also affects the current landscape. Through focusing on adaptation, several companies demonstrate their commitment towards sustainability and their readiness while responding to the evolving needs of inhabitants and plants.

Climate change mitigation involves different forms of action to prevent the emission of greenhouse gases, which are mainly formed by human activities. The CSR initiatives aimed at reducing the emission of greenhouse gases, promoting sustainable practices, and enhancing energy efficiency. This article seeks to examine the effectiveness of several initiatives while exploring how corporations focus on integrating environmental considerations into their core operations. The introduction highlights the need for corporate action to escalate and mitigate ecological challenges by exploring the different forms of CSR strategies and their outcomes while seeking to provide an understanding of the contribution of business to climate change mitigation.

The CSR concept goes through a significant transformation due to the increasing awareness of the issues related to the environment and the shift of focus of CSR towards the environment and sustainability management. The fifth assessment report of the IPCC contributes through scientific input to the Paris Agreement, which aims to limit the increase of global temperature to 1.5 °C above the pre-industrial level (Biró and Szalmáné Csete, 2021). Achieving a 1.5 °C requires a reduction in global greenhouse gas emissions of 55% by 2030 as compared to 2017; hence, a 25% reduction of 2 °C is also required. However, increasing awareness of the recognition of the finite nature and environmental issues of natural resources has shifted the focus of CSR towards environmental and sustainability stewardship. Spreading awareness about the environment helps to reduce the destruction of the Earth and preserve natural resources. The new understanding of CSR employs a broad range which also helps in balancing the environmental, social and economic objectives of the system.

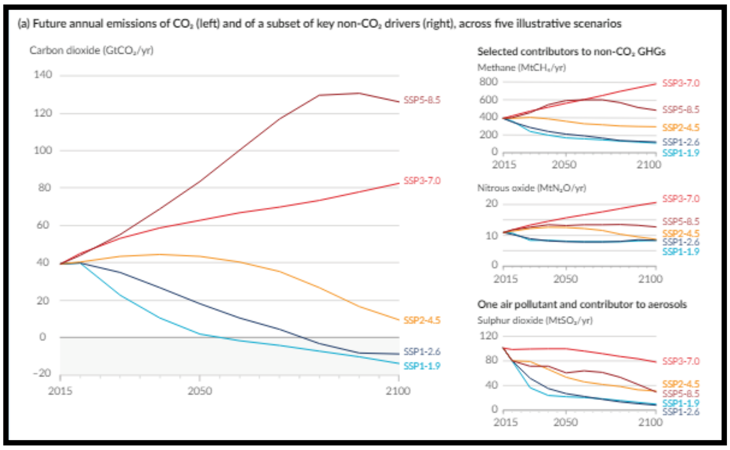

Figure 1: Future annual emissions of CO_2 and the subset of key non-CO_2 drivers

(Source: Ipcc.ch, 2021)

There is a shift notice which is driven by the growing concern and awareness of the public about climate change and the realisation of sustainable business activities which lead to long beneficial circumstances. Companies and businesses are also now expected to go beyond compliance with environmental proactively and regulations proactively while addressing the impacts of their operations. The “Intergovernmental Panel on Climate Change (IPCC)” states adaptation is an adjustment process of expected or actual climate and its vulnerable effects (Bianco, 2020). In human systems, adaptation mainly seeks to avoid or moderate exploit or harm of some beneficial opportunities. Climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes. The industrial revolution is generally marked by the beginning of environmental degradation with resource exploitation and unchecked emissions which lead to severe ecological damage.

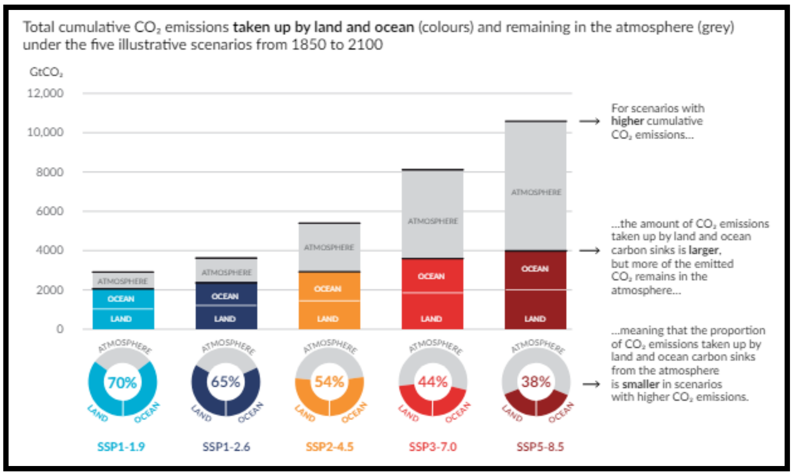

Figure 2: Cumulative anthropogenic of CO2 emissions taken up by ocean and land sinks from 1850 to 2100

(Source: Ipcc.ch, 2021)

As industrial activities are increasing their environmental footprint is also causing pressing issues related to climate. In the late 20th century the emergence of the environmental movement was visible which crucially played a role in raising awareness about the regulatory changes. The concept of sustainable development was introduced in the Brundtland Report in the year of 1987, it helps to meet the need for present development while focusing on the future ability, without compromising. For the above scenario, the higher calmative of CO_2 emissions taken up by the oceans and land sink is larger as the emitted CO_2 still there in the atmosphere (ipcc.ch, 2021). It shows that the proportion of CO_2 emissions taken by the ocean and land carbon sink is smaller as compared to the atmosphere is smaller with a high CO_2 emission. The implementation of CSR strategies assists in mitigating the variable of climate change across different regions and industries. The objectives of this study are centered on evaluating the strategic role of Corporate Social Responsibility (CSR) in addressing environmental sustainability and climate change mitigation. Specifically, the study aims to evaluate the effectiveness of CSR initiatives in reducing corporate carbon footprints and promoting environmentally responsible operations. It further seeks to discuss how CSR-driven sustainable practices influence overall business performance, contributing not only to environmental goals but also to long-term organizational success. Additionally, the research explores the critical role of corporate accountability in strengthening CSR efforts, thereby enhancing their impact on climate change mitigation. Lastly, the study aims to recommend effective strategies for stakeholder engagement in CSR programs, with a particular focus on fostering environmental sustainability through collaborative and transparent initiatives.

2. LITERATURE REVIEW

Climate risk and the moderating effects of CSR

CSR engagement helps to mitigate the impact of climate risk mainly on its financial performance by implementing social capital and reputation channels. The role of CSR in the mitigation of climate change is also to reduce the emission of harmful gases like greenhouse gases. An organisation with the proper CSR strategies can reduce the emission level of greenhouse gases on a good average. However, a company with a high standard of sustainability also outperformed the paper in terms of accounting performance and the stock market and it also helps in developing a positive relationship between the financial dynamic and CSR of the company. CSR activities engagement at times of crisis periods helps in influencing stakeholders and strengthening the corporate image (Ozkan *et al.* 2023). The CSR approach helps to encourage the organisation to expand and identify the connections between economic and societal progress while creating a model of sustainable business which benefits the community and also the company.

CSR practices help in reducing effects of the climate risk on the performance of an organisation through serving it as an insurance mechanism, preserving social trust and being a governance tool. CSR disclosure is categorised among the important elements which are used by the organisation to manage suppliers, investors, or consumers among others (Gallego-Álvarez and Pucheta-Martínez, 2022). The CSR implementation also helps the organisation by boosting its sales growth, reducing the cost of capital and is also beneficial for attracting employees. Some companies are there that are focused on reducing the environmental impact on the organisation through using marketing tools and without engaging in any type of substantial operations. These dynamic also helps to engage in the SCR credibility initiatives whole help the environmental sustainability progress. A strong structure of governance helps in associating the performance of the CSR with the robust governance mechanism and independent board under an organisation. The effective CSR practices transparently engage the environmental substantive.

The study helps to outline the specific goals while emphasising CSR's impact on promoting sustainable practices, reducing carbon footprints, fostering stakeholder engagement and enhancing corporate accountability. CSR governance encourages the corporation to engage in environmental and social problems which result from different operational activities (Wirawan *et al.* 2020). CSR strategy can be used to reduce the inherent risks of the company, while CSR is also seen as a commitment, in which the organisation can perceived to support business ethics and sustainable development. Sustainable development implies a responsibility to maintain a balance between the environment and the interests of the company. International bodies and Governments have a major role in shaping the practices of CSR through implementing regulations and policies. The SDGs and Paris Agreement provided a global framework for climate action while encouraging different companies to align with their CSR strategies which also align with these types of goals and its affecting landscape.

Moderating factors of CSR on performance relationship and climate risk

The critical factors affecting individuals' pro-environmental behavior and willingness to pay for socially responsible products are shared experiences and culture. The regulatory pressures guide several companies to the view on the CSR value and benefit of adopting rigorous environmental practices. CSR is a dependent factor, and depends on companies' financial performance and the availability of resources for social responsibility activities. Any companies with a better CSR have a better economic performance. CSR helps provide a competitive advantage to companies and mitigates climate risk. CSR practices are merging as a significant tool that helps enhance the organization's resilience and reduce the challenges posed by climate change (Ayorinde *et al.,* 2024). CSR also focuses on the integration of social and environmental considerations into an organisation's business operations. It also acknowledges its responsibility to industries to mitigate the negative effects and contribute towards positive communities.

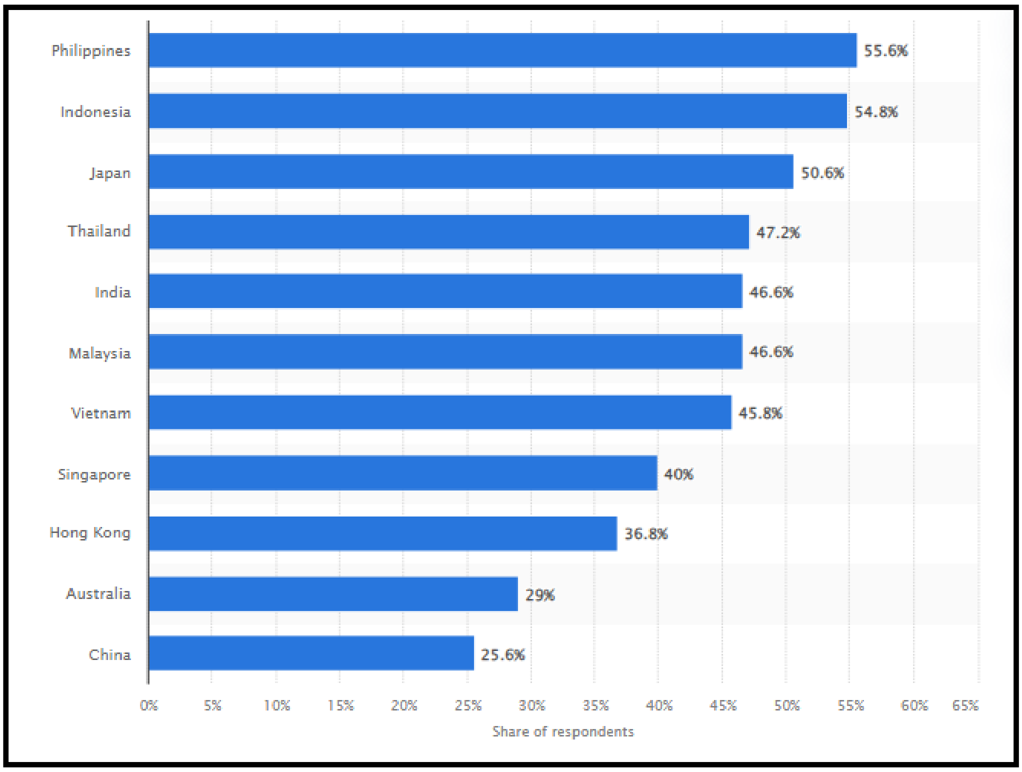

Figure 3: Consumers share worries about climate change

(Source: Statistica Research Department, 2024)

Climate risk assessment in the CSR practices plays an important role in fostering community engagement, promoting sustainable development and building adaptive capacity. The shareholders are also exerting pressure on the organisations for initiating disclosure of climate risk (Matsumura *et al.* 2024). 55.6% of respondents in the Philippines are worried about climate change which is the highest (Statista Research Department, 2024). SMEs constitute a portion of the global economy while understanding the contributions of climate change mitigation is also important for the assessment of CSR's impact. Climate change mitigation and CSR emphasise the potential significance of environmental benefits which is driven by the CSR initiatives. An effective CSR strategy helps to lead the substantial reductions in GHG emissions, enhanced stakeholder relationships and improved corporate performance. However, challenges like green washing need strong regulatory and governance frameworks.

Role of CSR in Enhancing Company Recognition

CSR in an organisation helps to promote their recognition and working culture to enhance the possibilities to improve the environmental challenges. These corporate responsibilities include different types of components including "environmental impact", "responsibility to maintain the ethics of organisations", "different types of financial responsibilities", and "philanthropic endeavour" (Stojanovic *et al*. 2020). By enhancing the CSR responsibilities within the corporate working culture, organisations improve their "brand recognition" by establishing a culture of collaboration, engagement of employees within the working procedure, and cultivating a workplace culture. As per the remark of Wirba (2023), CSR refers to the corporate and social responsibility within the business process by following not only the financial responsibilities but also the environmental factors. Brand recognition is based on the quality of products, services, and the values of an organisation, and CSR improves the recognition of the company by enhancing their "credibility", "loyalty toward customers", and "trustworthiness" related to their responsibility directly associated with the improvement of recognition.

Demonstrating the organisational motive besides the profit generation, this corporate responsibility helps to enhance the ethical purpose and responsibilities of organisations towards environmental factors. Besides the financial assistance to the economic enhancement, the moral perception of the organisations enhances the customer impression on the overall business process and retention of them toward the higher ethical standard. The CSR of organisations improves the promotion of "advantages of green competition" and "green images of organisational business process" (Alam and Islam, 2021). The green imagery of organisations related to the structural and corporate work process includes "environmentalism" and "international strictness related to the environmental factors" (Shahzad *et al*. 2020). CSR management with the involvement of employees and people within the management process of environmental security manages the green corporate imagery of organisations.

The greater implication of the CSR management system within the business management system helps to acquire the "knowledge of external sources" and improve the overall settings of the working process of the corporate sector.

3. ISSUES FACED BY COMPANIES IN PROCURING CSR INITIATIVES

Various types of challenges are there that have been faced by corporate sectors in procuring CSR initiatives in their working process. Among the various challenges, "resistance from stakeholders" is the major issue that has been faced by organisations in maintaining their CSR initiatives due to the increment of financial inclusion within the overall financial resource production. Different types of social and environmental issues are there that have to face by organisations in maintaining their CSR (Siregar, 2021). Besides this, "cost and Resource constraints" the another important challenging factor in the maintenance of effective CSR responsibilities within their working process due to the external use of excessive cost to enhance environmental security and safety. As per the study of Fatima and Elbanna (2023), political factors related to organisational factors and geographical issues are the most common hindrances behind the implementation of CSR responsibilities within the corporate working process. Protecting and improving the welfare system of the public included various responsibilities of corporate organisations to improve their trustworthiness to their customers.

Apart from this, "complexities in the compliances based on the regular working process" is another important challenge for companies implementing their CSR. Maintaining a regular formation within the working procedure and measuring the impact of those factors related to the CSR responsibilities creates vulnerable situations for the companies in enforcing their ethical approaches to secure environmental health. Technological innovation and the proper implementation of those tools in maintaining the responsibilities bear the sheer importance of developing the CSR responsibilities within their working process (Bux *et al*. 2020). On the other hand, "lack of proper policy generation" is a challenging factor for the implementation of CSR within the work process of the corporate sectors. The government initiatives in implementing new policies and regulations within their organisational culture create a barrier in the successful implementation of CSR (Mahmmod *et al*. 2021). The strictness of the enforced laws and regulations is directly connected to the implementation of CSR within the working culture of organisations.

4. HYPOTHESES DEVELOPMENT

Green Supply Chain Effectiveness and Climate Change Mitigation

Green Supply Chain Management (GSCM) has emerged as a critical strategic approach that integrates environmental thinking into supply chain operations. It includes practices such as green purchasing, eco-design, cleaner production, reverse logistics, and environmental collaboration with stakeholders (Srivastava, 2007). The primary aim is to reduce environmental risks and ecological degradation while enhancing the overall sustainability of supply chains. Research consistently suggests that effective implementation of GSCM can lead to substantial climate change mitigation outcomes. Zhu and Sarkis (2004) highlight that organizations adopting GSCM practices show a significant reduction in carbon emissions, particularly through process optimization and energy-efficient technologies. Similarly, Vachon and Klassen (2008) found that collaborative environmental initiatives between suppliers and manufacturers contribute to lower greenhouse gas (GHG) emissions across the supply chain.

Green procurement and life cycle analysis also play a vital role in minimizing the carbon footprint. For example, Sarkis (2012) explains that supplier selection based on environmental performance not only promotes sustainable sourcing but also influences upstream emission reductions. Moreover, the integration of reverse logistics helps in resource recovery and reduces landfill waste, thus indirectly lowering emissions from production and disposal (Rao & Holt, 2005). In the Indian context, studies by Diabat and Govindan (2011) show that Indian manufacturing firms adopting GSCM have experienced measurable environmental improvements, including energy savings and reduced CO_2 emissions. These improvements are linked to policy incentives, technological innovation, and increasing consumer awareness of climate issues. However, the effectiveness of green supply chains in mitigating climate change depends on factors such as regulatory frameworks, organizational commitment, infrastructure, and stakeholder engagement. As shown in the work by Ahi and Searcy (2013), without clear metrics and consistent implementation, the potential climate benefits of GSCM may remain underutilized. In conclusion, there is strong empirical evidence supporting the direct role of Green Supply Chain effectiveness in mitigating climate change. Through emission reduction, resource efficiency, and sustainable design, GSCM acts as a bridge between environmental responsibility and operational performance.

H_1: Green Supply Chain Effectiveness positively impact Climate Change Mitigation

Corporate Accountability and Climate Change Mitigation

Corporate accountability has become a vital concept in the global response to climate change. It refers to the obligation of companies to disclose, manage, and reduce the environmental impacts of their operations. The shift from voluntary environmental responsibility to structured accountability frameworks has strengthened the role of corporations in climate change mitigation (Gray, 2001). Research shows that when companies are held accountable through regulatory mandates, investor pressure, or stakeholder activism—they are more likely to adopt sustainable practices that directly reduce greenhouse gas emissions (GHGs). According to Kolk and Pinkse (2005), transparent climate-related disclosures and emission reporting systems encourage firms to improve energy efficiency and invest in low-carbon technologies. Carbon accounting and climate-related financial disclosures, such as those recommended by the **Task Force on Climate-related Financial Disclosures (TCFD)**, have proven effective in compelling firms to integrate climate risks into their core strategies (Carney, 2016). This accountability translates into direct climate action—e.g., setting science-based emission reduction targets, adopting clean energy, and redesigning production processes.

In addition, empirical studies (e.g., Luo & Tang, 2014) suggest a positive relationship between environmental accountability and emission performance. Firms with strong sustainability governance structures, clear environmental key performance indicators (KPIs), and third-party audits are more proactive in climate mitigation.

H_2: Corporate Accountability positively impacts Climate Change Mitigation

Mediating role of Sustainable Practices between green supply chain effectiveness and climate change mitigation

The growing emphasis on sustainability has led to the integration of green supply chain management (GSCM) as a strategic approach for businesses aiming to reduce environmental impacts. While GSCM has a direct influence on climate change mitigation through practices such as green sourcing, eco-design, and energy efficiency (Srivastava, 2007), recent research emphasizes that the **adoption of sustainable practices acts as a mediating factor** that enhances this relationship. Sustainable practices—defined as long-term, environmentally conscious operational behaviors such as waste minimization, use of renewable resources, lifecycle analysis, and stakeholder engagement—serve as the mechanism through which green supply chains exert a stronger influence on carbon reduction (Zhu & Sarkis, 2004). These practices help operationalize the intent of GSCM and translate strategic policies into measurable environmental outcomes. For instance, according to Eltayeb, Zailani, and Ramayah (2011), firms that combine GSCM with active implementation of sustainability-oriented initiatives (such as ISO 14001 certifications, green innovation, and circular economy principles) report significantly better outcomes in carbon emission control and climate resilience. These sustainable practices bridge the gap between policy formulation and environmental performance, thus playing a critical mediating role. Empirical studies (e.g., Green et al., 2012) have validated this mediating effect using structural equation modeling (SEM), revealing that firms with high GSCM effectiveness only realize significant climate change mitigation outcomes when they embed sustainability practices into daily operations. In other words, the link between GSCM and environmental outcomes is not always linear, and sustainable practices act as the **channel that enables climate benefits**. In the Indian context, companies in sectors like manufacturing, textiles, and FMCG have shown that aligning sustainable practices (such as green product design, energy audits, and water recycling) with supply chain strategies amplifies their contribution to national climate goals (Govindan et al., 2014). Government initiatives like the BRSR and corporate ESG reporting frameworks further encourage firms to embed sustainability across supply chain functions.

In summary, literature strongly supports the **mediating role of sustainable practices** in reinforcing the impact of green supply chain effectiveness on climate change mitigation. Without these practices, GSCM may remain a strategic intent rather than a functional contributor to climate action.

H_3: Sustainable practices significantly mediate the relationship between Green supply chain effectiveness and Climate Change Mitigation

Mediating role of Sustainable Practices between corporate accountability and climate change mitigation

Corporate accountability plays a foundational role in promoting ethical, transparent, and environmentally responsible behavior within organizations. It emphasizes the duty of corporations to disclose and act upon their environmental impact, particularly in the context of climate change (Gray, 2001). However, the direct impact of corporate accountability on climate change mitigation is often realized through the **mediating role of sustainable practices** embedded within corporate operations. Sustainable practices—such as energy conservation, waste reduction, carbon footprint tracking, green innovation, and stakeholder-inclusive decision-making—translate corporate commitments into tangible climate action. According to Hahn and Figge (2011), corporate accountability mechanisms like environmental audits, sustainability reporting (e.g., GRI, BRSR), and board-level sustainability oversight often prompt companies to adopt sustainable practices that reduce emissions and support climate resilience. Empirical studies support this mediating relationship. For example, Luo and Tang (2014) found that firms engaging in comprehensive climate-related disclosures tend to adopt stronger sustainability programs, which in turn lead to measurable reductions in greenhouse gas emissions. These findings suggest that accountability structures alone are insufficient for climate mitigation unless they lead to consistent and well-integrated sustainable practices. Furthermore, corporate sustainability frameworks such as ESG (Environmental, Social, and Governance) and CSR (Corporate Social Responsibility) serve as operational extensions of accountability, enabling firms to implement practices like eco-friendly procurement, lifecycle assessments, and renewable energy adoption. These practices directly impact climate change mitigation, acting as the conduit through which corporate accountability translates into environmental performance (Eccles, Ioannou, & Serafeim, 2014). In the Indian context, regulatory mandates such as the Companies Act 2013 (CSR compliance) and SEBI's BRSR reporting framework have enhanced corporate environmental accountability. However, as KPMG (2022) notes, the real progress in climate mitigation is seen in companies that have institutionalized sustainability into core business operations—indicating the mediating role of sustainable practices in achieving climate goals.

H4: Sustainable practices significantly mediate the relationship between Corporate accountability and Climate Change Mitigation

Moderating role of CSR activities in the relationship between green supply chain effectiveness, corporate accountability, and climate change mitigation

Climate change mitigation has become a strategic imperative for organizations worldwide, prompting firms to integrate environmentally responsible approaches into their operations. Two major drivers—Green Supply Chain Effectiveness (GSCM) and Corporate Accountability (CA) have shown significant influence in reducing environmental impacts. However, recent studies suggest that the effectiveness of these relationships is moderated by Corporate Social Responsibility (CSR) activities, which enhance or weaken the pathway toward meaningful climate action. Green Supply Chain Management (GSCM) involves the adoption of eco-friendly practices across the supply chain, such as sustainable sourcing, waste reduction, and energy-efficient logistics (Srivastava, 2007). While GSCM directly contributes to lowering carbon emissions, the presence of strong CSR activities strengthens the motivation and public commitment of firms to pursue deeper environmental reforms (Zhu & Sarkis, 2004). CSR acts as a moderating force by aligning organizational goals with broader societal and environmental expectations, thereby increasing the accountability and consistency of GSCM practices. Similarly, Corporate Accountability (CA) the obligation of firms to report and manage their environmental performance—can influence climate change mitigation. However, in the absence of strong stakeholder engagement and value-driven initiatives, accountability risks becoming a symbolic exercise. CSR initiatives help **amplify** accountability, not only by pushing firms to go beyond regulatory compliance but also by involving communities and investors in climate-related decisions (Carroll & Shabana, 2010).

Empirical studies support this moderating role. For instance, Lee (2012) found that firms with active CSR programs are more likely to implement green supply chain strategies successfully, as CSR fosters a culture of environmental ethics and innovation. Another study by Clarkson et al. (2008) revealed that stakeholder-focused CSR efforts enhance the transparency and environmental performance outcomes of corporate accountability systems.

In the Indian context, mandatory CSR under the Companies Act, 2013 has compelled firms to integrate sustainability into their operational and reporting practices. Research shows that firms combining CSR with GSCM and accountability mechanisms demonstrate superior environmental outcomes, particularly in sectors like energy, FMCG, and infrastructure (KPMG India, 2022). In summary, literature confirms that **CSR activities serve as a crucial moderator** in the relationship between GSCM, corporate accountability, and climate change mitigation. They enhance the environmental impact of organizational strategies by embedding ethical, stakeholder-centric, and sustainable values into core business operations.

H5: At high levels of CSR activities compared to CSR activities, the mediation effect of sustainable practices on the relationship between GSCE and CCM is stronger

H6: At high levels of CSR activities compared to CSR activities, the mediation effect of sustainable practices on the relationship between CA and CCM is stronger

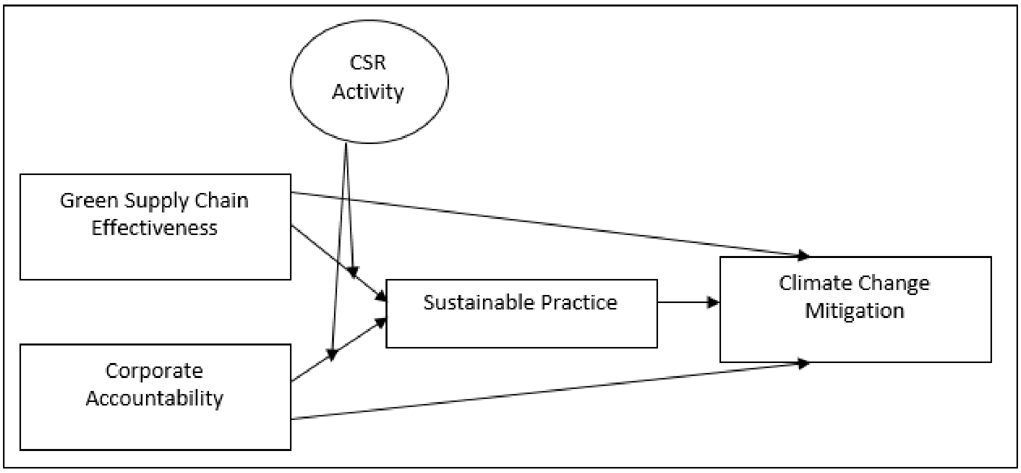

Figure 4: Conceptual Framework

5. METHODOLOGY

The researcher has conducted a ***primarily qualitative study*** to address the question of answering the research questions and justify the proper aim and objective of this study. ***Positivist research phiwordlosophy is*** used by the researcher to cover the "wide range" of this study topic within a short period. The researcher chose this philosophy to differentiate the issues related to the qualitative and quantitative study. Using the ***deductive approach*** with the positivist philosophy, the researcher analyses the transparent interconnection between the selected DV and IVs of this research. The researcher used the exploratory design to create a generalised view of this study topic. Exploratory design helps to better understand the actual nature of the issues related to the topic (Al-Ababneh, 2020). Through the help of this research approach, the researcher describes the theoretical basis of the study of the role of CSR in coping with climate change.

This study follows the ***primary data collection*** method for collecting quantitative data after conducting the ***online survey*** using ***IBM SPPS*** software. The researcher used the purposive sampling method in choosing the samples for this study. After selecting 51 participants for the sample population from the managerial dignitaries of the corporate sectors, 13 online survey questionnaires were conducted that included 3 demographic questions and 10 other closed-ended questions. These questions are sent to the dignitaries through ***Gmail*** via the creation of ***Google Forms***. The responses are collected within an Excel data sheet containing equivalent numerical values for each response. The analysis of this information has been conducted by creating the ***Likert Scale***, and through this, the quantification of the participants' responses has been collected by the researcher (Sollazzo *et al*. 2020). The primary data analysis involves gathering the "first-hand" information, the researcher aims to ensure the reliability of the research topic and to enhance the ethical consideration of the study.

Hypothesis testing

The hypotheses were evaluated using AMOS 23, SEM. Both direct and indirect impacts were tested. Climate Change Mitigation (CCM) is the outcome variable in this SEM model, with higher-order Green Supply Chain Effectiveness (GSCE) and Corporate Accountability (CA) as the independent variables and Sustainable Practices (SP) as the mediator. Table 1's results are shown here, and the model estimation indicated that the evidence fit the framework well. The direct effects (H_1 and H_2) were tested in the first stage. The path estimate reported that GSCE had a significant influence on CCM (GSCE ----> CCM, β= 0.558, p = 0.000), Thus, the study found support for H_1. Additionally, Corporate Accountability positively impacts climate change mitigation (CA → CCM, β= 0.296, p = 0.002). Thus, the study found support for H_2.

Table 1 shows the result of the structural model

Path	Coefficient	Std. Error	P Value	Hypothesis
GSCE ------> CCM	0.558	0.158	***	Supported
CA ------> CCM	0.296	0.165	0.002	Supported

Note: GSCE: Green Supply Chain Effectiveness; CA: Corporate Accountability; CCM: Climate Change Mitigation

Indirect Effect Analysis

The mediation effect was then investigated (Table 2). SP shows no mediation indirect effect between GSCE and CCM (SP --> TI --> STD: (H_3) = 95% Boot- LLCI = 0.029; Boot- ULCI = -0.167). However, SP has a full mediation effect on the relationship between CA and CCM (CA --> SP --> CCM (H_4) = 95% Boot- LLCI = 0.019; Boot- ULCI = 0.197).

Table 2 Mediation Effect

Hypothesis	**Estimate**	**Bootstrap 95% Cls**		**P value**	**Result**
		Lower	**Upper**		
GSCE ---> SP ----> CCM	0.042	0.029	-0.167	0.41	No Mediation
CA ---> SP ----> CCM	0.062	0.019	0.197	***	Full Mediation

Conditional indirect effect analysis

After examining the mediation impact, the study looks at how CSR Activity, using model 58 in process macro, affected the mediation effect of Sustainable Practices. Using boot estimates from the 5000 bootstrap samples, it was determined whether CSR activities moderated the indirect impact of green supply chain effectiveness on climate change mitigation through sustainable practices. Table 3 lists the outcomes of the analysis of moderated mediation. According to the findings, there were substantially different conditional indirect impacts of GSCE (0.0216; LLCI = 0.0043 and ULCI = 0.0899) on climate change mitigation via CSR activities at high and low CSR levels. H_3 was therefore accepted but H_4 were rejected.

Table 3 moderation effect of CSR Activities

			Bootstrap 95% Cls		
Path	Effect	SE	LLCI	ULCI	Hypothesis
GSCE --> SP --> CCM	0.0216	0.0292	0.0043	0.0899	Supported
CA ---> SP ---> CCM	0.0319	0.0752	0.0063	-0.0745	Not Supported

6. DISCUSSION

The "commitment of management" within the organisational structure and cultural innovation, hampers the overall development of the CSR responsibilities within the corporate culture. Most of the participants were less agreed with the fact that the companies spent a sufficient amount on the implementation of CSR practices but studies show that companies' expenditure is at a significant level on the maintenance of CSR practices. Due to the abruptness of the process implementation within the business process, the lack of motivating factors remains absent for the employees, stakeholders, and consumers related to the organisational productivity (Usmani *et al*. 2022). Maintenance of the sustainability related to the management of the "bio-economy" hampers the overall success in improving the enforcement of the CSR responsibilities (Donner and de Vries, 2021). Apart from that, the "lack of reputation" of the companies in managing their responsibilities for coping with the climate crisis and the interchange condition of environmental factors denote the challenging factor for the companies to implement ethical responsibilities within their business management process.

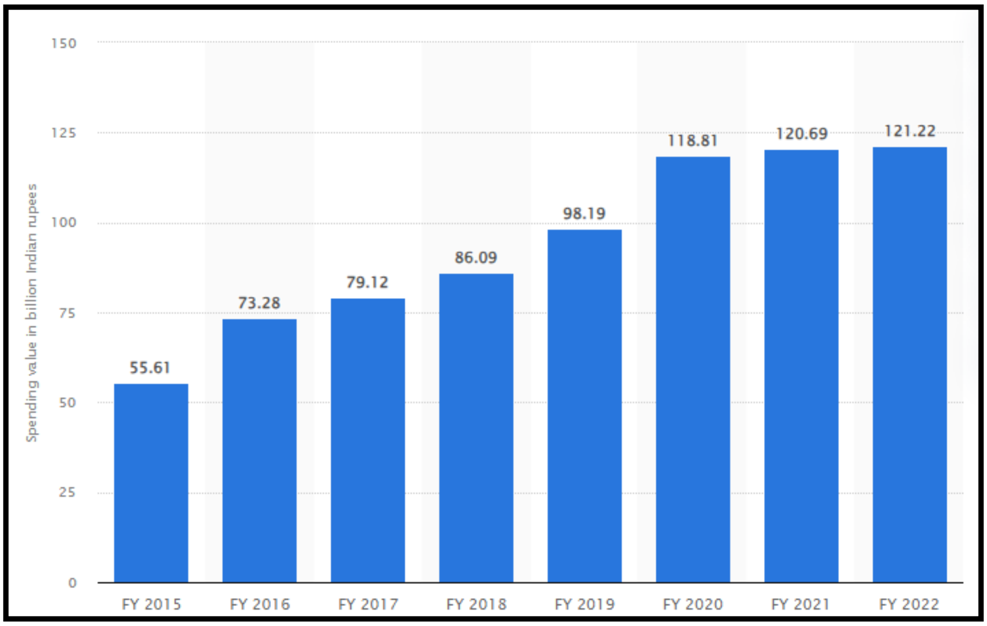

Figure 7: Rate of spending rate of companies maintaining CSR

(Source: Rathore, 2024)

Corporate sectors maintain their CSR responsibilities to maintain their ethical perspective and responsibilities toward society and the environment including environmental responsibilities, financial responsibilities, and philanthropic responsibilities. Studies show that the corporate sectors are spending almost 121.22 USD in the financial year of 2022 to implement CSR within their work processes (Rathore, 2024). As per the analysis, most of the respondents did not agree enough with the fact that the implementation of CSR to maintain sustainable practices is important for the development of practices to cope with climate change but studies show the difference. Working culture responsibilities Ensuring "compliance" with the national and international regulations related to their working procedure enhances the responsibilities related to waste disposal management, maintenance of the standard level of emissions in their work process, and the essential regulations associated with the business process.

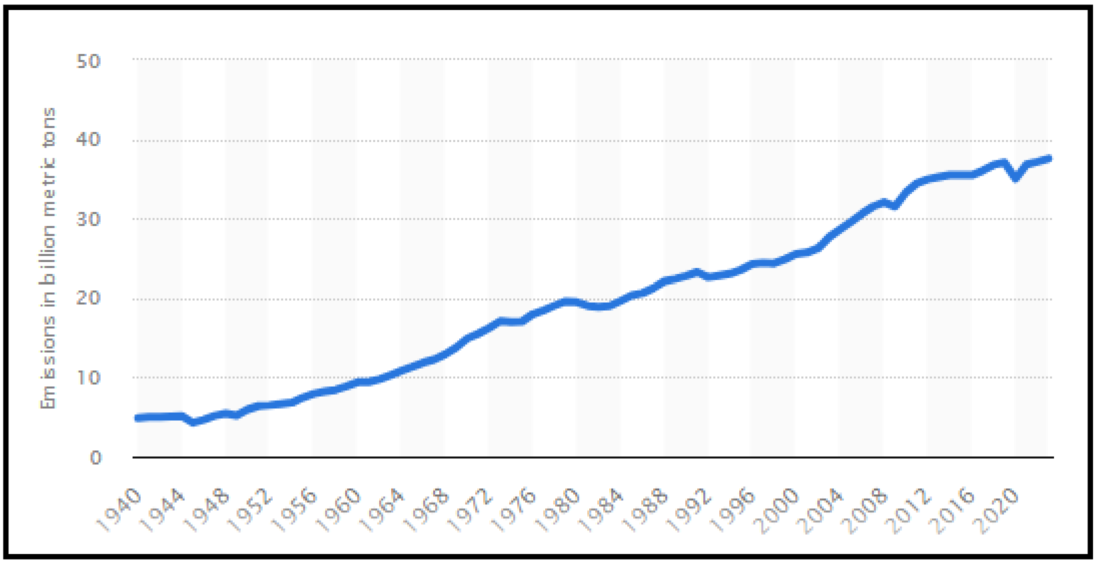

Figure 8: Increasing emission rate of Carbon Carbon di Oxide worldwide

(Source: Tiseo, 2024)

The environmental responsibilities help to enhance the awareness among the population related to the environmental conditions, and impact on ensuring the secure state of climate conditions (Li *et al*. 2020). Transitioning the energy sources to initiate the renewable factors within the working process, corporate sectors create motivational examples for the population to maintain those responsibilities (Wolniak *et al*. 2021). Continual monitoring of the energy sources and the implementation of renewable energy sources within their working process; corporate sectors help to preserve the energies for the future. Most of the respondents agreed with the fact that the emission of Carbon dioxide is increasing at a huge rate and the CSR implementation helps to reduce the emission within the environment.

The corporate sectors implement their “philanthropic responsibilities” by ensuring their fund for children's education, supporting various types of initiatives related to health initiatives, and assisting the beautification process of the community. Mostly, the corporate sectors provide their assistance by donating financial assistance to improve the support system of the foundation. Association of philanthropic decisions within their work process initiate the improvement of the stable recognition of companies to their customers (Arco-Castro *et al*. 2020). Advocating the “social justice” policy reform is the most important philanthropic decision for the corporate sector to maintain its responsibilities toward society. Besides this payment of wages to the employees properly without creating any discrimination, the corporate sector plays a vital role in improving the ethical contribution of people toward society. The commitment to the social responsibilities within the CSR activities for emitting the carbon footprint enhances their environmental responsibilities to maintain a healthy climate (Janowski, 2020). Initiating different innovative products for the management of environmental issues creates the enhancement of philanthropic responsibilities among the population.

Financial responsibilities are the factors associated with the overall management of the profit generation and the enhancement of the company's recognition for the maintenance of various factors. Most of the respondents agreed with the fact that the stakeholder's influence and the corporate reputation are interconnected with the CSR implementation. By introducing sustainable investment and financial services within the corporate sectors, the companies introduce their financial responsibilities for the promotion of sustainable development of goals associated with their business (Coelho *et al*. 2023). The corporate sectors provide donations for charitable causes to enhance their engagement in performing their roles within the society development programme and the maintenance of ethical participation in climate change issues (Devie *et al*. 2020). Investment of financial resources for maintaining the total budget and developing the factors related to the management of positive records enhance the responsibilities of the management of the financial responsibilities.

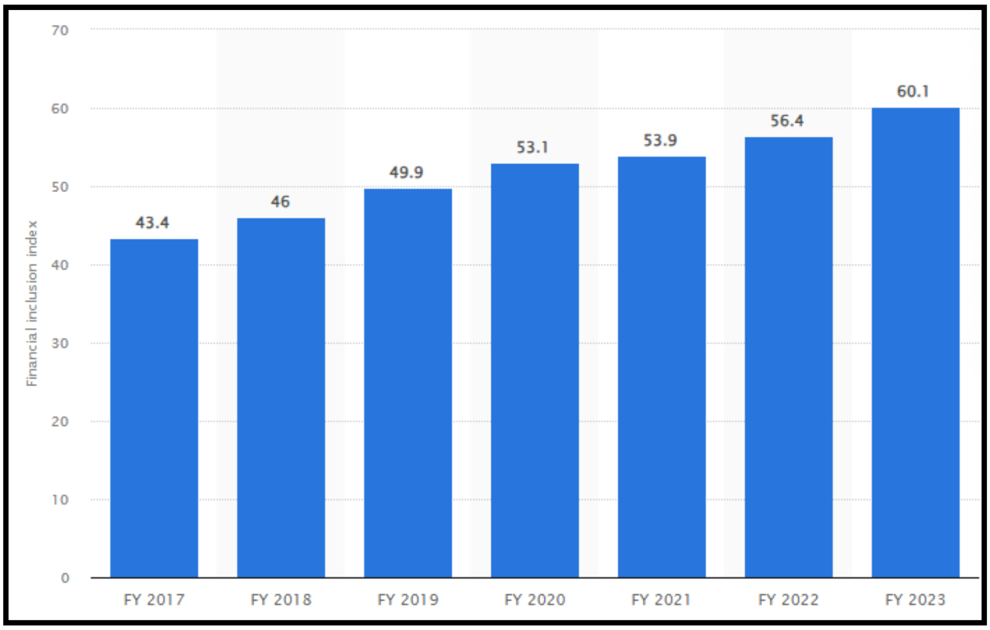

Figure 10: Financial Inclusion after the Implementation of CSR in the corporate sector

(Source: Statista, 2023)

The corporate sector with the development of their CSR responsibilities for the maintenance of a healthy climate and to mitigate the environmental crisis develops their working process. By enforcing CSR activities within their working process, the corporate sector, the financial inclusion has increased to 60.1 in 2023 compared to 2017, when the rate was 43.4. Most of the participants did not agree with the fact that CSR implementation within the corporate sector influenced the overall financial development of business but studies show the difference. Adopting the "regeneration of practices related to the agricultural sector" enhances the healthy environment for the development of their work process (Bianco, 2020). Besides this, knowledge about the restoration process of the restrictive forest areas is another important step for the corporate sectors for the initiation of CSR within their work process. The process of "adjustment" between the expected climate and the embedded condition of climate improves the CSR responsibilities of the corporate sectors.

7. CONCLUSION

The role of implemented CSR within the corporate sector enhances the ethical assistance within the work process by maintaining their role in maintaining social responsibilities. By initiating various types of environmental initiatives within the working process, the corporate sectors motivate the people to reduce the usage of carbon emissions. Implementing environmental CSR, the corporate sector introduces various innovative thoughts for the management of crisis factors in the environment to cope with the challenges related to the interchange conditions within the environment. The usage of renewable energies within the working procedure enhances the possibility of restoring the function of the energies in the environment. Besides this, the enforced financial and philanthropic responsibilities within their working culture enhance the possibilities to gain the trustworthiness of the consumers to the companies.

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