



Effect of corporate social responsibility on sustainable environmental performance: mediating effects of green capability and green transformational leadership; moderating effects of top management environmental concern and perceived organizational support

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Abstract

Corporate Social Responsibility (CSR) is increasingly acknowledged as an essential component of sustainable environmental performance (SEP), but the mechanisms behind this relationship are poorly understood, particularly in the case of SMEs in developing nations. Based on the Natural Resource-Based View (RBV) theory, this study investigates how green capability (GC) and green transformational leadership (GTL) mediate the CSR-SEP relationship, with a focus on the moderating function of perceived organizational support (POS). A survey of 420 SME employees in Bangladesh was undertaken, and the results were examined using SPSS and AMOS for structural equation modeling. The findings indicate that CSR greatly improves SEP. Furthermore, GC and GTL act as key mediators, increasing the CSR-SEP relationship. Furthermore, POS moderates the correlations between CSR and SEP, as well as GTL and SEP, implying that organizational support can strengthen or weaken these links. These findings demonstrate the diverse role of CSR in promoting environmental sustainability in many economic circumstances. The study provides practical implications for SMEs and policymakers, emphasizing the strategic significance of leadership and organizational support in improving CSR-driven sustainability efforts.

Keywords CSR · Green capability · Green transformational leadership · Sustainable growth · Mediating and moderating factors

1 Introduction

Smaller enterprises, economic campaigners, academics, including industrialists whose companies have historically neglected ecological problems in everyday operations have caused adverse ecological effects (Ramzan et al., 2022). The problem of environmental deterioration is pervasive that has gained attention nowadays. The elements that lead to

environmental deterioration are becoming more widely acknowledged these days. These include changes in the environment, increasing water consumption, air pollution, and the leakage of dangerous substances (Gazi et al., 2024a, b, c, d, e). The planet's problems must be addressed immediately, as evidenced by the declaration that 2018 was the hottest year on record (Bhat et al., 2024; Sadiq et al., 2022). Due to pressure by consumers to lessen the ecological effect, SMEs are proactively taking action to do so (Saqib, 2022). Consequently, eco-friendly practices have started to be integrated into businesses' everyday operations. The capacity of a company to attain long-term success while reducing adverse effects on the surroundings and commune is known as sustainable performance (Masud et al., 2024; Wang et al., 2024; Wu et al., 2024; Ren et al., 2024).

Researchers especially company executives are highly motivated by financial incentives associated with environmental projects (Gazi et al., 2024a, b, c, d, e; Khalid et al., 2021; Yang et al., 2021). Theoretically, researchers are using phrases like "green capability and green transformational leadership" (Hussain et al., 2022), "green HRM activities" (Singh et al., 2020; 2024), "green supply chain operates" (Wu & Kung, 2020), and "green innovation" (Tolliver et al., 2020) to participate in discussions about environmental sustainability.

In accordance with Bhat et al. (2024), SMEs exert a significant impact on the environment, contributing to problems including the depletion of air and water pollution, and environmental deterioration. SMEs also generate pollution and trash, which may be detrimental to regional ecological systems (Abbass et al., 2022; Balsalobre-Lorente et al., 2022; Gazi et al., 2024a, b, c, d, e). Researchers and practitioners are concerned about the fact that, for example, Bangladesh, an emerging nation, produces 7.72% more CO₂ annually than it does now (Hasan & Chongbo, 2020). Centobelli et al. (2020) claim that carbon dioxide discharge radiation and CO₂ creation have surged to previously unheard-of levels. The significance of elements like social cohesiveness, economic expansion, and environmental consciousness is emphasized by our study. Additionally, additional exploration on CSR is required (Liu et al., 2024; Wang & Bian, 2022; Xu et al., 2018). Organizations need to understand CSR because sustainable environmental considerations are becoming a critical component of their business strategy (Gazi et al., 2024a, b, c, d, e; Wang & Bian, 2022). According to surveys, about 8000 multinational corporations with operations in 160 countries have spent close to \$4 trillion in CSR projects (Bhat et al., 2024). Companies should uphold ethical norms in addition to their freedom to sell goods. CSR is now widely acknowledged and a crucial component of many businesses (Hou, 2019; Masud et al., 2024). According to particular inquiry, CSR may boost company productivity (Javed et al., 2020; Kraus et al., 2017).

Interaction within company results that CSR includes therefore not entirely obvious, although many experts believe that mediation and moderation are essential elements based on RBV research (Hussain et al., 2022; Wang et al., 2023). According to Hart (1995), RBV is predicated on the idea that GC and GTL are both essential elements of renewable efficiency. Therefore, CSR, GC, and GTL must be major success measures for a business (Gazi et al., 2024a, b, c, d, e; Hussain et al., 2022). While CSR is increasingly seen as a strategy to enhance Sustainable Environmental Performance (SEP) (Huang & Ren, 2024; Wang et al., 2023), there is limited understanding of how CSR initiatives achieve measurable SEP, particularly in resource-constrained SMEs. Unlike earlier studies focusing on individual mediators like green capability or green transformational leadership, this research examines their combined mediating roles, which remain underexplored. Additionally, Perceived Organizational Support (POS) as a moderator in the CSR-GTL-SEP relationship has received little attention, leaving gaps in understanding how organizational support amplifies these effects. By analyzing these dynamics within the natural Resource-Based View

(RBV) framework, this study provides a fresh, integrated perspective. It also addresses the underrepresentation of SMEs in emerging economies, such as Bangladesh, in existing CSR research, which has predominantly focused on large firms in developed contexts.

Several studies had quickly examined how CSR affects a long-term ecological performance through the overlapping consequences of GC and GTL (Gazi et al., 2024a, b, c, d, e; Hussain et al., 2022; Rehman et al., 2022; Wang & Bian, 2022). We looked at the mediators of GC and GTL as well as the effect of CSR on SEP in order to close that hole. Nevertheless, few studies have looked at how POS serves as a buffer linking CSR and GTL with respect to of business success (Nureen & Nuță, 2024; Wang et al., 2023; Zhao & Huang, 2022). To mitigate this divide, researchers looked at how POS functions as a moderating factor between CSR and GTL in the achievement of SEP. Javed et al. (2020) and Kraus et al. (2017) highlight the economic benefits of CSR on financial outcomes, emphasizing the environment. While researchers like Hussain et al. (2022) and Rehman et al., (2022) examined the individual effects of GC and GTL on CSR and SEP, their joint mediating roles remain unexplored. Building on the RBV framework (Centobelli et al., 2020; Hart, 1995), prior studies emphasize organizational resources in achieving sustainability. While many studies explore CSR's impact on organizational and environmental outcomes, the moderating role of POS remains underexplored. This study addresses this gap by examining how POS enhances the CSR-GTL-SEP relationship, contributing to both theory and practice by optimizing CSR strategies. Focusing on SMEs in Bangladesh, it also fills the research gap on CSR in emerging economies, offering a localized view that enhances global discussions. By integrating CSR, GC, GTL, and POS, the study offers a comprehensive framework to understand CSR's impact on SEP in SMEs, setting it apart from previous research. Researchers developed three key research questions (RQs) based on these insights:

RQ1: What elements affect the relationship between CSR and SEP?

RQ2: What intermediate functions do GC and GTL play in the interaction between SEP and CSR?

RQ3: How does POS function in CSR, GTL, and SEP?

This study offers novel insights into the CSR-environmental performance relationship by simultaneously exploring the dual mediating roles of green capability (GC) and green transformational leadership (GTL). Unlike prior studies that focus on these mediators individually, this research highlights their synergistic effects within the natural RBV framework, providing a fresh perspective on mediation analysis. Additionally, it examines how perceived organizational support (POS) amplifies the CSR-GTL-SEP linkage, offering actionable strategies for managers to enhance sustainable practices. By focusing on SMEs in Bangladesh, the study addresses the unique challenges of resource-constrained environments, contributing to the global discourse on CSR in emerging economies.

2 Literature review

2.1 Theoretical framework

The Resource-Based View (RBV) highlights that organizations achieve competitive advantage by leveraging valuable, rare, inimitable, and non-substitutable resources (Barney,

1991). Hart's (1995) extension of RBV emphasizes that adopting environmentally friendly practices provides businesses with a strategic edge. Resources like green capability (innovating and implementing sustainable practices) and green transformational leadership (cultivating an eco-conscious culture) are vital assets that enhance sustainable environmental performance (SEP) and align with CSR objectives (Khan et al., 2022a, b; Menguc & Ozanne, 2005). CSR, under the RBV framework, is a rare and valuable resource that enhances organizational goodwill, strengthens stakeholder relationships, and fosters employee loyalty (Rotzel et al., 2019; Usman et al., 2022). Green capabilities provide firms with competitive differentiation and improve environmental performance (Hu et al., 2024; Jabeen et al., 2024; Rehman et al., 2022; Xu et al., 2024), while green transformational leadership drives strategic initiatives, shapes culture, and fosters long-term sustainability (Ozgul & Zehir, 2022; Abbass et al., 2021). Additionally, high perceived organizational support (POS) complements these resources by fostering a supportive environment, enhancing performance, and creating a competitive advantage (Singh et al., 2020; 2024).

Organizational Support Theory (OST) suggests that employees' perception of how much their organization values their contributions and cares about their well-being influences their motivation, attitudes, and behavior (Singh et al., 2020; 2024). Perceived Organizational Support (POS) enhances leadership and organizational capabilities, encouraging alignment with CSR goals and boosting sustainable environmental performance (SEP) (Abbas et al., 2021). This study integrates OST and the Resource-Based View (RBV) to examine how green capability (GC) and green transformational leadership (GTL) serve as vital organizational resources (Masud et al., 2024; Menguc & Ozanne, 2005). CSR initiatives enhance the value and rarity of these resources, while POS fosters an environment that motivates employees, strengthens leadership effectiveness, and optimizes the use of GC and GTL. High POS enables employees and leaders to deploy these resources more effectively, driving sustainability efforts (Gazi et al., 2024a, b, c, d, e; Khalid et al., 2021; Yang et al., 2021). By linking RBV and OST, the study highlights critical mediators (GC and GTL) and shows how supportive environments enhance their effectiveness, offering a comprehensive understanding of how resources and organizational dynamics interact to achieve SEP, and addressing gaps in prior research (Rotzel et al., 2019; Usman et al., 2022; Liao, 2024; Li et al., 2024). Lastly we can be said that, RBV highlights the strategic role of green capabilities (GC) and green transformational leadership (GTL) as key resources driving sustainability, while OST emphasizes the role of perceived organizational support (POS) in optimizing their use. Together, these theories provide a robust foundation for understanding how CSR initiatives enhance sustainable environmental performance (SEP), particularly in resource-constrained SMEs, supporting hypothesis development and practical application (see literature chart in Table 1).

2.2 CSR, GC, GTL and SEP

The environment as well as society at large are significantly impacted by SMEs. CSR research has gained more attention as a result of patron appetite for environmentally friendly, sustainable goods and indulgence. Gazi et al., (2024a, b, c, d, e), who note that CSR has been increasing in importance among students as well as professionals alike, endorse this viewpoint. CSR has not yet been defined precisely, having a number to investigate about the subject, leading to scientific inquiry challenging (Bhat et al., 2024; Cha et al., 2019). To thrive in the current marketplace, organizations must align their strategies and policies with public expectations. The phrase "corporate social

Table 1 Literature chart

Authors/years	Purpose/Objectives	Country and context	Samples	Theoretical frameworks/ models	Main construct	Key findings
Bhat et al (2024)	This research effort looks at the way Indian manufacturing enterprises regulate their impact on the planet through social amenable efforts	India	500	Resource-based view (RBV) theory	“Corporate social responsibility, Climate change, Environmental performance, Environmental strategy, Green innovation & Green transformational leadership”	Conclusions of the study indicate that sustainability is greatly impacted by business social obligation, or CSR. This link is mediated by technological advancement in greener capability, environmental strategy, and green transformational superintendence
Gazi et al., (2024a, b, c, d, e)	The focus objective this research is to investigate the way prospective customers’ perceptions, understanding, moral principles, along with colored advertising strategies are influenced by ecologic issues	China	290		“Environmental concern (EC), green brand knowledge (GBK), social value (SV), attitude towards green brands (ATGB), green purchase intention (GPI)”	The study found that GBP and GBK impact GPI directly and indirectly through ATGB. While SV and ATGB indirectly influence the intention to purchase environmentally friendly products, they do not directly impact GPI. The concept of EC is crucial for moderators
Wang et al (2023)	It demonstrates the relationship between CG and SP, using TMEC as a moderator and the board of directors as a mediator	China	314	Theories of agency and stakeholders	“Corporate governance; green finance; corporate social responsibility; sustainable performance; top management environmental concern”	The interaction among CG, GF, and SP in Chinese SMEs is examined in the above finding, which significantly adds substantially pool of knowledge

Table 1 (continued)

Authors/years	Purpose/Objectives	Country and context	Samples	Theoretical frameworks/ models	Main construct	Key findings
Wang et al. (2023)	Through the intermediate role of environmental CSR, the research investigates the connection among sustainable HRM procedures as well as GI and EP	Pakistan	314	Natural resource-based view theory	“Green human resource management; Green innovation; Environmental performance; Green transformational leadership; Green corporate social responsibility.”	The findings advance the theories of GHRM, GTFL, GCSR, GI, and EP in unique ways. It also offers insights into how transformational leadership can enhance the impact of GHRM on GCSR
Rehman et al., (2022)	Scholars believe that little is known about how contextual capability influences the interaction between EP, CSR, and ESO	Malaysia	377	Resource-based view (RBV) theory	“Corporate social responsibility; environmental performance (EP); environmental sustainability orientation (ESO); green capability (GC).”	EP is significantly impacted by GC and ESO. ESO and CSR have a big influence on GC because of its function as a mediator in the collaboration amongst ESO, CSR, with EP
Wang and Bian (2022)	Analyzing the connection entre SEP and CSR	China	415	the natural RBV theory	“Corporate social responsibility; environmental outcomes; environmental strategy; sustainable environmental performance (SEP)”	Our result aims to assist SME general managers and policymakers in developing an effective framework for dealing with CSR, ES, and EO to enhance SEP

Table 1 (continued)

Authors/years	Purpose/Objectives	Country and context	Samples	Theoretical frameworks/ models	Main construct	Key findings
Zhao and Huang (2022)	The study assessed how GTL, HRM, and GI affect the SBP of manufacturing industries	China, Manufacturing and service firms	295	Resource-based view theory	“Green transformational leadership (GTL); green human resources management (GHRM); green innovation (GIN); sustainable business performance (SBP); perceived organizational support (POS).”	There’s a strong link between GTL, green HRM, and green innovation with sustainable business performance in Chinese manufacturing firms. Organizational support significantly moderates this relationship
Sun et al (2022)	This study delves into the connection between GTL and EP, emphasizing the mediating influence of GHRM and GI. It also examines how environmental values (EV) moderate the relationship between GTL and EP	Pakistan	110	The Ability Motivation Opportunity (AMO) and Resource-Based View (RBV) theory	“Green transformational leadership (GTL); environmental performance (EP); environmental values; green innovation (GI)”	The findings revealed that GTL positively influences EP, with GHRM and GI serving as positive mediators in this relationship. Additionally, EV was observed to moderate the association between GTL and EP
Qing and Jin (2022)	Through analyzing the socioeconomic achievements of SEs, this inquiry aims to explore the relationship between corporate communal responsibility and feasibility while confirming the controlling effect of innovativeness in this regard	Korea	204	Unspecified	“Corporate social responsibility; sustainability; performance; innovativeness”	This finding highlights the critical role that corporate social responsibility (CSR) plays in encouraging sustainability among SEs and the need for creative thinking, especially in the form of engineering guidance, to help SEs

Table 1 (continued)

Authors/years	Purpose/Objectives	Country and context	Samples	Theoretical frameworks/ models	Main construct	Key findings
Singh et al. (2024)	The purpose of the present research is to investigate how financial organizations' green gig is affected by CSR and Green Finance	India	357	legitimacy theory	“CSR; green finance (GF); green innovation (GI); environmental performance (EP)”	The results highlight how crucial it is to take into account CSR characteristics, including biological and financial variables, as well as GF and GI, in order to achieve EP. It emphasizes how crucial it is to include long-term prosperity into financial strategies in order to support the marketplace's growth over the long run

responsibility" (CSR) symbolizes company's dedication toward putting neighborhood-beneficial strategies, decisions, and projects into action (Gazi et al., 2024a, b, c, d, e; Rehman et al., 2022). This research paper examines how corporate social responsibility affects the frugality, convivial, and terrain. Research indicates that productivity will rise when CSR is included into a company's routine operations (Orazalin & Baydauletov, 2020; Wang et al., 2023). Nevertheless, uncovering about Kraus et al. (2020) which CSR provides minimal effect overall sustainable development. mechanized commercial organizations points to a tenuous correlation that needs further research, especially when it comes to SMEs. Participating in charitable behaviors increases an enterprise's likelihood of adopting and implementing practices that enhance its contribution to the environment, according to SEP (Gazi et al., 2024a, b, c, d, e). Reducing environmental impact, promoting resource efficiency, and enhancing overall sustainability are common goals of CSR projects (Maráková et al., 2021). Furthermore, to being in line with the company's ethical standards, these policies foster innovation in environmentally friendly technologies and procedures. Businesses can increase SEP by strengthening their environmental stewardship through the integration of CSR into their core activities (Gazi et al., 2024a, b, c, d, e). Moreover, the connection between CSR and SEP is further strengthened by the fact that CSR promotes long-term sustainability goals, builds an uptrend reputé, and gains assistance for interested parties (Wang & Bian, 2022). Therefore, it is suggested that CSR significantly and favorably affects SEP.

Research shows that ecological competences are fostered by CSR, which results in a one-upmanship that persists (Wang & Bian, 2022). The natural RBV concept states that using CSR provides a prospect can enhance a company's environmental performance (Hart, 1995). According to Peñalver et al. (2018), development have to be incorporated into CSR initiatives that aim to improve the country's financial health. Based to particular studies, environmental CSR has an effect on ecological abilities (Bhat et al., 2024). Furthermore, Rehman et al., (2022) found that ecological IT capital—which includes relational, well-ordered, and human investment—is visibly impacted by biodegradable CSR. Moreover, Bhat et al. (2024) states that organizations are encouraged to create and implement eco-friendly strategies, increase resource efficiency, and lessen their environmental effect by CSR, which cultivates a culture of environmental responsibility. This strategic approach to social responsibility enables the company develop green capabilities, which are essential for gaining long-term competitive and environmental advantages. As a result, it is anticipated that the organization's green capabilities would grow along with its CSR initiatives.

CSR programs cultivate a culture that prioritizes social and environmental responsibility by demonstrating an organization's dedication to moral and sustainable business practices (Maráková et al., 2021; Ulanov, 2024). CSR initiatives frequently promote values like sustainability, social justice, and environmental stewardship, claim Hussain et al. (2022). Directors how adhere to these values have been at greater risk of exhibit GTL, motivating in addition to challenging employees to look for innovative ideas including environmentally friendly practices. Furthermore, the development of a transformational leadership style emphasizing the significance of sustainability, innovation, and the long-term well-being of the environment is likely for leaders who embrace CSR as a key corporate value (Zhao & Huang, 2022). Blue change Agents promote and encourage staff members to align their operations with sustainable objectives, hence enhancing environmental performance (Hussain et al., 2022). Consequently, CSR promotes governance which prioritizes green initiatives, enhancing the advantageous and complimentary link between the two ideas. Consequently, speculations become:

H1 Corporate Social Responsibility (CSR) has a positive relationship with Sustainable Environmental Performance (SEP).

H2 Corporate Social Responsibility (CSR) has a positive relationship with Green Capability (GC).

H3 Corporate Social Responsibility has a positive relationship with green transformational leadership (GTL).

2.2.1 GC, GTL and SEP

Today's quickly changing marketplace, going sustainable is crucial for an organization's survival, ability to sustain an edge over peers, and successful outcomes (Gazi et al., 2024a, b, c, d, e). GC involves merging, creating, and reorganizing outside as well as within materials to enhance continuous sustainability (Qiu et al., 2020). New literature indicates consider the firm's total revenue is significantly impacted through skills and competences (Bhat et al., 2024). The idea underlying the natural resource-based strategy also suggests that GC may be an important indicator of better societal efficiency (Hart, 1995). In line with studies, ICTs have a significant role in supporting creativity for small and medium-sized enterprises in Italy (Bhat et al., 2024). Scientists are looking at how information from inside and outside of a person, as well as from study and creative pursuits, might be combined to create novel concepts. While the function of green skills in the creation of SEP got relatively little attention, the influence of biologically creative flair on viability has been thoroughly examined (Gazi et al., 2025; Qiu et al., 2020). This research aims towards bridging this opening. The investigators of this research contend believe GC enhances a business's ability to innovate and implement eco-friendly procedures, both of which have a favorable effect on SEP. Furthermore, SMEs must assist build their GC in order to be better equipped to achieve optimal how well resources are used limit rubbish, and adhere to green requirements, all of that will enhance SEP. These considerations lead us to conclude whether GC have beneficial effects with SEP.

Firm's success is significantly impacted by entrepreneurs in a variety of methods. They've got the ability to influence attitudes, conduct, economic growth, and satisfaction among workers (Zhao & Huang, 2022). According to research by Gazi et al., (2024a, b, c, d, e), GTL has a favorable impact on fostering sustainable environmental behaviors by encouraging and pushing workers to embrace environmentally beneficial behaviors and enticing participation in environmentally friendly work. In addition to promoting a culture of environmental responsibility and innovation, GTL also links organizational objectives with sustainability. Some interesting theories were recently put forth: Whenever bosses exhibit ecological values, staff involvement in environmentally friendly techniques rises, enhancing the organization's overall environmental performance:

H4 Green Capability (GC) has a positive relationship with sustainable environmental performance (SEP).

H5 Green transformational leadership (GTL) has a positive relationship with sustainable environmental performance (SEP).

2.3 Role of GC and GTL as mediator

Prior to it, the relationships between environmental consequences, CSR, sustainable chemistry, and environmental innovation were the main topics of debate. According to the suggestion, CSR influences an individual's ability to use GTL and offers useful information to improve SEP. According to earlier studies, corporate social responsibility improves an organization's performance (Orazalin, 2020). It are several important distinctions between the ways that corporate performance and CSR interact, claim Sánchez-Infante Hernández et al. (2020). Furthermore, whenever a business promotes CSR, it frequently entails building and improving green capabilities, like innovative environmental technologies, sustainable resource management, and eco-friendly procedures (Bhat et al., 2024; Khan et al., 2022a, 2022b). Through these improved green capabilities, the business can execute sustainable practices more successfully and generate better environmental outcomes (Zahid et al., 2022). Therefore, by illustrating that CSR initiatives contribute in the growth of particular green capabilities, GC transforms the impact of CSR activities into demonstrable acquires in SEP. GTL is an approach to management that bridges the divide across CSR and SEP by encouraging corporate change into sustainable development (Gazi et al., 2024a, b, c, d, e; Zahid et al., 2022). GTL encourages employees and concentrates on accomplishing green goals by integrating CSR concepts into company activities (Zhao & Huang, 2022). By integrating sustainability into the organization's fundamental ideals and processes, this leadership approach strengthens CSR commitment and increases SEP. Therefore, since it is still unclear how business achievement and CSR are related, additional study into other mediating factors is required. The relationship among rewards and the preservation of nature is demonstrated by GC with GTL, as explained by the RBV paradigm (Hart, 1995). As a result, GC and GTL serve as mediators across SEP and CSR. Consequently, this follows theories are put forth at these probes:

H6 Green Capability (GC) mediates the relationship between CSR and SEP.

H7 Green transformational leadership (GTL) mediates the relationship between CSR and SEP.

2.3.1 Perceived organizational support (POS) as moderator

Kim et al. explored the relationship among POS, CSR, and company sustainability (2018). According to this study results, when businesses assist the staff, they promote compliance with reusable and environmentally friendly rules in how they operate. This makes it easier to execute corporate social responsibility (CSR) and improves SEP, which aims to promote amicable prestige. Similar findings were made by Gazi et al., (2024a, b, c, d, e), who suggested that POS is essential for putting CSR into practice and boosting profitability, especially for companies that support the planet through CSR programs.

POS, which acts for the sake of facilitator consider the linkage within CSR and SEP, affects how associates see and participate in CSR initiatives. Higher POS increases the probability that workers will feel appreciated and encouraged, which strengthens their commitment to CSR initiatives and raises the organization's SEP (Gazi et al., 2024a, b, c, d, e). Similarly, POS moderates the relationship connecting GTL along with SEP primarily affecting the degree to that staff members appreciate and endorse GTL's efforts

to promote sustainability (Zahid et al., 2022). Strong POS increases staff enthusiasm and alignment with the company's environmental goals, strengthening the effect of GTL on SEP (Khan et al., 2022a, 2022b). Therefore, with the goal to increase sustainability, POS is crucial to amplifying the impact of GTL and CSR activities. Additionally, Kusi et al. (2021) investigated the connection among sustainable development, GTL, and POS. They discovered that whenever their companies provide both emotional and monetary aid, revolutionary managers could become better able to persuade employees to embrace environmentally friendly practices. This dedication promotes sustainable operations by improving customer service, product quality, and environmental performance in processes. Similarly, Zhao and Huang (2022) shown that when businesses offer enough financial, social, and environmental support, effective GTL—which directs staff to take into account the environmental demands of consumers and authorities—is more effective. This approach, which prioritizes social and environmental performance, assists businesses in achieving environmental sustainability while preserving the bottom line. Taking light of the foregoing, researchers proposed an alternative explanation:

H8 Perceived Organizational Support moderates the relationship between CSR and SEP.

H9 Perceived Organizational Support moderates the relationship between GTL and SEP.

3 Methods

3.1 Research design

In order to create our survey questionnaire for the present research, researchers used a three-step approach. This survey was initially based on previously published publications. Following that, an inquiry group including three research researchers with significant expertise in SMEs thoughtfully selected to investigate issues. Following a careful analysis, we eliminated queries that were superfluous and reduced the number of important topics to increase lucidity and simplicity. Before moving involving to the data analysis portion, we conducted a pilot test on a sample of 35 individuals to ensure that the results were accurate. Such data is completely appropriate for additional analysis in light of the outcomes that we achieved through experimentation. According to the findings of a validity test, every model has a lowest Cronbach's Alpha value of 0.70 ($\alpha > 0.70$). There are three distinct components to the questioning tool. With the initial stages, participants were offered a place in the assessment with the assurance that their answers could be retained confidential and utilized exclusively for research. We have included demographic statistics in the following section. In order to ascertain how employees at small and medium-sized businesses thought regarding CSR along with how it mediated and moderated the impacts on sustainable environmental performance, the last segment included twenty-five questions, five in each component. The sources for the CSR, GC, GTL, and SEP components were Wang and Bian (2022), Rehman et al., (2022), and Hussain et al. (2022). In the end, Zhao and Huang (2022) and Wang et al. (2023) provided the POS components. These specific measures were selected based on their credibility and validity, ensuring their appropriateness and alignment with the objectives of this study (Fig. 1).

3.2 Data collection

To try to gain their insightful opinions, scientists employed a straightforward sample technique to collect data from seasoned workers of SMEs in industries including fabrics, automobiles, and electronics (Hussain et al., 2022; Wang et al., 2023). From November to December 2023, we used a Google form to administer an online survey in Bangladesh. The data in question was randomly collected from many forms for communicating channels, such as Facebook, WhatsApp, Messenger, email, and other digital networks. We received 435 questionnaires, all of which were complete with no missing values. However, we removed 15 responses and 2 items as they were outliers or otherwise unusable. Ultimately, we retained 420 valid responses for further analysis.

3.3 Data analysis tools

Scientists used the Amos-24 tool to do a SEM in order to examine our anticipated pathways. Additionally, societal data and stats were produced using IBM SPSS Statistics-24. The suggested pathways were shown to be legitimate by the SEM, and an assessment of the data model validated the accuracy and reliability of the results.

3.4 Common method variance

During our search, we utilized Harman's single factor test to screen for CMV. According to Podsakoff et al. (2003), if a single variable accounts for more than half of the variation or if all of the items load onto the same aspect, CMV issues can develop. Our test results show that there are no CMV problems in the data. Only a small number of components have self-values larger than one in the initial element, which explains 40.33% of all of revamping (Gazi et al., 2024a, b, c, d, e; Podsakoff et al., 2003).

4 Results

4.1 Inter item correlation matrix

Table 2 displays a lattice of correlations for every part. The data presented indicates that sustained ecological achievement with the perception of company backing are significantly correlated ($r=0.135$). Positive correlations with GTL, GC, and CSR are also seen, with the corresponding values of 0.218, 0.203, and 0.208.

4.2 Demographic profile

Table 3 shows that 40.5% of the people surveyed remained women and 59.5% of respondents were men. Of those who responded, 21.4% were under 25, 34.8% were between 25 and 35, 29.5% were between 35 and 45, and 14.5% were above 46. Graduate degrees were held by 40.5% of the population, master's degrees by 47.4%, intermediate degrees by 4.8%, and doctorates by 7.4%. As a result, it makes sense to assume that the majority of responders had advanced degrees. Out of the poll participants, 22.9% held senior officer roles, 18.6%

Table 2 Inter-item correlation matrix

	1	2	3	4	5
Corporate social responsibility (CSR)	1.000	.310	.225	.163	.208
Green capability (GC)	.310	1.000	.218	.197	.203
Green transformational leadership (GTL)	.225	.218	1.000	.166	.218
Perceived organizational support (POS)	.163	.197	.166	1.000	.135
Sustainable environmental performance (SEP)	.208	.203	.218	.135	1.000

Table 3 Demographic profile
(Total = 420)

		Frequency	%
Gender	Male	250	59.5
	Female	170	40.5
Age	Below 25 years	90	21.4
	25–35 years	146	34.8
	35–45 years	124	29.5
	Above 45	60	14.3
Educational qualification	Intermediate	20	4.8
	Graduation	170	40.5
	Master's Degree	199	47.4
	PhD	31	7.4
Job position	Senior officer	96	22.9
	Assistant manager	78	18.6
	Deputy manager	134	31.9
	Manager	76	18.1
	General manager	36	8.6
Total experiences	Less than 2	116	27.6
	2–6	155	36.9
	7–9	97	23.1
	Over 10	52	12.4

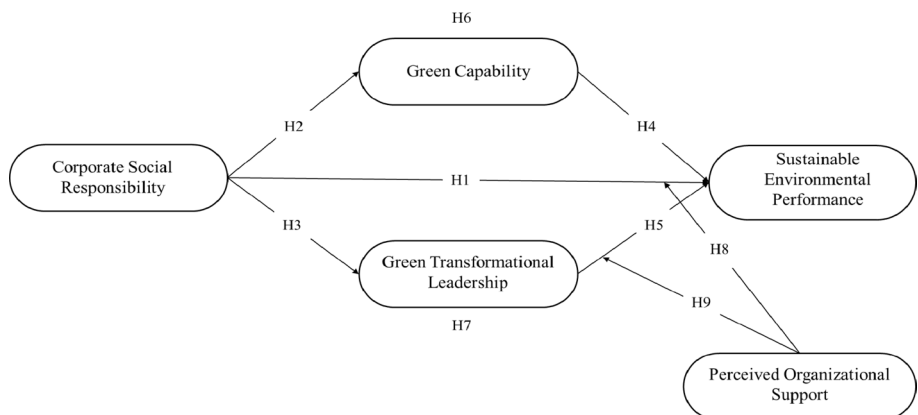
held assistant manager roles, 31.9% held deputy manager positions, 18.1% held manager positions, and 8.6% held general manager positions. Less than two years of employment was reported by 27.6% of experienced respondents, two to six years by 36.9%, and seven to nine years by 23.1%, and more than ten years by 12.4%.

4.3 Descriptive statistics (EFA)

The EFA's main conclusions are shown in Table 4. The correlation matrix analysis supported factor analysis and indicated significant relationships between the data. To determine the number of factors, a kernel value was employed. The Kaiser–Meyer–Olkin measure indicated that it stayed within a suitable range at 0.903. Bartlett's sphericity test showed that the correlation matrix suited the data well ($p < 0.000$). The associations of the

Table 4 Descriptive statistics (EFA)

Items	Factor loadings				
	1	2	3	4	5
CSR4	.960				
CSR3	.947				
CSR2	.933				
CSR5	.927				
CSR1	.927				
GTL4		.946			
GTL1		.945			
GTL3		.943			
GTL5		.943			
GTL2		.916			
GC2			.954		
GC3			.946		
GC4			.945		
GC1			.903		
GC5			.883		
SEP2				.949	
SEP3				.934	
SEP4				.919	
SEP5				.919	
SEP1				.896	
POS4					.952
POS3					.942
POS5					.942
POS1					.891
POS2					.872

**Fig. 1** Conceptual framework

25 indicators ranged from 0.872 to 0.960%, suggesting that the components may account for a significant amount of common variance (Fig. 1).

4.4 Overall confirmatory factor analysis (CFA)

In the frameworks utilized, item statistics are shown for each of the five variables. There are statistics provided for each construct. Each construct's range of mean values is as follows: The following numbers are 5.50, 5.34, 5.38, 5.60, 5.53, 5.54, 5.58, 5.45, 5.52, 5.35, 5.36, 5.36, 5.32, 5.54, 5.45, 5.07, 4.95, 5.25, 5.19, 5.26, 5.31, 5.49, 5.57, 5.36, and 5.33. The graph displays the associated standard deviations for every concept. According to the calculated aggregate numbers, more than half of respondents agreed with the questions asked. The information's statistical coherence was assessed using kurtosis and skewness. Both the skewness and kurtosis values must be around ± 2.00 in order for information to be appropriately assessed. The skewness and kurtosis of the information had been below the permitted limits, indicating that they were collected properly. The findings show which questions had the greatest and lowest answer rates. Furthermore, the study shows that the answers for each of the five components have a substantial association with one another (Table 5).

Table 5 Overall CFA results *Source:* Author calculation

Items	$\bar{x}$	σ	Skew	Kurtosis	Min	Max	α	Loading	Overall ($\bar{x}$)	Overall (σ)
CSR1	5.50	1.56	-1.62	2.024	1	7	.966	.927	5.4686	1.60473
CSR2	5.34	1.76	-1.21	.516	1	7		.933		
CSR3	5.38	1.72	-1.36	.857	1	7		.947		
CSR4	5.60	1.83	-1.58	1.353	1	7		.960		
CSR5	5.53	1.66	-1.66	1.972	1	7		.927		
GC1	5.54	1.43	-1.82	3.127	1	7	.958	.903	5.4910	1.40609
GC2	5.58	1.55	-1.79	2.562	1	7		.954		
GC3	5.45	1.52	-1.79	2.581	1	7		.946		
GC4	5.52	1.57	-1.86	2.749	1	7		.945		
GC5	5.35	1.53	-1.51	1.817	1	7		.883		
GTL1	5.36	1.57	-1.51	1.392	1	7	.966	.945	5.4071	1.49432
GTL2	5.36	1.49	-1.25	.992	1	7		.916		
GTL3	5.32	1.62	-1.36	.793	1	7		.943		
GTL4	5.54	1.65	-1.49	1.297	1	7		.946		
GTL5	5.45	1.62	-1.47	1.379	1	7		.943		
POS1	5.07	1.61	-1.15	.599	1	7	.954	.891	5.1448	1.56702
POS2	4.95	1.52	-.85	-.054	1	7		.872		
POS3	5.25	1.77	-1.08	.056	1	7		.942		
POS4	5.19	1.83	-1.03	-.084	1	7		.952		
POS5	5.26	1.77	-1.20	.380	1	7		.942		
SEP1	5.31	1.61	-1.30	1.028	1	7	.957	.896	5.4129	1.51748
SEP2	5.49	1.69	-1.42	1.071	1	7		.949		
SEP3	5.57	1.71	-1.53	1.290	1	7		.934		
SEP4	5.36	1.60	-1.16	.678	1	7		.919		
SEP5	5.33	1.60	-1.24	.934	1	7		.919		

4.5 Measurement model analysis

Two solidity measures are used to evaluate the steadiness of the measurement model and the inter-item reliability of the checklist elements. According to Hair et al. (1988), CA aggregate ($\alpha > 0.70$) and $CR > 0.70$ are satisfactory endurance levels. According to Fornell and Larcker (1981), factor loads (> 0.70) and average variance driven ($AVE > 0.50$) are sufficient to evaluate convergent validity. Hair et al. (2010) state that when assessing discriminant validity, the maximum correlation value has to be smaller than the square root of AVE. Multicollinearity is tested using the VIF, which has a threshold value of 10 or less. The measurement model is shown in Fig. 2, and its validity and reliability are shown in Table 6. Because the inter-construct correlation factor is smaller than the square root of AVE, the results show both convergent and discriminant validity. AVE scores are above 0.50, CA and CR values are over 0.70, and factor loads are getting close to 0.70. The model's VIF values, which range from 1.068 to 1.158, do not exhibit multicollinearity. $\chi^2/d = 2.178$, $GFI = 0.903$, $AGFI = 0.881$, $CFI = 0.975$, $TLI = 0.972$, $IFI = 0.975$, $NFI = 0.955$, and $RMSEA = 0.053$ are further model fit indices displayed in Table 6 (Hair et al., 2010; Hu & Bentler, 1999).

4.6 Structural model analysis

In light of measuring the model's fitness, we evaluated the suggested routes using a SEM analysis (Fig. 3). The important model fit data is shown in Table 7 are examples of model fit indices. Moreover, the data reveals that GC, GTL, and SEP account for 10%, 6%, and 9% of the variance, respectively. Five of the nine hypotheses (H1 through H5) are direct, while two of them deal with mediation and moderation effects. Since none of the P values are greater than 0.05, the results are all very significant. Table 7 supports H1 by showing that CSR has a favorable impact on SEP ($\beta = 0.127$). Additionally, the graph demonstrates that CSR ($\beta = 0.277$, $\beta = 0.214$) strongly links GC and GTL and encourages H2 and H3, both of which affect SEP. Additionally, Table 7 supports H4 and H5 by showing that GC ($\beta = 0.130$) and GTL ($\beta = 0.169$) had favorable impacts on SEP.

4.7 Mediation analysis

This study employed bootstrapping, following Baron and Kenny's (1986) recommendation, to evaluate the model's mediating effects. Bootstrapping through a mediator facilitates assessing the indirect influence of the independent variable. Table 8 shows that both GC and GTL have a considerable influence on the link between CSR and SEP. The bias-corrected model supports H6 (0.037) and H7 (0.034) within a 95% confidence interval. Additionally, Table 8 demonstrates that all mediations have positive lower and upper limits and that all indirect effects have a P value of less than 0.05, suggesting that all relationships seem meaningful. The graphical mediation outcome is displayed in Fig. 4.

4.8 Moderating effects

Analyzing AMOS connection moderation is one way to deal with random and non-random measurement sampling issues. By modifying AMOS interactions, the current study

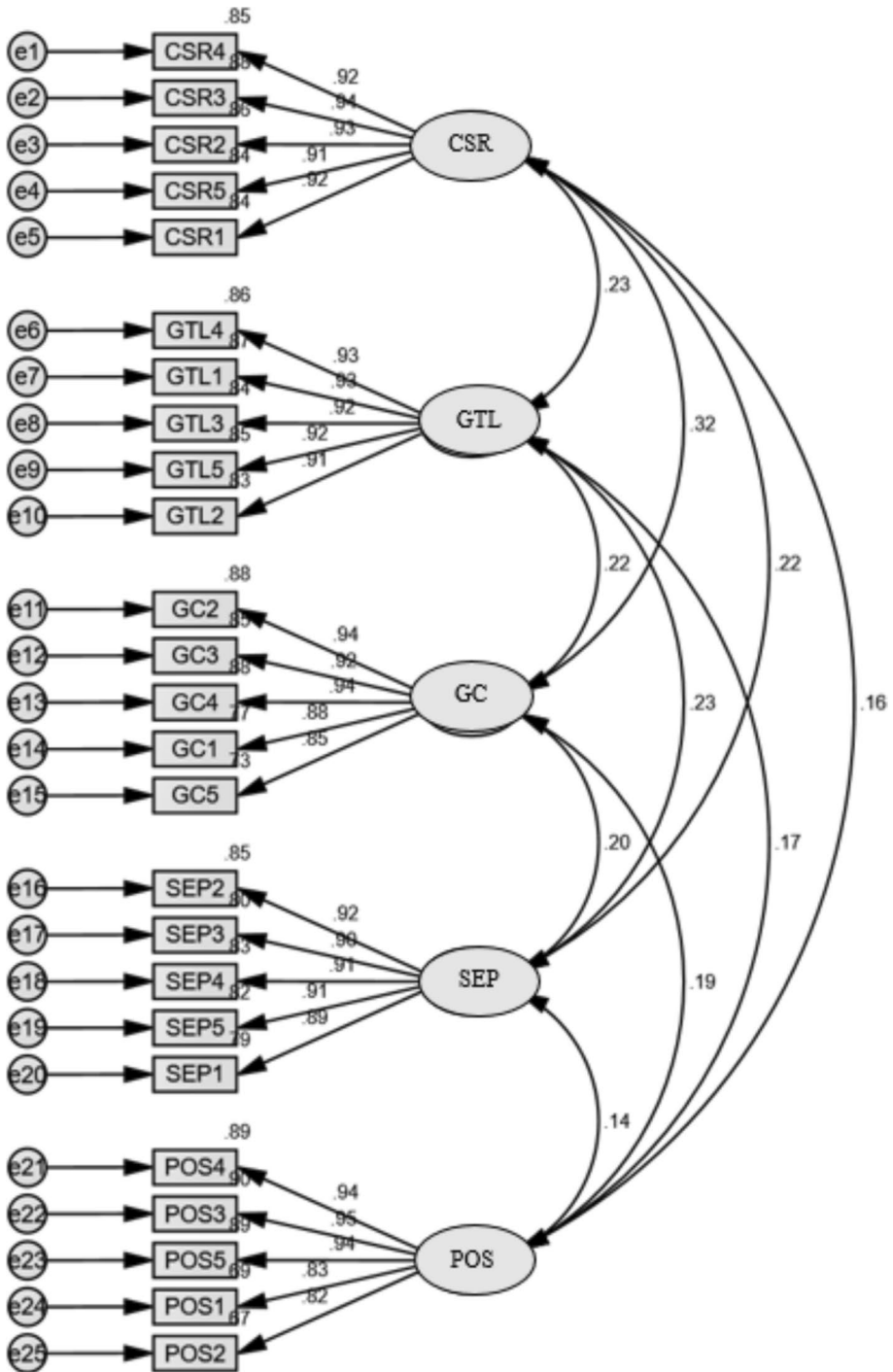


Fig. 2 Measurement model

Table 6 Validity Statistics

Variables	CR	AVE	MaxR(H)	MSV	1	2	3	4	5	VIF
1. Corporate social responsibility	.966	.852	.967	.103	.923					1.147
2. Green transformational leadership	.966	.852	.967	.055	.234	.923				1.158
3. Green capability	.959	.823	.964	.103	.321	.222	.907			1.095
4. Sustainable environmental performance	.957	.818	.958	.051	.216	.225	.202	.904		
5. Perceived organizational support	.954	.807	.967	.036	.165	.165	.191	.143	.898	1.068

Model fit indices: $\chi^2/d = 2.178$, $GFI = 0.903$, $AGFI = 0.881$, $CFI = 0.975$, $TLI = 0.972$, $IFI = 0.975$, $NFI = 0.955$, $RMSEA = 0.053$

Bold diagonal values are the square root of AVE value

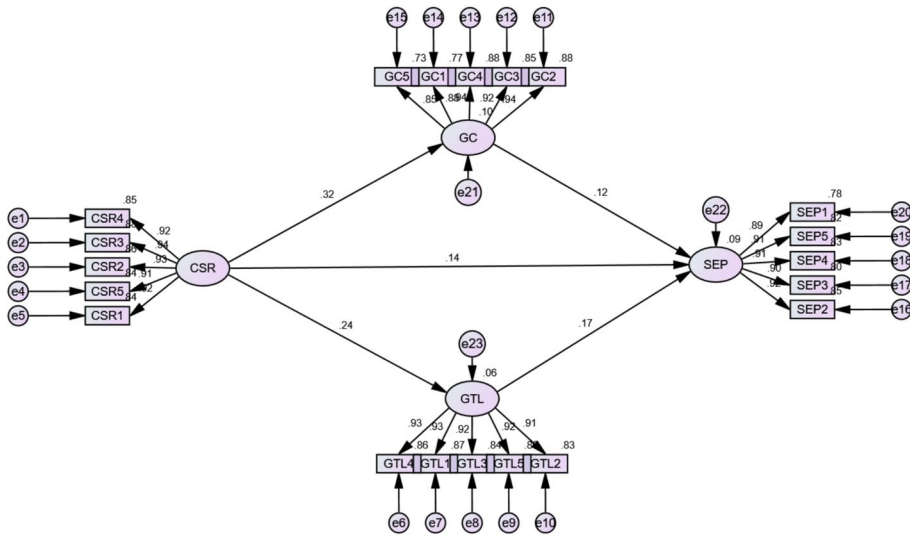


Fig. 3 Structural equation model

investigates the moderating effects of perceived corporate backing. Table 9 illustrates the link between CSR and green sustainability as well as how POS moderates both green transformational leadership and sustainable environmental performance. *P* values of 9.709 and 9.021 and interaction coefficients of .332 and .298 were obtained from SEM analysis, respectively. H8 and H9 have a *P* value of less than 0.001. We employed a product indicator strategy that required multiplying $CSR \times POS$ and $GTL \times POS$ in order to predict the outcome variable SEP. A graph illustrating the moderating impact is displayed in Fig. 5.

5 Discussion

This study examines the relationships among SEP, POS, GTL, GC, and CSR. The findings reveal that CSR directly impacts sustainable environmental performance (SEP), aligning with prior research (Bhat et al., 2024; Gazi et al., 2024a, b, c, d, e; Hussain et al., 2022; Martinez-Conesa et al., 2017; Wang & Bian, 2022; Wang et al., 2023). CSR also enhances GC and GTL, which mediate its effect on SEP, consistent with studies by Gazi et al., (2024a, b, c, d, e) and Hussain et al. (2022). Additionally, GC and GTL directly influence SEP, supporting results from Zhao and Huang (2022) and Bhat et al. (2024). The study highlights POS as a moderator, shaping both the CSR-SEP and GTL-SEP relationships, corroborating findings by Pham and Tran (2020), Gazi et al., (2024a, b, c, d, e), and Zhao and Huang (2022). The results from Table 7, 8 and 9 (Figs. 3, 4 and 5) are discussed below in relation to the hypotheses, supported by relevant previous studies:

5.1 CSR and sustainable environmental performance

The first hypothesis looked at how CSR and SEP are directly related in Bangladeshi businesses. CSR and SEP were seen to be favorably connected in Bangladesh. CSR explains

Table 7 Hypotheses results

Results	Factors	Estimate	S.E. & T value	P value	Hypothesis	Decision
Green Capability (GC) ($R^2 = 10\%$)	GC $\leftarrow$ CSR	0.277	0.042(6.617)	***	H2	Supported
Green Transformational Leadership (GTL) ($R^2 = 6\%$)	GTL $\leftarrow$ CSR	0.214	0.045(4.744)	***	H3	Supported
Sustainable Environmental Performance (SEP) ($R^2 = 9\%$)	SEP $\leftarrow$ GTL	0.169	0.051(3.324)	***	H5	Supported
	SEP $\leftarrow$ CSR	0.127	0.049(2.599)	0.009	H1	Supported
	SEP $\leftarrow$ GC	0.130	0.055(2.339)	0.019	H4	Supported

Model fit indices: $\chi^2/d = 2.096$, GFI = 0.928, AGFI = 0.908, CFI = 0.982, TLI = 0.979, IFI = 0.982, NFI = 0.966, RMSEA = 0.051

$p > 0.05$ = not significant and *** or $p < 0.05$ is accepted

Table 8 Mediation results

Indirect effect	Bootstrapping			
	Bias-corrected			
	95% Confi-			
	dence Interval			
	Estimate	Lower	Upper	P
<i>H6 CSR → GC → SEP</i>	0.037	0.012	0.078	0.07
<i>H7 CSR → GTL → SEP</i>	0.034	0.013	0.066	.001

P < 0.05 significant; *P* > 0.05 insignificant; *CI* Confidence Interval; the process repeated 5000 times.”

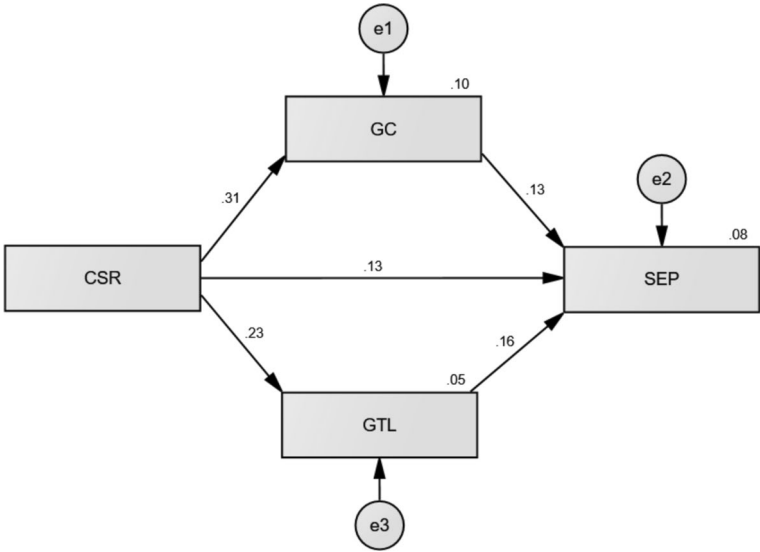


Fig. 4 Mediation analysis

Table 9 Moderation analysis outcomes

Path	Estimate	S.E	<i>t</i> value	<i>p</i>	Decision
<i>CSR × POS → SEP</i>	0.332	0.034	9.709	***	Moderate
<i>GTL × POS → SEP</i>	0.298	0.033	9.021	***	Moderate

9% ($R^2 = .09$) of the variance in SEP, while Table 7 and Fig. 3 show a significant positive relationship between CSR and SEP ($\beta = .127$, $t = 2.599$). This finding is consistent with established theories and previous studies (Gazi et al., 2024a, b, c, d, e; Martinez-Conesa et al., 2017; Wang & Bian, 2022; Wang et al., 2023; Younas, 2024). Conclusions indicate that CSR and SEP have a rather high correlation with each other. The findings address our RQ1 and support the original hypothesis. The findings demonstrate that CSR boosts market share and investor interest, which in turn enhances SEP, by enhancing the brand

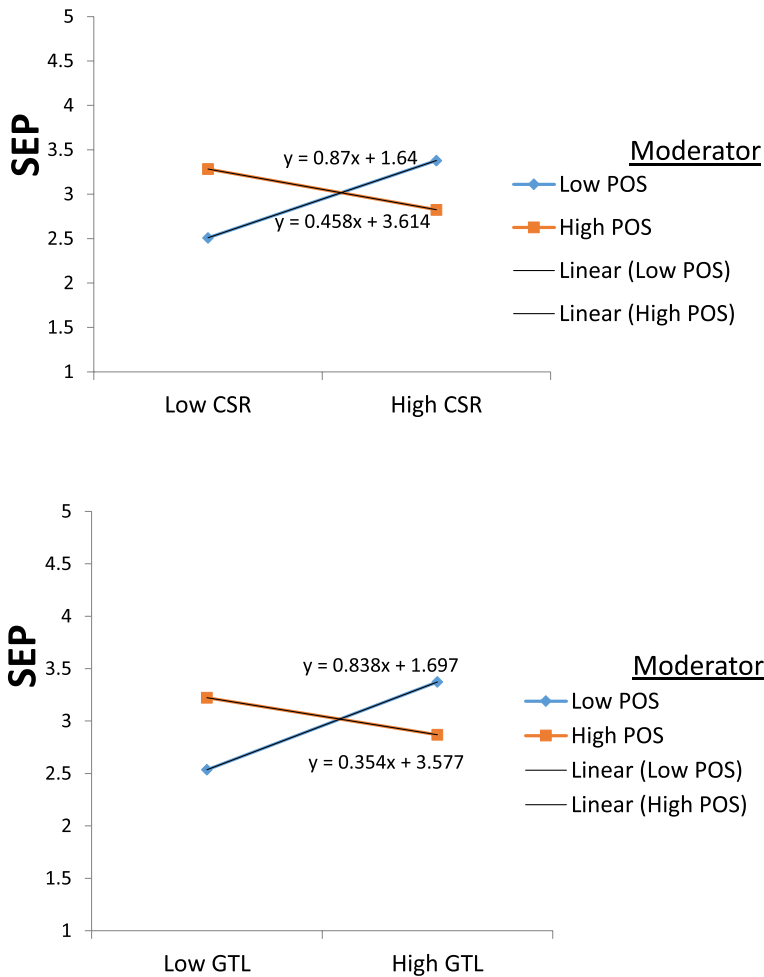


Fig. 5 Moderation results

of a business and cultivating customer loyalty. In conclusion, there is a strong correlation between CSR and SEP in Bangladeshi SMEs.

5.2 CSR and GC SMEs

The second theory that was investigated how GC and CSR are directly related in Bangladeshi SMEs. It was anticipated that within Bangladeshi SMEs, GC and CSR would positively connect. The R square value is 10%, as indicated by Table 7 and Fig. 3 ($R^2=0.10$). Table 6 indicates that the CSR and GC have a moderately significant positive connection ($\beta=0.277$, $t=6.617$) which align with previous studies by Gazi et al., (2024a, b, c, d, e) and Hussain et al. (2022). Additionally, the data show that GC and CSR have an excellent relationship. The results lend credence to the second notion.

5.3 CSR and GTL SMEs

The third hypothesis tested the positive correlation between CSR and GTL in Bangladeshi SMEs, with Fig. 3 and Table 7 showing an R^2 value of 6%. Table 7 indicates an important and favorable interrelatedness between CSR and GTL ($\beta = .214$, $t = 4.744$, $p = 0.001$). Aligning with the previous studies of Hussain et al. (2022) and Kraus et al. (2020). Additionally, the results demonstrate a strong positive correlation between GTL and CSR. The findings support the third theory. Therefore, among Bangladeshi SMEs, there can be a positive correlation between CSR and GTL. In relation to the current research's findings, the author also contended that CSR possesses the greatest impact on GC and GTL because it promotes the adoption of green procedures and developments and cultivates an eco-aware habits, which enables executives to far more successfully promote and navigate ethical objectives.

5.4 GC and SEP in Bangladeshi SMEs

The fourth hypothesis looked at the connection between GC and SEP in Bangladeshi SMEs. It was expected that GC and SEP would positively correlate in Bangladeshi firms. In Bangladeshi SMEs, Table 7 shows a robust and positive relationship with GC and SEP. R^2 is 0.09, $t = 2.339$, $\beta = 0.130$, and $A = 0.019$, with an R square value of 9%. Which is supporting by the previous studies by Zhao and Huang (2022) and Bhat et al. (2024). This result indicates that, GC and SEP have a favorable correlation. Furthermore, the findings suggest that among Bangladeshi SMEs can effectively manage and lessen their environmental impact by using the resources and procedures that GC provides which enhance SEP as well.

5.5 SEP and GTL in Bangladeshi SMEs

The fifth hypothesis looked at how SEP and GTL relate to SMEs in Bangladesh. It was expected that GTL and SEP would positively correlate in Bangladeshi firms. In Bangladeshi SMEs, Table 7 shows a statistically significant and favorable link between GTL and SEP. The R square value is 9% at $R^2 = 0.09$. $\beta = .169$ at $t = 3324$, $p = 0.001$. Which is also consistent with prior studies (Rehman et al., 2022; Wang & Bian, 2022; Wang et al., 2023). Thus, the result demonstrate that GTL and SEP have a good correlation in Bangladeshi companies. Moreover, the findings also argued that by fostering an innovative and sustainable culture, GTL encourages workers to implement eco-friendly behaviors that improve SEP.

5.6 Mediating effects of GC and GTL

The mediating effects of GC and GTL on the connections between CSR and SEP are assessed in this study. The importance of partial mediation ($\beta = 0.037$) and the H6 pathway ($p = 0.07$) are displayed in Table 8. There is little mediation ($\beta = 0.034$) and a substantial H7 pathway ($p = 0.01$). The answer to our RQ2, which states that GC and GTL significantly mediate the link between CSR and SEP, thus supports H6 and H7, which is supported by the previous studies (Bhat et al., 2024; Zahid et al., 2022; Zhao & Huang,

2022). The indirect effects of GC and GTL on the relationship between CSR and SEP, however, have not been included in previous studies that have discovered links between CSR, GC, GTL, and SEP. By demonstrating that GC and GTL have an indirect impact on the link between CSR and SEP, our research closes this information gap.

5.7 The moderating effects of POS

The present research assesses whether the relationship between GTL-SEP and CSR-SEP is altered by POS. Table 9 shows that there is moderation ($\beta=0.332$) and that the H8 pathway is significant ($p=0.001$). There is moderation ($\beta=0.298$) and the H9 pathway has importance ($p=0.001$). The link between CSR-SEP and GTL-SEP is strongly moderated by POS, according to the response to our RQ3, aligning with the prior studies Pham and Tran (2020). Additionally recognized are H8 and H9. Prior studies have shown that POS affects SEP (Gazi et al., 2024a, b, c, d, e; Zhao & Huang, 2022), but they haven't looked at how POS changes the relationship between GTL-SEP and CSR-SEP. The finding that POS significantly moderates the relationship between GTL-SEP and CSR-SEP was a further benefit to this project.

Latter light of all of this, the creator advises governments believe CSR significantly affects GC and GTL, which in turn improves SMEs' SEP. The data demonstrating whether POS significantly affects CSR, GTL, and SEP also points to the need for regulators to give POS greater importance.

6 Conclusion and policy implications

This study might provide insight into how POS, GC, GTL, and CSR efforts improve SMEs' SEP in Bangladesh. Additionally, we sent out three RQs: First, the results demonstrated that CSR significantly and favorably affected SEP. Second, the results illustrate that GC and GTL have a ripple effect on the relationship across CSR and SEP. Lastly, the findings indicate that POS significantly moderates the relationship among CSR-SEP and GTL-SEP. What sets the research we do apart is that we examine both the direct relationship amongst CSR and SEP and the indirect impacts of GC and GTL on this relationship. A further distinctive feature is the analysis of the moderating effect of POS on the connection between GTL-SEP and CSR-SEP. We'll look into how CSR affects SEP in major industrial sectors within the years ahead. Furthermore, we are going to inquire into the effects of various theories of leadership (such as transactional and transformational leadership) on SEP.

6.1 Theoretical implications

First, by showing how CSR, as an important organizational resource, may promote sustainable development, this research expands on natural RBV. It highlights the need of both tangible and intangible assets, such as improved productivity, reduced operating expenses due to a company's reputation, and organizational commitment, to obtain a competitive advantage via sustainability. Second, through seeing it as a strategic resource that can be controlled and used to improve the health of the planet, outcomes show how well CSR is congruent via sustainable RBV. Third, by showing that GC and GTL are essential mediating factors in the CSR-SEP relationship, the study supports natural RBV's assertion that these elements are critical for preserving a competitive edge in an unpredictable circumstances.

Fourth, it suggests that, considering the benefits of CSR for both, GC and GTL programs may be viewed as complementary assets which encourage the effective implementation of CSR. Fifth, by providing knowledge of theory into the tactical combination of GC and GTL, it bolsters the idea that SEP requires a synthesis of valued elements. Sixth, by verifying the function of POS as essential modifiers in the CSR-SEP and GTL-SEP interactions, the study bolsters the natural RBV's assertion that organizational support is a prerequisite for maintaining SEP. This difference improves our comprehension of the interactions between various components under natural RBV. In addition to advancing the exploration regarding natural RBV within the broader context about conserving, its theological ramifications pave the stage over further investigation into the intricate connections between CSR, GC, GTL, POS, and sustainable environmental development.

6.2 Managerial implications

Politicians, entrepreneurs, consumers, and executives in Bangladesh's SMEs can all benefit greatly from its conclusions. The examined scenario states that SMEs ought to emphasize the cumulative impact of GC, GTL, and CSR on environmental performance. Over the past few years, SEP has drawn more attention from academics and professionals. By reducing energy use, debris, and greenhouse gases, improving their brand identity, preserving water, and and deploying less nonrenewable resources, chemicals, and components, SMEs in developing nations can raise their SEP by applying the research methodology. Since corporate social responsibility (CSR) improves sustainable environmental performance, executives have begun to give it more weight. Additionally, GC and CSR have a significant impact on GTL, which improves SEP. The crucial moderating function that POS plays emphasizes how important leadership support and dedication are to the advancement of CSR programs and long-term success. GTL is capable of to successfully advise, motivate, and urge its followers to lessen the detrimental effects of company operations, hence promoting long-term viability with the organizations' assistance. Finally, while assessing sustainable environmental performance, administrators and trustees should take into account CSR, GC, GTL, POS, and SEP.

6.3 Policy recommendation

To improve SEP and match corporate goals, management must develop sound rules. These stringent regulations should aim to reduce waste and pollution, as well as the usage of single-use items, greenhouse gas emissions, and reusable materials. Additionally, they must to conserve power and water, which will gradually improve the company's reputation for more environmentally friendly operations. Businesses and investigators are advised by this proactive strategy to provide CSR, GC, GTL, and POS highest priority.

6.4 Limitations and future research

Given that the current study has met its goals, there are still a number of limitations. First off, it is unclear if CSR, GC, GTL, and POS in major industrial organizations will yield outcomes that are consistent through a lengthy amount period of time because this investigation employed an exploratory technique. Therefore, further investigators ought to duplicate the experiment spanning an extended period duration in a similar situation. Following

the present inquiry among SMEs, future research may collect data from important business associations to evaluate the findings.

Additional study could examine how CSR and environmental performance are related, using the concepts of green HRM and ecological economy as moderators. Scientists should investigate how sustainability strategies and green HRM are employed as mediators between CSR and sustainable environmental performance in order to determine their applicability. The present analysis concentrated on Bangladesh, a nation with a distinctive way of life. To see whether there are any variations in the outcomes, researchers in the future might broaden the study model and test it in both rich and developing countries.

7 Appendix

Table: Questionnaires

Sl. No.	Statements (Subject Matter)	References	SD	D	SWD	NS	SWA	A	SA
Corporate social responsibility									
CSR1	Our firm takes part in initiatives aimed at preserving and enhancing the natural environment	Wang and Bian, (2022)	1	2	3	4	5	6	7
CSR2	To reduce its detrimental effects on the environment, our company runs unique activities		1	2	3	4	5	6	7
CSR3	Our company strives for sustainable growth while taking the next generation into account		1	2	3	4	5	6	7
CSR4	Beyond what is required by law, our company upholds consumer rights		1	2	3	4	5	6	7
CSR5	Our company gives its consumers complete and accurate product information		1	2	3	4	5	6	7
Green capability									

Sl. No.	Statements (Subject Matter)	References	SD	D	SWD	NS	SWA	A	SA
GC1	Our company is able to quickly monitor the environment in order to find new green prospects	Rehman et al., (2022)	1	2	3	4	5	6	7
GC2	Our company offers efficient procedures for finding and learning new green information		1	2	3	4	5	6	7
GC3	The business is capable of creating environmentally friendly technologies		1	2	3	4	5	6	7
GC4	Our company is capable of effectively coordinating staff members to create environmentally friendly technologies		1	2	3	4	5	6	7
GC5	Our organization is adept at effectively allocating resources to foster green innovation		1	2	3	4	5	6	7
Green transformational leadership									
GTL1	The leader gives followers a clear vision for a sustainable environment		1	2	3	4	5	6	7
GTL2	The leader inspires employees to develop a sustainable environmental plan		1	2	3	4	5	6	7
GTL3	The leader motivates staff to meet long-term environmental objectives		1	2	3	4	5	6	7
GTL4	The leader considers sustainable environmental beliefs of my subordinates		1	2	3	4	5	6	7
GTL5	The leader stimulates subordinates to think & share their green ideas		1	2	3	4	5	6	7
Sustainable environmental performance									

Sl. No.	Statements (Subject Matter)	References	SD	D	SWD	NS	SWA	A	SA
SEP1	Sustainable Environmental activities significantly reduced overall costs	Singh et al. (2020; 2024) and Zhao and Huang (2022)	1	2	3	4	5	6	7
SEP2	Sustainable Environmental activities significantly reduced the lead times		1	2	3	4	5	6	7
SEP3	Sustainable Environmental activities significantly improved product/process quality		1	2	3	4	5	6	7
SEP4	Sustainable Environmental activities significantly improved the reputation of my company		1	2	3	4	5	6	7
SEP5	Sustainable Environmental activities significantly reduced waste within the entire value chain process		1	2	3	4	5	6	7
Perceived organizational support									
POS1	The organizational values my contribution to its well-being	Eairween (2018) and Zhao and Huang (2022)	1	2	3	4	5	6	7
POS2	The organization strongly considers my goals and values		1	2	3	4	5	6	7
POS3	The organization care about my well-being		1	2	3	4	5	6	7
POS4	The organization is willing to extend itself in order to help me perform my job to the best of my ability		1	2	3	4	5	6	7
POS5	The organization tries to make my jobs as interesting as possible		1	2	3	4	5	6	7
POS6	The organization take pride in my accomplishments at work		1	2	3	4	5	6	7

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Data availability Data will be provided upon reasonable request.

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References

- Abbass, K., Song, H., Khan, F., Begum, H., & Asif, M. (2022). Fresh insight through the VAR approach to investigate the effects of fiscal policy on environmental pollution in Pakistan. *Environmental Science and Pollution Research*, 29(16), 23001–23014. <https://doi.org/10.1007/s11356-021-17438-x>
- Abbass, K., Tanveer, A., Huaming, S., & Akhtar Khatiya, A. (2021). Impact of financial resources utilization on firm performance: A case of SMEs working in Pakistan. *Turk Turizm Arastirmalari Dergisi*, 2(6), 60–78. <https://doi.org/10.26677/tr1010.2019.145>
- Balsalobre-Lorente, D., Ibáñez-Luzón, L., Usman, M., & Shahbaz, M. (2022). The environmental Kuznets curve, based on the economic complexity, and the pollution haven hypothesis in PIIGS countries. *Renewable Energy*, 185, 1441–1455. <https://doi.org/10.1016/j.renene.2021.10.059>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Bhat, A. A., Mir, A. A., Allie, A. H., Ahmad Lone, M., Al-Adwan, A. S., Jamali, D., & Riyaz, I. (2024). Unlocking corporate social responsibility and environmental performance: Mediating role of green strategy, innovation, and leadership. *Innovation and Green Development*, 3(2), 100112. <https://doi.org/10.1016/j.igd.2023.100112>
- Centobelli, P., Cerchione, R., & Esposito, E. (2020). Pursuing supply chain sustainable development goals through the adoption of green practices and enabling technologies: A cross-country analysis of LSPs. *Technological Forecasting and Social Change*, 153, 119920. <https://doi.org/10.1016/j.techfore.2020.119920>
- Cha, W., Abebe, M., & Dadanlar, H. (2019). The effect of CEO civic engagement on corporate social and environmental performance. *Social Responsibility Journal*, 15(8), 1054–1070. <https://doi.org/10.1108/srj-05-2018-0122>
- Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2022). Investigating the impacts of microlevel CSR activities on firm sustainability: Mediating role of CSR performance and moderating role of top management support. *Cross Cultural & Strategic Management*, 30(1), 123–141. <https://doi.org/10.1108/ccsm-12-2021-0228>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800104>
- Gazi, M. A. I., Masud, A. A., Kabir, S., Chaity, N. S., Senathirajah, A. R. S., & Rahman, M. K. H. (2024a). Impact of green banking practices on green CSR and sustainability in private commercial banks: The mediating role of green financing activities. *Journal of Sustainability Research*. <https://doi.org/10.20900/jsr20240072>
- Gazi, M. A. I., Rahman, M. K. H., Masud, A. A., Amin, M. B., Chaity, N. S., Rahman, A., & Abdullah, M. (b). AI capability and sustainable performance: Unveiling the mediating effects of organizational creativity and green innovation with knowledge sharing culture as a moderator. *Sustainability*, 16(17), 7466–7466. <https://doi.org/10.3390/su16177466>
- Gazi, M. A. I., Masud, A. A., Rahman, M. K. H., Islam, M. R., & Senathirajah, A. R. B. S. (c). Adaptability and resilience: Insights into Bangladeshi E-commerce customer behavior during COVID-19. *Environment and Social Psychology*. <https://doi.org/10.59429/esp.v9i7.2626>
- Greiner, M., & Sun, J. (2021). How corporate social responsibility can incentivize top managers: A commitment to sustainability as an agency intervention. *Corporate Social-Responsibility and Environmental Management*, 28(4), 1360–1375. <https://doi.org/10.1002/csr.2148>
- Grubor, A., Berber, N., Aleksić, M., & Bjekić, R. (2020). The influence of corporate social responsibility on organizational performance: Research in AP Vojvodina. *Anali - Ekonomski Fakultet U Subotici/anali Ekonomskog Fakulteta U Subotici*, 43, 3–13. <https://doi.org/10.5937/aneksub2001003g>
- Gazi, M. A. I., Masud, A. A., Yusof, M. F., Billah, M. A., Islam, M. A., & Hossain, M. A. (d). The green mindset: How consumers' attitudes, intentions, and concerns shape their purchase decisions. *Environmental Research Communications*, 6(2), 025009–025009. <https://doi.org/10.1088/2515-7620/ad23f4>
- Gazi, M. A. I., Kazi, M., Yusof, M. F., Masud, A., Aminul Islam, Md., Rahman, A., & Alamgir Hossain, Md. (e). Mediating role of entrepreneurial intention on the relationship between entrepreneurship education and employability: A study on university students from a developing country. *Cogent Business & Management*. <https://doi.org/10.1080/23311975.2023.2294514>

- Gazi, M. A. I., Masud, A. A., Emon, M., Ibrahim, M., & Senathirajah, A. R. B. S. (2025). The triadic relationship between green HRM, innovation, and pro-environmental behaviour: A study of their interactions and impacts on employee productivity and organizational sustainability. *Environmental Research Communications*. <https://doi.org/10.1088/2515-7620/ada676>
- Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis.
- Hair, J. F., Anderson, R. E., & Tatham, R. L. (1988). Multivariate data analysis with readings. *Journal of the Royal Statistical Society, 151*(3), 558. <https://doi.org/10.2307/2983017>
- Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review, 20*(4), 986–1014. <https://doi.org/10.5465/amr.1995.9512280033>
- Hasan, M. M., & Chongbo, W. (2020). Estimating energy-related CO2 emission growth in Bangladesh: The LMDI decomposition method approach. *Energy Strategy Reviews, 32*, 100565. <https://doi.org/10.1016/j.esr.2020.100565>
- Hou, T. C. (2019). The relationship between corporate social responsibility and sustainable financial performance: Firm-level evidence from Taiwan. *Corporate Social Responsibility and Environmental Management, 26*(1), 19–28. <https://doi.org/10.1002/csr.1647>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Hussain, Y., Abbass, K., Usman, M., Rehan, M., & Asif, M. (2022). Exploring the mediating role of environmental strategy, green innovations, and transformational leadership: The impact of corporate social responsibility on environmental performance. *Environmental Science and Pollution Research, 29*(51), 76864–76880. <https://doi.org/10.1007/s11356-022-20922-7>
- Huang, F., & Ren, Y. (2024). Harnessing the green frontier: The impact of green finance reform and digitalization on corporate green innovation. *Finance Research Letters, 66*, 105554. <https://doi.org/10.1016/j.frl.2024.105554>
- Hu, F., Zhang, S., Gao, J., Tang, Z., Chen, X., Qiu, L., & Zhou, H. (2024). Digitalization empowerment for green economic growth: the impact of green complexity. *Environmental Engineering and Management Journal, 23*(3), 519–536. <https://doi.org/10.30638/eemj.2024.040>
- Javed, M., Rashid, M. A., Hussain, G., & Ali, H. Y. (2020). The effects of corporate social responsibility on corporate reputation and firm financial performance: Moderating role of responsible leadership. *Corporate Social Responsibility and Environmental Management, 27*(3), 1395–1409. <https://doi.org/10.1002/csr.1892>
- Jabeen, R., Mehmood, S., Ahmed, M., Ghani, T., Javaid, Z. K., & Popp, J. (2024). The role of green HRM on environmental performance: Mediating role of green ambidexterity and green behavior and moderating role of responsible leadership. *Journal of Chinese Human Resources Management, 15*(2), 70–90. <https://doi.org/10.47297/wspchrmWSP2040-800504.20241502>
- Khalid, K., Usman, M., & Mehdi, M. A. (2021). The determinants of environmental quality in the SAARC region: A spatial heterogeneous panel data approach. *Environmental Science and Pollution Research, 28*(6), 6422–6436. <https://doi.org/10.1007/s11356-020-10896-9>
- Khan, M. K., Ali, S., Zahid, R. M. A., Huo, C., & Nazir, M. S. (2022a). Does whipping tournament incentives Spur CSR performance? An empirical evidence from chinese sub-national institutional contingencies [Original Research]. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2022.841163>
- Khan, M. K., Zahid, R. M. A., Shahzad, K., Hussain, M. J., & Kitendo, M. M. (2022b). Role of managerial ability in environmental, social, and economics sustainability: An empirical evidence from China. *Journal of Environmental and Public Health, 2022*(1), 8588385. <https://doi.org/10.1155/2022/8588385>
- Khan, S. R., Yu, Z., & Farooq, K. (2022). Green capabilities, green purchasing, and triple bottom line performance: Leading toward environmental sustainability. *Business Strategy and the Environment, 32*(4), 2022–2034. <https://doi.org/10.1002/bse.3234>
- Kraus, S., Burtscher, J., Niemand, T., Roig-Tierno, N., & Syrjä, P. (2017). Configurational paths to social performance in SMEs: The interplay of innovation, sustainability, resources and achievement motivation. *Sustainability, 9*(10), 1828. <https://doi.org/10.3390/su9101828>
- Kraus, S., Rehman, S. U., & García, F. J. S. (2020). Corporate social responsibility and environmental performance: The mediating role of environmental strategy and green innovation. *Technological Forecasting & Social Change/technological Forecasting and Social Change, 160*, 120262. <https://doi.org/10.1016/j.techfore.2020.120262>
- Kusi, M., Zhao, F., & Sukamani, D. (2021). Impact of perceived organizational support and green transformational leadership on sustainable organizational performance: A SEM approach. *Business Process Management Journal, 27*(5), 1373–1390. <https://doi.org/10.1108/bpmj-09-2020-0419>

- Li, G., Luo, J., & Liu, S. (2024). Performance evaluation of economic relocation effect for environmental non-governmental organizations: Evidence from China. *Economics*, 18, 20220080. <https://doi.org/10.1515/econ-2022-0080>
- Liao, H. (2024). How to facilitate employee's workplace environmental-friendly behavior: The joint impact of green transformational leadership and green human resource management. *Journal of Chinese Human Resources Management*, 15(1), 3–15. <https://doi.org/10.47297/wspchrmWSP2040-800501.20241501>
- Liu, J., Chen, K., & Lyu, W. (2024). Embracing artificial intelligence in the labour market: The case of statistics. *Humanities and Social Sciences Communications*, 11(1), 1112. <https://doi.org/10.1057/s41599-024-03557-6>
- Maráková, V., Wolak-Tuzimek, A., & Tučková, Z. (2021). Corporate social responsibility as a source of competitive advantage in large enterprises. *Journal of Competitiveness*, 13(1), 113–128. <https://doi.org/10.7441/joc.2021.01.07>
- Martinez-Conesa, I., Soto-Acosta, P., & Palacios-Manzano, M. (2017). Corporate social responsibility and its effect on innovation and firm performance: An empirical research in SMEs. *Journal of Cleaner Production*, 142, 2374–2383.
- Masud, A. A., Islam, M. T., Rahman, M. K. H., Or Rosid, M. H., Rahman, M. J., Akter, T., & Szabó, K. (2024). Fostering sustainability through technological brilliance: a study on the nexus of organizational STARA capability, GHRM, GSCM, and sustainable performance. *Discover Sustainability*. <https://doi.org/10.1007/s43621-024-00495-w>
- Menguc, B., & Ozanne, L. K. (2005). Challenges of the “green imperative”: A natural resource-based approach to the environmental orientation–business performance relationship. *Journal of Business Research*, 58(4), 430–438. <https://doi.org/10.1016/j.jbusres.2003.09.002>
- Nureen, N., & Nuță, A. C. (2024). Envisioning the invisible: Unleashing the interplay between green supply chain management and green human resource management: An ability-motivation-opportunity theory perspective towards environmental sustainability. *Journal of Comprehensive Business Administration Research*, 1(2), 55–64. <https://doi.org/10.47852/bonviewJCBA42022030>
- Orazalin, N. (2020). Do board sustainability committees contribute to corporate environmental and social performance? The mediating role of corporate social responsibility strategy. *Business Strategy Environment*, 29(1), 140–153.
- Orazalin, N., & Baydauletov, M. (2020). Corporate social responsibility strategy and corporate environmental and social performance: The moderating role of board gender diversity. *Corporate Social-Responsibility and Environmental Management*, 27(4), 1664–1676. <https://doi.org/10.1002/csr.1915>
- Özgül, B., & Zehir, C. (2022). Top management's green transformational leadership and competitive advantage: The mediating role of green organizational learning capability. *Journal of Business and Industrial Marketing*, 38(10), 2047–2060. <https://doi.org/10.1108/jbim-01-2022-0043>
- Peñalver, A. J. B., Conesa, J. B., & De Nieves Nieto, C. (2018). Analysis of corporate social responsibility in Spanish agribusiness and its influence on innovation and performance. *Corporate Social-Responsibility and Environmental Management*, 25(2), 182–193. <https://doi.org/10.1002/csr.1448>
- Pham, H. S. T., & Tran, H. T. (2020). CSR disclosure and firm performance: The mediating role of corporate reputation and moderating role of CEO integrity. *Journal of Business Research*, 120, 127–136. <https://doi.org/10.1016/j.jbusres.2020.08.002>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879.
- Qing, C., & Jin, S. (2022). What drives consumer purchasing intention in live streaming e-commerce? *Frontiers in Psychology*, 13, 938726. <https://doi.org/10.3389/fpsyg.2022.938726>
- Qiu, L., Jie, X., Wang, Y., & Zhao, M. (2020). Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. *Corporate Social-Responsibility and Environmental Management*, 27(1), 146–165. <https://doi.org/10.1002/csr.1780>
- Ren, Y., Zhang, J., & Wang, X. (2024). How does data factor utilization stimulate corporate total factor productivity: A discussion of the productivity paradox. *International Review of Economics & Finance*, 96, 103681. <https://doi.org/10.1016/j.iref.2024.103681>
- Ramzan, M., Raza, S. A., Usman, M., Sharma, G. D., & Iqbal, H. A. (2022). Environmental cost of non-renewable energy and economic progress: Do ICT and financial development mitigate some burden? *Journal of Cleaner Production*, 333, 130066. <https://doi.org/10.1016/j.jclepro.2021.130066>
- Rehman, S. U., Bhatti, A., & Chaudhry, N. I. (2019). Mediating effect of innovative culture and organizational learning between leadership styles at third-order and organizational performance in Malaysian SMEs. *Journal of Global Entrepreneurship Research*. <https://doi.org/10.1186/s40497-019-0159-1>

- Rehman, S. U., Bresciani, S., Yahiaoui, D., & Giacosa, E. (2022). Environmental sustainability orientation and corporate social responsibility influence on environmental performance of small and medium enterprises: The mediating effect of green capability. *Corporate Social Responsibility and Environmental Management*, 29(6), 1954–1967. <https://doi.org/10.1002/csr.2293>
- Rötzel, P. G., Stehle, A., Pedell, B., & Hummel, K. (2019). Integrating environmental management control systems to translate environmental strategy into managerial performance. *Journal of Accounting & Organizational Change*, 15(4), 626–653. <https://doi.org/10.1108/jaoc-08-2018-0082>
- Sadiq, M., Shinwari, R., Usman, M., Ozturk, I., & Maghyreh, A. I. (2022). Linking nuclear energy, human development and carbon emission in BRICS region: Do external debt and financial globalization protect the environment? *Nuclear Engineering and Technology*, 54(9), 3299–3309. <https://doi.org/10.1016/j.net.2022.03.024>
- Sánchez-Infante Hernández, J. P., Yañez-Araque, B., & Moreno-García, J. (2020). Moderating effect of firm size on the influence of corporate social responsibility in the economic performance of micro-, small- and medium-sized enterprises. *Technological Forecasting and Social Change*, 151, 119774. <https://doi.org/10.1016/j.techfore.2019.119774>
- Singh, S. K., Giudice, M. D., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150, 119762. <https://doi.org/10.1016/j.techfore.2019.119762>
- Singh, P. K., Vasudevan, A., Singh, E. N., Das, B. K., Sunder, R. G., Mate, N. R., Kumar, R., Singh, N., & Aier, B. (2024). Impact of corporate social responsibility (CSR) on customer loyalty in Indian telecom industry: The moderating role of consumer demographics. *Sustainability*, 16(16), 7129. <https://doi.org/10.3390/su16167129>
- Suifan, T. S., Abdallah, A. B., & Janini, M. A. (2018). The impact of transformational leadership on employees' creativity. *Management Research Review*, 41(1), 113–132. <https://doi.org/10.1108/mrr-02-2017-0032>
- Sun, X., Askary, A. E., Meo, M. S., Zafar, N. U. A., & Hussain, B. (2022). Green transformational leadership and environmental performance in small and medium enterprises. *Ekonomika Istraživanja/ ekonomika Istraživanja*, 35(1), 5273–5291. <https://doi.org/10.1080/1331677x.2021.2025127>
- Tandoh, I., Duffour, K. A., Essandoh, M., & Amoako, R. N. (2022). *Corporate Governance, Corporate Social Responsibility and Corporate Sustainability: The Moderating Role of Top Management Commitment*. Zenodo (CERN European Organization for Nuclear Research). <https://doi.org/10.5281/zenodo.5996574>
- Tolliver, C., Keeley, A. R., & Managi, S. (2020). Policy targets behind green bonds for renewable energy: Do climate commitments matter? *Technological Forecasting and Social Change*, 157, 120051. <https://doi.org/10.1016/j.techfore.2020.120051>
- Usman, M., Kousar, R., Makhdom, M. S. A., Yaseen, M. R., & Nadeem, A. M. (2022). Do financial development, economic growth, energy consumption, and trade openness contribute to increase carbon emission in Pakistan? An insight based on ARDL bound testing approach. *Environment, Development and Sustainability*, 25(1), 444–473. <https://doi.org/10.1007/s10668-021-02062-z>
- Ulanov, V. L. (2024). The need for the green economy factors in assessing the development and growth of Russian raw materials companies. *Journal of Comprehensive Business Administration Research*, 1(1), 19–26. <https://doi.org/10.47852/bonviewJCBAR42022237>
- Wang, L., Ur Rehman, A., Xu, Z., Amjad, F., & Ur Rehman, S. (2023). Green corporate governance, green finance, and sustainable performance nexus in Chinese SMES: A mediation moderation model. *Sustainability*, 15(13), 9914. <https://doi.org/10.3390/su15139914>
- Wang, X., & Bian, W. (2022). Analyzing the role of corporate social responsibility for sustainable environmental performance: Mediating roles of environmental strategy and environmental outcomes. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2022.906610>
- Wu, T., & Kung, C. C. (2020). Carbon emissions, technology upgradation and financing risk of the green supply chain competition. *Technological Forecasting and Social Change*, 152, 119884. <https://doi.org/10.1016/j.techfore.2019.119884>
- Wu, S., Cheng, P., & Yang, F. (2024). Study on the impact of digital transformation on green competitive advantage: The role of green innovation and government regulation. *PLoS ONE*, 19(8), e306603. <https://doi.org/10.1371/journal.pone.0306603>
- Wang, Y., Zhang, J., Yan, Y., & Guan, J. (2024). The bidirectional causality of tie stability and innovation performance. *Research Policy*, 53(10), 105102. <https://doi.org/10.1016/j.respol.2024.105102>
- Xu, A., Siddik, A. B., Sobhani, F. A., & Rahman, M. M. (2024). Driving economic success: Fintech, tourism, FDI, and digitalization in the top 10 tourist destinations. *Humanities and Social Sciences Communications*, 11(1), 1549. <https://doi.org/10.1057/s41599-024-03978-3>

- Xu, X., Zeng, S., & Chen, H. (2018). Signaling good by doing good: How does environmental corporate social responsibility affect international expansion? *Business Strategy and the Environment*, 27(7), 946–959. <https://doi.org/10.1002/bse.2044>
- Yang, B., Usman, M., & Jahanger, A. (2021). Do industrialization, economic growth and globalization processes influence the ecological footprint and healthcare expenditures? Fresh insights based on the STIRPAT model for countries with the highest healthcare expenditures. *Sustainable Production and Consumption*, 28, 893–910. <https://doi.org/10.1016/j.spc.2021.07.020>
- Younas, A. (2024). The influence of internal corporate social responsibility factors on the innovation climate of employees in the healthcare industry. *Journal of Comprehensive Business Administration Research*, 1(2), 74–83. <https://doi.org/10.47852/bonviewJCBAR42022293>
- Zahid, R. M. A., Khurshid, M., & Khan, W. (2022). Do chief executives matter in corporate financial and social responsibility performance nexus? A dynamic model analysis of Chinese firms. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2022.897444>
- Zhao, W., & Huang, L. (2022). The impact of green transformational leadership, green HRM, green innovation and organizational support on the sustainable business performance: Evidence from China. *Economic Research-Ekonomska Istraživanja*, 35(1), 6121–6141. <https://doi.org/10.1080/1331677x.2022.2047086>
- Zhou, G., Zhang, L., & Zhang, L. (2019). Corporate social responsibility, the atmospheric environment, and technological innovation investment. *Sustainability*, 11(2), 481.

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