

Servant Leadership and Sustainability: A Mediated-Moderated Model in the Context of Pakistani SMEs

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Abstract

This study examines the influence of servant leadership on environmental performance in Pakistani small and medium-sized enterprises (SMEs), with green absorptive capacity (GAC) serving as a mediator and the regulatory framework acting as a moderator. Grounded in the resource-based view (RBV) and institutional theory, the study positions servant leadership as a key enabler of sustainability through the acquisition and application of green knowledge. Data were collected from 148 SMEs and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Results show that servant leadership significantly enhances environmental performance, with partial mediation by GAC. Moreover, the regulatory framework strengthens this relationship, indicating that well-enforced environmental policies amplify leadership-driven sustainability outcomes. The study addresses critical gaps in emerging economy contexts, where SMEs often lack formal environmental systems and institutional support. It contributes to the literature by integrating leadership behaviour, knowledge capabilities, and regulatory influence into a cohesive framework. The findings offer practical implications for SME managers and policymakers seeking to align leadership development with green strategy under resource-constrained conditions.

Keywords: Servant Leadership, Environmental Performance, Green Absorptive Capacity, Sustainability, SMEs, Pakistan, Green Knowledge Assimilation, Structural Equation Modelling (SEM).

1 Introduction

Control mental performance, measured also via various resources, including efficiency, emission control, waste management, and clean technology adoption, reflects how effectively an organization fulfills its environmental obligations (Singh et al., [2020](#)), in addition to Servant Leadership, Green Absorptive Capacity, and Regulatory Framework. Over the past decade, increasing global emphasis on sustainability has spurred research into the antecedents and outcomes of environmental performance, particularly within small and medium-sized enterprises (SMEs). SMEs account for a significant share of global industrial activity, yet they often lack robust regulatory oversight, which raises environmental concerns (Revell & Blackburn, [2007](#)).

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Unlike large corporations, SMEs frequently operate with limited resources and expertise, which constrains their adoption of formal environmental management systems (Hillary, [2004](#)). Given their aggregate ecological footprint, enhancing the environmental performance of SMEs is critical for achieving broader sustainability objectives.

1.1 Antecedents of Environmental Performance

Both internal and external drivers shape environmental performance. Internally, leadership style, organizational culture, and strategic orientation are foundational. For instance, servant and green transformational leadership have been shown to support environmental innovation and compliance (Robertson & Barling, [2013](#)). Externally, regulatory frameworks, market competition, and stakeholder demand for sustainable products exert significant influence (Del Brío & Junquera, [2003](#)). Performance metrics typically include outcome-based and process-based indicators such as energy usage, emission levels, waste reduction, and adoption of green technologies (Testa et al., [2014](#)). Frameworks like ISO 14001 and the Global Reporting Initiative offer standards for compliance, though their implementation is uneven among SMEs due to capability and resource constraints. In developing contexts like Pakistan, infrastructural limitations, lack of access to green financing, and low environmental awareness hinder the adoption of sustainable practices (Jenkins, [2009](#); Khan & Qureshi, [2023](#)).

1.2 Servant Leadership

Servant leadership emphasizes the leader's role in serving others, like employees, customers, and communities, before personal gain (Greenleaf, [2013](#)). Key attributes include empathy, stewardship, empowerment, and a long-term orientation towards stakeholder well-being (Liden et al., [2008](#); Spears, [1995](#)). Its relevance to sustainability has garnered scholarly attention, as its ethical, community-centered orientation aligns with pro-environmental goals (Barbuto & Wheeler, [2006](#); Eva et al., [2019](#)). Empirical studies highlight its influence on organisational citizenship behaviour (OCB), psychological empowerment, and trust-related factors, which are particularly impactful in SMEs due to their flatter hierarchies and informal structures (Hunter et al., [2013](#); Liden et al., [2008](#)).

Recent evidence also suggests that servant leadership significantly enhances environmental innovation and green organizational culture (Afsar & Umrani, [2020](#); Robertson & Barling, [2017](#)). In emerging economies, servant leaders can bridge institutional gaps by promoting sustainability even when formal governance structures are weak (Ahmad et al., [2021](#)). Nonetheless, empirical research linking servant leadership to environmental performance, particularly in SME and developing country contexts, remains scarce.

1.3 Green Absorptive Capacity (GAC) as a Mediator

Green absorptive capacity (GAC) refers to an organization's ability to acquire, assimilate, transform, and exploit environmental knowledge for innovation and performance (Chen et al., [2015](#); Zahra & George, [2002](#)). In SMEs, where structural constraints limit formal environmental initiatives, GAC becomes an essential dynamic capability for sustainable competitiveness (Albort-Morant et al., [2018](#)). Leadership plays a pivotal role in fostering GAC through knowledge sharing, trust, and empowerment (Ahmad et al., [2021](#)).

Recent studies affirm the mediating role of GAC between strategic leadership and environmental performance. GAC enables SMEs to internalise external environmental knowledge and translate it into actionable strategies, thereby enhancing their responsiveness to regulatory and stakeholder pressures (Zahoor & Gerged, [2021](#)). Furthermore, GAC is positively influenced by digitalization and collaborative supply chain practices (Geng et al., [2021](#); Hou et al., [2025](#)), underscoring its multi-dimensional role in sustainability.

1.4 Regulatory Framework as a Moderator

Regulatory frameworks exert a dual function that both enables and coerces firms' environmental behavior (Porter & van der Linde, [1995](#)). As for SMEs, which often lack environmental management systems, well-designed regulations can foster innovation by establishing clear expectations (Aragón-Correa et al., [2008](#); Testa et al., [2014](#)). However, effectiveness depends on enforcement capacity and institutional support, which are often weak in developing countries like Pakistan (Khan & Qureshi, [2023](#)). Enforcement and complementary measures such as training, regulations, and incentives are perceived as burdensome and can be done without (Del Brío & Junquera, [2003](#)).

Research suggests that the presence of strong regulatory frameworks enhances the effectiveness of leadership-driven sustainability efforts (Zada et al., [2025](#)). In contexts with robust environmental governance, servant leaders are better positioned to mobilize internal efforts in line with external mandates. Conversely, in regulatory vacuums, even committed leaders may struggle to operationalise environmental goals due to systemic constraints.

This study examines the influence of servant leadership on environmental performance in Pakistani small and medium-sized enterprises (SMEs), with green absorptive capacity (GAC) serving as a mediator and the regulatory framework acting as a moderator. Grounded in the resource-based view (RBV) and institutional theory (IsT), the study positions servant leadership as a key enabler of sustainability through the acquisition and application of green knowledge. Data were collected from 148 SMEs and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Results show that servant leadership significantly enhances environmental performance, with partial mediation by GAC. Moreover, the regulatory framework strengthens this relationship, indicating that well-enforced environmental policies amplify leadership-driven sustainability outcomes. The study addresses critical gaps in emerging economic contexts, where SMEs often lack formal environmental systems and institutional support. It contributes to literature by integrating leadership behaviour, knowledge capabilities, and regulatory influence into a cohesive framework. The findings offer practical implications for SME managers and policymakers seeking to align leadership development with green strategy under resource-constrained conditions.

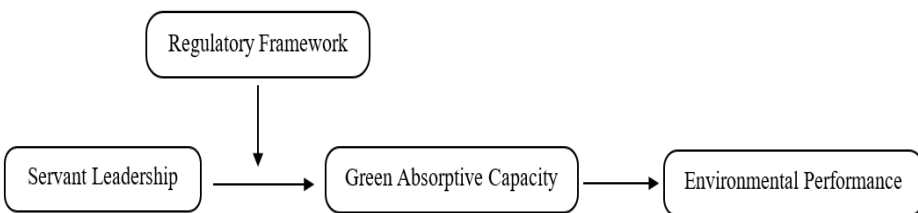


Figure 1: Framework

1.5 Conceptual Framework Description

This conceptual framework is grounded in servant leadership theory (Greenleaf, [2013](#)), dynamic capabilities theory (Teece, [2007](#)), and institutional theory (Scott, [2001](#)) to explore the interplay between leadership behaviour, absorptive capacity, regulatory environment, and environmental performance in the context of SMEs.

1.6.1 Servant Leadership (Independent Variable)

Servant leadership emphasizes moral responsibility, follower development, and community well-being. In SMEs, this leadership style fosters a participatory culture that motivates employees to

engage in pro-environmental behaviours and sustainability efforts (Eva et al., [2019](#); Liden et al., [2008](#)). Servant leaders serve as role models, promoting a vision of ethical and sustainable conduct. Recent studies confirm its relevance in fostering ecological consciousness and sustainability-oriented innovation, particularly in resource-constrained environments (Bu et al., [2022](#); Krara et al., [2025](#)). Hence, a direct positive effect on environmental performance is expected (H1).

1.6.2 Green Absorptive Capacity (Mediator):

GAC is defined as a firm's ability to acquire, assimilate, transform, and apply external green knowledge (Albort-Morant et al., [2018](#); Chen et al., [2015](#)). It serves as a vital dynamic capability that enables firms to respond strategically to environmental challenges. In the presence of servant leadership, GAC is enhanced through encouragement of learning, openness to stakeholder engagement, and the creation of trust-based, knowledge-sharing cultures (Ahmad et al., [2021](#); Zahoor & Gerged, [2021](#)). Empirical studies indicate that GAC mediates the relationship between leadership and environmental innovation, particularly in SMEs where formal environmental management systems are absent. This supports the mediating hypothesis (H3).

1.6.3 Regulatory Framework (Moderator)

The regulatory framework includes environmental laws, enforcement mechanisms, and institutional support that shape firm behavior. According to the Porter Hypothesis (Porter & van der Linde, [1995](#)), well-designed regulations can stimulate innovation and performance improvements. Servant leadership interacts with regulatory environments by aligning intrinsic values with external mandates, enhancing compliance and proactive sustainability behaviors (Eva et al., [2019](#); Testa et al., [2014](#)). However, the strength of this influence is contingent on institutional enforcement and support mechanisms. In contexts like Pakistan, weak regulatory structures may limit leadership impact unless supported by robust policy initiatives (Hou et al., [2025](#)). The moderating hypothesis (H2) posits that the servant leadership–environmental performance link is stronger under stringent and well-enforced regulations (Geng et al., [2021](#); Zada et al., [2025](#)).

1.6.4 Environmental Performance (Dependent Variable)

Environmental performance reflects how effectively a firm manages its ecological footprint through reduced emissions, resource conservation, and sustainable practices (Testa et al., [2014](#); Singh et al., [2020](#)). Servant leadership and GAC are theorised to drive improvements in these metrics, especially in SMEs where environmental strategies are often informal and leader driven.

This integrated model contributes to theory by unifying behavioural, strategic, and institutional lenses to understand environmental performance in SMEs. It also provides practical insights for policy and management by emphasizing leadership development, capacity-building, and regulatory strengthening in sustainability strategies.

2 Literature Review

Metrics including resource efficiency, emission reductions, waste management, and the adoption of clean technologies are commonly used to assess an organisation's environmental performance, which is the degree to which it fulfils its environmental obligations (Singh et al., [2020](#)). Scholarly interest in comprehending the causes and effects of environmental performance across industries, especially in the SME sector, has increased throughout the past 10 years due to the increased emphasis on sustainable development and environmental accountability on a worldwide scale. Small and medium enterprises (SMEs) represent a significant portion of industrial activity globally but often operate under limited regulatory oversight, which poses environmental risks (Revell & Blackburn, [2007](#)). Unlike larger corporations, SMEs tend to lack the resources and expertise to implement comprehensive environmental management systems, yet their collective environmental footprint can be substantial (Hillary, [2004](#)). Improving environmental performance in SMEs is

thus critical for achieving broader national and global sustainability goals.

Several internal and external factors drive environmental performance. Internally, leadership style, organizational culture, and strategic orientation play pivotal roles. For example, green transformational and servant leadership have been found to encourage environmental innovation and compliance (Robertson & Barling, [2013](#)). Externally, regulatory pressure, market competition, and customer demand for green products can also act as catalysts (Del Brío & Junquera, [2003](#)). Environmental performance is commonly measured through both process-based and outcome-based indicators. These include energy efficiency, water usage, emission levels, pollution prevention, and the implementation of environmental management practices (Testa et al., [2014](#)). The Global Reporting Initiative (GRI) and ISO 14001 provide standardized frameworks to guide reporting and compliance, but adoption rates vary among SMEs due to financial and technical barriers. In emerging economies such as Pakistan, SMEs face compounded challenges due to infrastructural deficiencies, lack of green financing, and low environmental awareness (Jenkins, [2009](#)). Cultural attitudes and institutional voids further limit the motivation and capacity of SMEs to invest in sustainable practices. As such, leadership becomes a critical lever for change, making it important to explore the behavioural antecedents that influence green performance outcomes.

Recent research has started exploring the integration of dynamic capabilities, such as green absorptive capacity and innovation orientation, into the study of environmental performance. However, empirical investigations remain limited in SME contexts and even more so in developing countries (Chen et al., [2015](#)). The intersection between leadership styles and environmental outcomes through mediating variables like knowledge management, employee engagement, and organizational learning is an emerging and under-researched domain.

A leadership paradigm known as "servant leadership" prioritizes the needs of communities, workers, and clients over the leader's interests (Greenleaf, [2013](#)). In contrast to conventional leadership approaches that emphasise authority or organisational hierarchy, servant leadership aims to empower followers, encourage moral behaviour, and cultivate a climate of trust and cooperation. It has attracted interest over time in several areas, such as human resource management, organizational behavior, and more recently, environmental and sustainability management. Robert K. Greenleaf first proposed the idea, arguing that a servant leader's main drive is to serve, which motivates followers to be dedicated and perform well. Empathy, listening, stewardship, dedication to others' development, and community building are all essential components of servant leadership (Spears, [1995](#)). Because of these qualities, the design is especially appropriate for businesses looking to improve their ethical and socially conscious culture.

Servant leadership is positively correlated with important organisational outcomes as work satisfaction, employee engagement, organisational citizenship behaviour (OCB), and performance, according to several empirical studies (Eva et al., [2019](#); Liden et al., [2008](#)). It is well established that servant leaders foster psychological empowerment, promote participatory decision-making, and foster trust. These results are especially beneficial for SMEs, where more individualised leadership dynamics are made possible by tight-knit teams and adaptable organisational structures. Servant leadership theory has been applied to the sustainability field in recent years, with the argument that its focus on community welfare and moral duty is consistent with environmental stewardship objectives (Barbuto & Wheeler, [2006](#)). By setting an example of moral behavior and cultivating a common vision for sustainability, servant leaders can have an impact on pro-environmental behavior (Hunter et al., [2013](#)). According to studies, servant leadership promotes environmental innovation, helps organizations adopt sustainable practices, and helps create a green organizational culture (Robertson & Barling, [2017](#)).

Because SMEs have fewer formal organizations and fewer resources, leadership is particularly critically important. Because of its developmental and participatory emphasis, servant leadership

is a good model for encouraging staff dedication and creativity in these kinds of businesses (Ling et al., [2008](#)). Even in the absence of official sustainability frameworks, servant leaders can successfully mobilise group activities towards environmental goals by empowering staff members and promoting their participation in decision-making. Research on servant leadership and environmental performance, particularly in emerging economies and SME environments, is still scarce despite the expanding corpus of literature. The ways that servant leadership affects environmental or green results have not been thoroughly examined experimentally in many studies. To gain a deeper understanding of this relationship between leadership and outcomes, it is necessary to investigate possible mediators including green absorptive capacity, green human resource practices, and environmental information sharing.

A crucial organizational skill, green absorptive capacity (GAC) is essential for small and medium-sized businesses (SMEs) looking to enhance their environmental performance through sustainability and innovation projects. GAC, which is defined as a company's capacity to get, absorb, transform, and utilize green knowledge, helps businesses to absorb outside environmental data and turn it into workable plans (Albort-Morant et al., [2018](#)). In environments with limited resources, such as developing economies, it is essential as a mediator between environmental innovation and green strategic orientation. Researchers like Zahoor and Gerged ([2021](#)) have shown that GAC greatly improves businesses' ability to convert green technologies into sustainable results by encouraging eco-innovations and ecologically conscious procedures. Furthermore, research has shown that supply chain cooperation and digital orientation can enhance GAC even further (Zhao & Liu, [2024](#)). GAC is a vital dynamic competence that enables businesses to successfully respond to environmental rules and stakeholder expectations in the context of SMEs, where formal frameworks for environmental management are frequently absent (Latip et al., [2022](#)). According to the research, GAC is a strategic enabler of long-term sustainability as well as a mediator, impacting external partnerships in green supply chains as well as internal practices like green human resource management (Jabbour et al., [2016](#)). Despite increased focus, there are still gaps in our knowledge of how GAC is applied in particular sectors and how institutional settings influence its efficacy.

By establishing minimum standards, encouraging green innovation, and enforcing compliance requirements, the regulatory framework significantly influences the sustainability and environmental behavior of businesses, especially SMEs. Environmental rules encourage businesses to adopt cleaner technology, lower emissions, and improve resource efficiency by acting as both enabling and coercive mechanisms (Porter & van der Linde, [1995](#)). Because they frequently lack established environmental management systems and have limited resources, SMEs are particularly affected by regulatory frameworks. According to the Porter Hypothesis, strict yet encouraging laws can foster innovation rather than stifle it.

Latip et al. ([2022](#)), for instance, discovered that environmental legislation has a favourable impact on SMEs' green absorptive ability, allowing them to innovate in response to policy demands. Similarly, Testa et al. ([2014](#)) emphasize that organizational qualities like green expertise and leadership commitment, when paired with regulatory pressure, improve environmental performance. Nevertheless, the effects of regulatory frameworks differ depending on the institutional setting and the nation. The efficacy of laws in developing economies such as Pakistan may be compromised by the lack of robust enforcement mechanisms and insufficient policy support (Khan & Rafique, [2022](#)). Moreover, SMEs often perceive environmental regulations as burdensome due to compliance costs and administrative complexities, unless accompanied by training, subsidies, or knowledge-sharing initiatives (Del Brío & Junquera, [2003](#)). Therefore, even while legislative frameworks are crucial for influencing environmental performance, their effectiveness is mostly dependent on the caliber of enforcement, institutional capability, and the availability of supplementary resources to encourage SME innovation and compliance.

As researchers examine how leadership philosophies impact sustainable organizational results, the connection between environmental performance and servant leadership has drawn more attention. According to Liden et al. (2008), servant leadership, which is defined by empathy, moral conduct, community stewardship, and an emphasis on follower development, establishes a foundation of motivation and culture that promotes ecologically conscious behavior among staff members. Servant leadership, as opposed to transactional or authoritarian leadership styles, encourages moral responsibility and intrinsic drive, both of which are critical for advancing pro-environmental efforts inside businesses (Eva et al., 2019).

According to empirical data, servant leaders have a major impact on their firms' environmental attitude. For example, Khan and Qureshi (2023) discovered a favorable correlation between green organizational citizenship behavior (GOCB) and servant leadership, which in turn affected industrial enterprises' environmental performance. Servant leaders can inspire workers to go beyond their designated job responsibilities and participate in sustainability measures like waste reduction, energy conservation, and eco-innovation by promoting shared vision, environmental mindfulness, and empowerment (Sousa & van Dierendonck, 2017). Additionally, according to Hunter et al. (2013), the moral and values-based character of servant leadership is in direct harmony with the objectives of corporate social responsibility, especially environmental sustainability.

Servant leadership is even more important in the context of small and medium-sized businesses (SMEs), which frequently lack official environmental management systems. SMEs frequently base their environmental initiatives on the personal beliefs and conduct of their CEOs (Jenkins, 2009). By encouraging knowledge exchange, setting an example of sustainability commitment, and fostering an environment-conscious culture, servant leaders in SMEs can serve as catalysts for green behavior (Ahmad et al., 2021). They are crucial in integrating environmental ideals into corporate culture, particularly when institutional or regulatory demands from outside sources are minimal.

According to the literature, servant leadership fosters moral, cooperative, and proactive environmental behaviors, which in turn improve environmental performance. Because of the significant influence that leadership values have on sustainability results in SME contexts, we suggested the following:

H1: *The servant leadership positively affects the environmental performance in the context of SMEs in Pakistan*

A key moderating factor in the impact of servant leadership on environmental performance in small and medium-sized businesses (SMEs) is the legal framework. Because external pressure matches their internal drive to serve society and protect the environment, servant leaders are more likely to push their organizations toward sustainable practices in environments with strict, transparent, and well-enforced environmental regulations (Testa et al., 2014). Regulatory measures that require adherence to environmental norms are naturally complemented by servant leadership characterised by moral conduct, empowerment, and a strong commitment to stakeholders (Eva et al., 2019).

By encouraging a culture of environmental responsibility among staff members, leaders with a servant orientation are more likely to not only adhere to environmental regulations but also to go above and beyond them (Liden et al., 2008). The absence of enforcement, however, can lessen the external incentives required to fully realize the promise of servant leadership in weak regulatory frameworks, as those typically present in many poor nations, like Pakistan (Khan & Rafique, 2022). Even well-meaning leaders may encounter resource-based or structural constraints in these situations, which hinder the successful adoption of sustainable policies. Research has indicated a boundary condition for leadership effectiveness in sustainability domains, demonstrating that

regulatory clarity and enforcement have a substantial impact on how leadership styles transfer into green outcomes (Aragón-Correa et al., [2008](#); Zada et al., [2025](#)).

In light of the opportunities and limitations faced by Pakistani SMEs, the legal framework thus serves as a crucial mediator, either enhancing or diminishing the impact of servant leadership on environmental performance. Thus, we put out our hypothesis.

H2: *The regulatory framework moderates the relationship between servant leadership and environmental performance in Pakistani SMEs.*

Scholarly interest in the function of green absorptive capacity (GAC) as a mediator between environmental performance and servant leadership is growing, especially in organisational behaviour that is focused on sustainability. Key pillars of absorptive ability are information sharing and organizational learning, which are fostered by servant leadership's emphasis on trust, empowerment, and personal development (Eva et al., [2019](#); Liden et al., [2008](#)). Leaders who practice servant leadership help staff members learn about and use the environment, which improves the company's capacity to identify, adopt, and capitalise on green technologies.

The dynamic ability of an organization to process external environmental knowledge and transform it into beneficial internal practices is known as "green absorptive capacity" (Chen et al., [2015](#); Zahra & George, [2002](#)). Building green absorptive capacity requires open communication, inter-functional coordination, and information integration, all of which are more likely to occur when servant leadership is present (Ahmad et al., [2021](#)). By allowing the company to embrace green technologies, adhere to environmental rules, and develop sustainable operations, this capability turns into a strategic asset in enhancing environmental performance.

The mediating function of GAC in the relationship between performance and leadership is supported by empirical research. For instance, Nicholson and Kurucz ([2019](#)) contend that care and development-focused leadership behaviours significantly improve businesses' capacity to absorb environmental knowledge, hence boosting their competitiveness and environmental responsiveness. Similarly, Aboelmaged and Hashem ([2019](#)) discovered that, especially in knowledge-intensive industries like manufacturing and SMEs, green absorptive capacity is a crucial conduit via which strategic leadership influences corporate environmental performance. GAC becomes even more important in developing nations like Pakistan, where resources for environmental knowledge may be scarce. By fostering a culture of continuous learning, investing in green training, and encouraging collaboration with stakeholders, servant leaders can serve as knowledge facilitators, strengthening GAC and enhancing environmental outcomes (Khan & Rafique, [2022](#)).

To summarize, by fostering a positive learning atmosphere, servant leadership enhances green absorptive capacity, which in turn significantly improves environmental performance.

H3: *Green absorptive capacity mediates the relationship between servant leadership and environmental performance in Pakistani SMEs.*

3 Methodology

3.1 Research Design and Approach

This study adopts a quantitative, cross-sectional survey design to investigate the effect of servant leadership on environmental performance, with green absorptive capacity (GAC) serving as a mediator and the regulatory framework acting as a moderator. A cross-sectional design is appropriate for obtaining empirical insights at a single point in time and is frequently used in organizational behavior and environmental sustainability studies (Creswell, [2014](#); Sarstedt et al., [2021](#)). The quantitative approach enables objective measurement and hypothesis testing, aligning with contemporary investigations into the role of leadership in green performance (Aboelmaged

& Hashem, [2019](#)).

3.2 Population, Sampling, and Data Collection

The study targeted managers, supervisors, and frontline staff employed in manufacturing SMEs operating in environmentally sensitive industries in Pakistan, including textiles, food processing, chemicals, and pharmaceuticals (Khan & Qureshi, [2023](#)). A purposive non-probability sampling strategy was employed due to its effectiveness in acquiring data from domain-specific respondents with managerial and operational insights (Ahmad et al., [2021](#); Bu et al., [2022](#)).

Using Krejcie and Morgan's (1970) sample size guidelines, a sample of 150 was targeted, yielding 148 valid responses post-screening. Sampling frames were derived from the Small and Medium Enterprises Development Authority (SMEDA) and regional chambers of commerce. Data collection employed a hybrid method involving face-to-face distribution and digital forms via Google Forms, minimizing non-response bias and increasing data accessibility (Podsakoff et al., [2003](#); Zahoor & Gerged, [2021](#)).

Informed consent was secured from all respondents, emphasizing voluntary participation and data confidentiality. This ethical protocol mitigated the risks of social desirability bias and aligned with standards for empirical organizational research (Tourangeau & Yan, [2007](#)).

3.3 Instrumentation

Measurement items were adapted from validated scales widely used in sustainability and leadership research:

- Servant Leadership was assessed using 14 items from Ehrhart (2004), focusing on stewardship, humility, and community-building dimensions.
- Green Absorptive Capacity (GAC) was measured using the multidimensional framework by Chen et al. ([2015](#)), covering knowledge acquisition, assimilation, transformation, and exploitation. Its application in SME research is well-established (Albort-Morant et al., [2018](#)).
- Environmental Performance included indicators from Awasthi et al. ([2010](#)) and Chiou et al. ([2011](#)), such as emissions reduction, waste management, and energy efficiency.
- Regulatory Framework was measured using a modified version of Leonidou et al. ([2017](#)), capturing regulatory clarity, stringency, and enforcement effectiveness—key aspects highlighted in institutional sustainability research (Latip et al., [2022](#); Li et al., [2022](#); Zada et al., [2025](#)).

All items were evaluated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). This format enhances measurement consistency and is frequently employed in behavioural sustainability research (Li et al., [2022](#); Singh et al., [2020](#)).

3.4 Data Analysis Technique

Data was processed using Microsoft Excel and analyzed via Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0. PLS-SEM is suitable for complex models with mediation and moderation, especially when data deviates from normality (Sarstedt et al., [2021](#); Sarstedt et al., [2021](#)).

A two-stage analysis was conducted:

- Measurement Model: Reliability was assessed using Cronbach's Alpha and Composite Reliability (CR); convergent validity via Average Variance Extracted (AVE); and discriminant validity using Fornell–Larcker and HTMT criteria (Henseler et al., [2015](#)).
- Structural Model: Hypotheses were tested via bootstrapping (5,000 samples), analyzing direct,

indirect, and moderating paths (Hayes, [2020](#)). Multicollinearity (VIF), R^2 , and model fit indicators (SRMR) were assessed to ensure robustness and explanatory strength (Sarstedt et al., [2021](#)).

This rigorous methodology conforms to best practices in empirical research on sustainability, leadership, and organizational behavior.

4 Results

A two-stage analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted, encompassing the measurement and structural models, as suggested by Hair et al. ([2011](#)) and Henseler et al. ([2015](#)). The measurement model focused on evaluating the reliability and validity of constructs through Confirmatory Factor Analysis (CFA), assessing convergent and discriminant validity (Henseler et al., [2015](#)). Composite reliability, which is regarded as superior to Cronbach's Alpha in structural modeling (Starkweather & Hames, [2012](#)), was used for reliability assessment.

Following Hair et al. ([2011](#)), item loadings were examined with a threshold of 0.50. All items exceeded this threshold, confirming the acceptable reliability of the items. As presented in Table 1, all constructions demonstrated composite reliability and factor loadings exceeding 0.70, supporting internal consistency.

Convergent validity was confirmed through Average Variance Extracted (AVE) values, all of which were above 0.50 (Fernandes et al., [2022](#); Sarstedt et al., [2021](#)). Specifically, AVE values of 0.611 (Servant Leadership), 0.739 (Regulatory Framework), 0.671 (Green Absorptive Capacity), and 0.716 (Environmental Performance) satisfied convergent validity criteria.

Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio as proposed by Henseler et al. ([2015](#)). Table 2 shows that most values fall below 0.90, which aligns with thresholds proposed by Gold et al. ([2001](#)) and Kline ([2011](#)). However, the proximity to this threshold necessitates caution and supports further validation, consistent with recommendations in recent sustainability leadership research (Zhao & Liu, [2024](#)).

4.1 Reliability and Convergent Validity

In alignment with best practices in structural equation modeling, this study assessed the measurement model's reliability and convergent validity using multiple criteria (Hair et al., [2011](#); Henseler et al., [2015](#)). Reliability was examined through Cronbach's Alpha, composite reliability (CR), and ρ_A , while convergent validity was assessed using indicator loadings and Average Variance Extracted (AVE).

As shown in Table 1, all item loadings exceeded the minimum threshold of 0.70, indicating strong individual reliability (Hair et al., [2011](#)). The Cronbach's Alpha values for all constructs ranged from 0.920 to 0.945, while CR and ρ_A values were all above 0.90, surpassing the recommended benchmark of 0.70 for internal consistency (Nunnally & Bernstein, [1994](#); Sarstedt et al., [2021](#)). These results confirm the high reliability of the measurement model.

In addition, AVE values for all constructs exceeded the critical value of 0.50, indicating that more than 50% of the variance in each construct is explained by its indicators (Fornell & Larcker, [1981](#)). Specifically, the AVE values were 0.611 for Servant Leadership, 0.739 for Regulatory Framework, 0.671 for Green Absorptive Capacity, and 0.716 for Environmental Performance. These findings support convergent validity, consistent with recent empirical research in sustainability and organizational behavior (Franke & Sarstedt, [2019](#)).

Collectively, these metrics confirm that the measurement model meets the reliability and convergent validity criteria necessary for evaluating structural models in Partial Least Squares

Structural Equation Modeling (PLS-SEM) contexts (Hult et al., [2022](#)).

Table 1: Reliability & Convergent Validity

Construct	Variable Item	Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Servant Leadership	SL1	0.767	0.942	0.944	0.949	0.611
	SL2	0.835				
	SL3	0.818				
	SL4	0.821				
	SL5	0.73				
	SL6	0.712				
	SL7	0.792				
	SL8	0.812				
	SL9	0.823				
	SL10	0.76				
	SL11	0.757				
	SL12	0.732				
	SL13	0.772				
	SL14	0.892				
Regulatory Framework	RF1	0.828	0.929	0.93	0.944	0.739
	RF2	0.879				
	RF3	0.847				
	RF4	0.903				
	RF5	0.871				
	RF6	0.827				
Green Absorptive Capacity	GAC1	0.733	0.945	0.946	0.953	0.671
	GAC2	0.833				
	GAC3	0.708				
	GAC4	0.769				
	GAC5	0.822				
	GAC6	0.822				
	GAC7	0.87				
	GAC8	0.89				
	GAC9	0.874				
	GAC10	0.851				

	EP1	0.903				
	EP2	0.888				
Environmental Performance	EP3	0.888	0.92	0.922	0.938	0.716
	EP4	0.773				
	EP5	0.761				
	EP6	0.853				

4.2 Discriminant Validity Assessment

Discriminant validity determines the extent to which a construction is truly distinct from other constructions in the structural model, both conceptually and empirically (Hair et al., [2011](#)). Ensuring discriminant validity is essential to confirm that each construct captures phenomena not represented by other variables in the model (Fornell & Larcker, [1981](#)).

This study employed the Heterotrait-Monotrait Ratio of Correlations (HTMT), which has gained prominence for its superior sensitivity in detecting discriminant validity issues compared to earlier criteria, such as the Fornell-Larcker test (Henseler et al., [2015](#)). As recommended by Clark and Watson ([2016](#)), Kline ([2011](#)), and Gold et al. ([2001](#)), HTMT values should generally remain below 0.85 or 0.90, depending on the research context.

As shown in Table 2, all HTMT values in the current study fall well below the conservative threshold of 0.90, with the highest value being 0.71, observed between Green Absorptive Capacity and Environmental Performance. These results confirm that the constructions are empirically distinct, thereby satisfying discriminant validity requirements (Franke & Sarstedt, [2019](#); Hult et al., [2022](#)). The findings are consistent with recent sustainability-focused PLS-SEM applications, which underscore the importance of HTMT for rigorous construct validation (Batra, [2025](#)).

Table 2: Heterotrait-Monotrait Ratio (HTMT)

	Environmental Performance	Green Absorptive Capacity	Regulatory Framework	Servant Leadership
Environmental Performance				
Green Absorptive Capacity	0.71			
Regulatory Framework	0.556	0.612		
Servant Leadership	0.559	0.697	0.635	

4.3 Path Analysis and Hypothesis Testing

Table 3 presents path coefficients derived through bootstrapping (5,000 samples). All hypothesized relationships were statistically supported. Servant Leadership had a significant direct effect on Environmental Performance ($\beta = 0.155$, $t = 1.819$, $p < 0.01$). The indirect effects through the Regulatory Framework ($\beta = 0.105$, $t = 1.853$, $p < 0.01$) and Green Absorptive Capacity ($\beta = 0.338$, $t = 5.806$, $p < 0.001$) were also significant, validating H2 and H3.

This section illustrates the relationships between the study variables. Table 3 provides an overview of the proposed relationships among the variables and presents the results of path analysis using SEM PLS. The findings reveal a significant relationship between Servant Leadership (SL) and Environmental Performance (EP) ($\beta = 0.155$, $t = 1.819$; LL = 0.457, UL = 0.682), thus confirming

the support for H1. Similarly, Servant Leadership, Regulatory Framework is also significantly associated with Environmental Performance (EP) ($\beta = 0.105$, $t = 1.853$; $LL = 0.56$, $UL = 0.674$), indicating support for H2.

Furthermore, the mediation role of Green Absorptive Capacity (GAC) between SL and EP ($\beta = 0.338$, $t = 5.806$; $LL = 0.278$, $UL = 0.436$) is also substantiated, covering all relevant parameters. Therefore, we can conclude that all our hypotheses are supported.

Table 3: Path Analysis

Hypothesis	Relation	Beta	SD	T value	P values	LL	UL	Decision
H1	SL -> EP	0.155	0.087	1.819	0.009	0.457	0.682	Supported
H2	SL.>RF->EP	0.105	0.055	1.853	0.006	0.56	0.674	Supported
H3	SL ->GAC->EP	0.338	0.058	5.806	0	0.278	0.436	Supported

4.4 Coefficient of Determination (R^2)

The model's explanatory power was assessed using R^2 values. As per Chin (1998) and Cohen (1988), an R^2 value of 0.26 indicates a strong effect. Our results show that the model explains 46% of the variance in Environmental Performance, indicating moderate predictive power (Hair et al., 2011; Henseler et al., 2015), as indicated in Table 4. Based on these standards, Chin (1998) states that an R^2 value of 0.25, 0.50, and 0.75 denotes a weak, moderate, and strong association, respectively.

Table 4: R-square of Constructs

Construct	R^2	Effect
Environmental Performance (EP)	0.46	Moderate

5 Discussion

This study examined the impact of servant leadership on environmental performance in Pakistani small and medium-sized enterprises (SMEs), with a specific focus on the mediating role of Green Absorptive Capacity (GAC) and the moderating role of the regulatory framework. The findings offer valuable theoretical and empirical insights into the interaction between internal leadership capabilities and external institutional mechanisms, facilitating sustainable practices in resource-constrained environments.

Consistent with prior studies (Eva et al., 2019; Liden et al., 2008), the results confirmed that servant leadership significantly contributes to improved environmental performance. Servant leaders foster ethical conduct, long-term vision, and empowerment, all of which are conducive to environmental stewardship. This leadership style appears particularly valuable in settings like Pakistan, where formal sustainability infrastructure and institutional support may be weak (Khan & Rafique, 2022). By nurturing a shared vision and intrinsic motivation among employees, servant leaders catalyze environmentally responsible behaviors such as reduced emissions, efficient resource use, and the adoption of green technologies (Li et al., 2022).

The study further established that GAC partially mediates the relationship between servant leadership and environmental performance. This aligns with the resource-based view (RBV), which posits that firms equipped with environmental knowledge and learning capacities are better positioned to implement sustainable practices (Chen et al., 2015). Servant leaders cultivate a learning culture and facilitate information sharing, thereby enhancing employees' capacity to acquire, assimilate, and exploit environmental knowledge (Aboelmaged & Hashem, 2019; Zahoor & Gerged, 2021). GAC thus acts as a strategic capability that translates leadership intent into operational green outcomes, especially critical in SMEs where technical and financial resources are often limited (Akhtar et al., 2024).

In addition, the study confirms the moderating role of the regulatory framework, showing that

servant leadership exerts a stronger influence on environmental performance when regulatory policies are perceived as clear and strictly enforced. This supports institutional theory, which emphasizes that external institutional conditions shape how internal organizational behaviors affect performance outcomes (Testa et al., 2014; Zada et al., 2025). Where environmental regulation is stringent and predictable, servant leaders are more likely to align moral obligations with institutional demands, resulting in enhanced compliance and improved green outcomes (Bu et al., 2022; Li et al., 2022).

These findings underscore that leadership alone is not sufficient in isolation. Institutional reinforcement, through clear environmental regulations, enforcement mechanisms, and incentive systems, is critical for amplifying the effects of values-based leadership in emerging markets.

5.1 Theoretical and Practical Implications

This research contributes to leadership and sustainability literature by introducing a multi-level framework that integrates servant leadership, GAC, and regulatory context. Theoretically, it advances the RBV by demonstrating how intangible assets such as environmental learning and absorptive capacity serve as critical internal capabilities for achieving sustainability objectives (Franke & Sarstedt, 2019). It also builds upon institutional theory, showing that environmental performance is shaped not only by firm-level practices but also by regulatory environments that facilitate or constrain action (Hult et al., 2022).

Practically, the study offers several key insights:

- **Leadership Development:** SME-focused leadership training programs should go beyond technical skills to include ethical decision-making, team empowerment, and stakeholder orientation, all of which are hallmarks of servant leadership. These behaviors can create a supportive internal environment for sustainability transformation.
- **Investment in Green Knowledge Systems:** Policymakers and SME owners should prioritize the development of green knowledge infrastructures such as training programs, collaborative platforms, and environmental audits. Strengthening GAC helps bridge the gap between leadership intentions and environmental action (Aboelmaged & Hashem, 2019).
- **Regulatory Reform and Incentivization:** Government agencies must develop transparent, enforceable environmental policies and introduce reward mechanisms such as green tax credits or certification programs. These measures enhance external accountability and complement leadership-driven sustainability (Zada et al., 2025).

Together, these implications suggest that organizational, cognitive, and institutional capacities must co-evolve to enable SMEs to transition toward sustainability.

5.2 Future Research Directions

While this study contributes novel insights into the intersection of leadership, knowledge capability, and regulation, several areas warrant further investigation:

- **Expanded Mediators:** Future studies could explore additional mediating mechanisms such as eco-innovation, green organizational culture, or employee environmental engagement, offering more profound insight into how leadership influences sustainability pathways.
- **Cross-Country Comparisons:** Given the contextual nature of institutional environments, replicating this model across other emerging or developing economies would allow researchers to examine how contextual variables influence the leadership–performance nexus.
- **Longitudinal and Mixed-Method Designs:** The current study's cross-sectional design limits causal inference. Longitudinal or mixed-method approaches could capture dynamic changes

in leadership practices and environmental capabilities over time.

- **Policy Instrument Effects:** Future research could disaggregate the regulatory framework to examine the effects of specific instruments, such as subsidies, green procurement, or environmental auditing schemes, on organizational sustainability.
- **Technological Moderators:** As digital transformation accelerates, investigating how green digital technologies and Industry 4.0 tools interact with leadership behaviors to affect environmental outcomes could yield timely and relevant insights.

These avenues would not only enrich academic understanding but also offer practical guidance for SME transformation under sustainability mandates.

Conflict of Interest

The author declares no financial or non-financial conflicts of interest related to the content of this manuscript.

Data Availability Statement

The data used in this study are available from the corresponding author upon reasonable requests.

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