JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

GREEN INCLUSIVE LEADERSHIP AND SUSTAINABLE PERFORMANCE IN MANUFACTURING SMES: THE SERIAL MEDIATING AND THE MODERATING ROLE OF GREEN ORGANIZATIONAL CULTURE

Tahreem Nasir[1], Shumaila Naz[2*], Ambreen Jabeen Shah[3]

[1]*Lahore Business School, The University of Lahore, Lahore 54792, Pakistan*
[*2]*Department of Management, Dr. Hassan Murad School of Management, University of Management and Technology, Lahore 54770, Pakistan*
[3]*Lahore Business School, The University of Lahore, Lahore 54792, Pakistan*

[1]tahreemnasir22@gmail.com, [*2]shumaila.naz@umt.edu.pk, [3]ambreen.jabeen@lbs.uol.edu.pk

DOI: https://doi.org/10.5281/zenodo.23560614

Keywords
Green inclusive leadership; Green knowledge sharing; Green innovation capability; Green organizational culture; Sustainable performance; Manufacturing SMEs; PLS-SEM

Article History
Received: *25 July 2026*
Accepted: *26 September 2026*
Published: 22 October 2026

Copyright @Author
Corresponding Author: * Shumaila Naz

Abstract

Manufacturing small and medium-sized enterprises (SMEs) are under growing pressure to improve their economic, environmental and social performance, yet little is known about how leadership is converted into these outcomes. Drawing on the Natural Resource-Based View and Social Learning Theory, this study examines whether green inclusive leadership (GIL) improves sustainable performance through green knowledge sharing (GKS) and green product and process innovation capabilities, and whether green organizational culture (GOC) strengthens the effect of GIL on GKS. Two-wave survey data were collected from 292 employees and managers of 33 manufacturing SMEs in Lahore, Faisalabad, Islamabad and Sialkot, Pakistan, and analysed using partial least squares structural equation modelling (PLS-SEM). GIL was positively related to GKS and directly related to environmental and social performance, but not to economic performance. GKS was positively related to both innovation capabilities and to all three performance dimensions. Green product innovation capability predicted economic, environmental and social performance, whereas green process innovation capability predicted environmental performance only. GKS mediated the effect of GIL on all three performance dimensions, and the serial path from GIL through GKS and innovation capability was supported for economic performance (via product innovation capability) and environmental performance (via both capabilities). GOC was positively related to GKS but did not moderate the GIL–GKS relationship (β = .022, p = .657) or the serial indirect effects. The findings show that green leadership creates value in SMEs mainly by mobilizing knowledge and building innovation capability, and that its benefits differ across the dimensions of sustainable performance.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

1. Introduction

Manufacturing small and medium-sized enterprises (SMEs) face rising climate risks, tighter environmental regulation and changing stakeholder expectations, which have placed sustainability at the centre of their strategic agenda. Although these firms account for a substantial share of material consumption, energy use, waste generation and emissions, many lack the financial resources, knowledge and routines needed to implement environmentally responsible practices (Pham & Vu, 2025). Understanding how manufacturing SMEs translate environmental intentions into economic, environmental and social outcomes is therefore an important question for both research and practice (Ali et al., 2021; Al-Hakimi et al., 2022; Junejo et al., 2025).

Sustainable performance extends beyond financial results to include economic, environmental and social outcomes. For manufacturing SMEs, it encompasses competitiveness and profitability as well as resource efficiency, reductions in waste and emissions, and improvements in employee and community well-being. Prior studies show that sustainable manufacturing practices, green innovation, knowledge processes and organizational culture can enhance SME sustainability outcomes (Ali et al., 2021; Al-Hakimi et al., 2022; Junejo et al., 2025; Raza et al., 2025), and Ye et al. (2022) demonstrate that green strategic orientation affects economic, environmental and social performance jointly rather than any single dimension. However, it remains unclear how leadership behaviour is translated into these multidimensional outcomes. Leaders can communicate environmental priorities, but improvement requires internal capabilities that turn environmental information into products, processes and routines.

Green inclusive leadership (GIL) offers a promising starting point for explaining this transition. GIL is a participative, open and accessible leadership style focused on environmental issues: green inclusive leaders encourage employees to propose green ideas, are available when environmental problems arise and involve employees in green decision-making. Bhutto et al. (2021) established GIL as a distinct leadership approach that stimulates employees' green creativity, and subsequent studies have linked GIL to green creativity (Dinibutun, 2024), green knowledge sharing and green innovation (Zhang et al., 2025), sustainable performance (Samo et al., 2024) and sustainable competitive advantage (Siddiquei et al., 2025). These studies suggest that the effects of GIL are largely indirect: leadership creates the conditions in which other strategic resources develop.

Green knowledge sharing (GKS) is one such resource. Environmental knowledge is dispersed among production workers, supervisors, engineers, quality and supply-chain staff, managers and external stakeholders, and potential sustainability solutions remain unused unless this knowledge is exchanged and recombined. GKS refers to the exchange of environmentally relevant experience, information, expertise and practices among employees, functions and units. Prior research shows that GKS improves green performance and innovation and that leadership is an important enabler of such exchange (Saleem et al., 2024; Zhang et al., 2025; Junejo et al., 2025). Almeida and Okon (2026) further show that GKS is directly related to the organizational performance of SMEs.

Knowledge sharing, however, does not automatically produce innovation. Manufacturing SMEs must also be able to apply environmental knowledge to product design, material selection, process efficiency, waste reduction, recycling, energy use and cleaner production. Green innovation capability (GIC) captures this ability to translate environmental knowledge and competencies into green product and process innovation (Chen, 2008; Borah et

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

al., 2023). Firms may possess knowledge but lack the capability to use it effectively, and SME evidence indicates that green innovation is a key mechanism linking green practices and knowledge resources to sustainable performance (Al-Hakimi et al., 2022; Junejo et al., 2025; Zairbani & Senthil Kumar, 2025).

This study integrates these arguments through the Natural Resource-Based View (NRBV; Hart, 1995), which holds that firms gain advantage by developing capabilities for pollution prevention, product stewardship and sustainable development. From this perspective, GIL is a managerial resource that mobilizes employees, GKS is a knowledge resource created through interaction, and GIC is an organizational capability that converts knowledge into concrete environmental improvement. At the employee level, Social Learning Theory (Bandura, 1977) explains why employees who observe visible green leadership cues are more likely to share environmental knowledge. Together, these perspectives suggest a sequential process of resource transformation rather than a direct, automatic link between leadership and performance.

A further question concerns the organizational context in which this process unfolds. Green organizational culture (GOC) refers to the shared environmental values, norms, assumptions and expectations within an organization. A strong GOC may reinforce leaders' environmental cues by lending legitimacy to sustainability-related behaviour, and prior studies identify GOC as an important element of SME sustainability models and a catalyst for green innovation and sustainable performance (Wang et al., 2022; Al-Hakimi et al., 2022; Raza et al., 2025). It is less clear whether GOC strengthens the capacity of GIL to stimulate GKS. Examining this boundary condition matters because culture and leadership may act either as complements or as substitute sources of environmental guidance.

Accordingly, this study examines whether GKS and GIC serially mediate the relationship between GIL and sustainable performance in Pakistani manufacturing SMEs, and whether GOC moderates the first stage of this process. Pakistan provides a relevant setting because its manufacturing SMEs, many of which are concentrated in industrial centres such as Lahore, Faisalabad and Sialkot, must respond to growing environmental expectations while operating with limited resources. The study makes three contributions. First, it develops and tests an NRBV-based sequence that links a managerial resource, a knowledge resource and innovation capabilities to economic, environmental and social performance, rather than treating these resources as parallel predictors. Second, it extends GIL research beyond proximal outcomes such as creativity and innovation to the firm-level outcome of sustainable performance, and distinguishes between product and process innovation capabilities. Third, it tests whether GOC is a boundary condition of the GIL–GKS relationship and of the resulting serial indirect effects, clarifying when environmental leadership is most likely to activate green knowledge processes.

2. Theoretical Framework and Hypotheses Development

2.1 Natural Resource-Based View and Social Learning Theory

The NRBV extends the resource-based view by arguing that the resources and capabilities firms develop are shaped by environmental constraints and opportunities (Hart, 1995). Rather than treating sustainability as a compliance requirement, the NRBV emphasizes the organizational capabilities needed for pollution prevention, product stewardship and sustainable development. The theory is appropriate for this study because the model links a managerial resource (GIL), a knowledge resource (GKS), innovation capabilities (GIC), a cultural resource (GOC) and multidimensional sustainable

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

performance. The NRBV also implies that the value of a green resource often depends on how it activates, and combines with, other organizational resources.

Social Learning Theory provides a complementary explanation at the employee level. Employees observe leaders' behaviour, infer which behaviours are valued and adjust their own behaviour accordingly (Bandura, 1977). When leaders visibly champion environmental issues, involve employees and remain available to discuss environmental questions, they signal that environmental knowledge and problem-solving are genuinely important. In this study, Social Learning Theory explains the behavioural link from GIL to GKS, while the NRBV explains how knowledge sharing and innovation capability contribute to sustainable organizational outcomes.

2.2 Green Inclusive Leadership and Sustainable Performance

GIL can support sustainable performance because inclusive leadership directs organizational attention and effort towards resource conservation, cleaner production, responsible decision-making and environmental problem-solving. From an NRBV perspective, the value of leadership lies in its ability to mobilize environmental resources efficiently. This is particularly relevant in manufacturing SMEs, where formal sustainability systems are often underdeveloped and managerial behaviour directly shapes the priority employees give to environmental issues. Samo et al. (2024) found that GIL positively affects sustainable performance through employees' innovative behaviour. Using manufacturing-sector data and an NRBV framework, Siddiquei et al. (2025) showed that top management's GIL is associated with sustainable competitive advantage, and Zhang et al. (2025) showed that GIL drives green innovation in SMEs. Together, these results suggest that GIL can improve economic, environmental and social outcomes by engaging employees and organizational practices around sustainability.

H1: Green inclusive leadership has a positive effect on the sustainable performance of manufacturing SMEs.

2.3 Green Inclusive Leadership and Green Knowledge Sharing

Effective GKS depends not only on the availability of environmental knowledge but also on employees' willingness to share it. Green inclusive leaders foster this willingness by creating openness, accessibility and psychological permission to discuss environmental issues. When leaders listen to green ideas, involve staff in green decisions and respond constructively to environmental suggestions or mistakes, employees perceive lower interpersonal risk in sharing knowledge. Social Learning Theory further implies that employees emulate behaviours that leaders model and reward (Bandura, 1977). Empirically, Zhang et al. (2025) found that GIL is positively and significantly related to GKS in SMEs and that GKS links GIL with green innovation, indicating that leadership works by activating knowledge resources rather than by shaping outcomes directly.

H2: Green inclusive leadership has a positive effect on green knowledge sharing.

2.4 Green Knowledge Sharing and Green Innovation Capability

Developing GIC requires firms to integrate information on materials, technologies, production methods, environmental regulation, customer needs, waste management, emissions and resource consumption. GKS makes such dispersed knowledge available across the organization. Exchanging environmental experience and know-how enables knowledge recombination, the discovery of new solutions and faster organizational learning. The NRBV suggests that knowledge resources create more value when they are integrated into capabilities

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

that enable environmental action. Zhang et al. (2025) report positive effects of GKS on green innovation, Saleem et al. (2024) show that GKS supports green performance through creativity-related mechanisms, and the broader green innovation literature highlights the capability to access and integrate environmental knowledge (Borah et al., 2023). Because GIC comprises product and process dimensions, H3 is tested separately for each (H3a: product; H3b: process).

H3: Green knowledge sharing has a positive effect on green innovation capability.

2.5 Green Knowledge Sharing and Sustainable Performance

GKS can also influence sustainable performance directly, because environmental information can improve operating decisions even before it is formalized into innovation capability. Sharing best practices can reduce waste, improve energy efficiency, strengthen environmental compliance, accelerate problem-solving and diffuse responsible practices across functions. These effects may lower operating costs while improving environmental and social outcomes. Junejo et al. (2025) found that GKS contributes positively to sustainable performance among Pakistani SMEs, Zairbani and Senthil Kumar (2025) report a positive relationship between GKS and sustainable business performance, and Almeida and Okon (2026) confirm the relevance of GKS for SME organizational performance in a cross-country setting.

H4: Green knowledge sharing has a positive effect on the sustainable performance of manufacturing SMEs.

2.6 Green Innovation Capability and Sustainable Performance

GIC is the capacity to transform environmental knowledge into products and processes. Green product innovation capability supports recyclable design, less harmful materials, product efficiency and market differentiation, whereas green process innovation capability reduces waste, emissions, energy consumption and material intensity and improves production efficiency. These outcomes link GIC closely to economic, environmental and social performance. Al-Hakimi et al. (2022) show that green innovation transmits the effect of green manufacturing practices to sustainable performance in SMEs, Junejo et al. (2025) identify green innovation as an important predictor and mediator of SME sustainable performance, and Zairbani and Senthil Kumar (2025) demonstrate that green innovation mediates the relationship between GKS and sustainable business performance.

H5: Green innovation capability has a positive effect on the sustainable performance of manufacturing SMEs.

2.7 Mediating Role of Green Knowledge Sharing

A direct effect of GIL on sustainable performance does not explain how leadership is converted into organizational outcomes. The NRBV suggests that managerial resources generate greater value when they mobilize complementary resources. GKS provides one such mechanism: GIL creates an inclusive environmental climate, employees respond by exchanging green knowledge, and the resulting knowledge base improves sustainability-related decisions and practices. Zhang et al. (2025) established GKS as a mediator between GIL and green innovation, and Junejo et al. (2025) demonstrated that GKS mediates sustainability-related relationships in SMEs. Extending these findings, this study proposes that GKS transmits part of the influence of GIL to sustainable performance.

H6: Green knowledge sharing mediates the positive relationship between green inclusive leadership and sustainable performance.

2.8 Mediating Role of Green Innovation Capability

Knowledge resources are most likely to produce sustainable outcomes when firms possess the

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

capability to exploit them. GKS increases access to environmental ideas and expertise, while GIC determines whether those ideas are transformed into cleaner products, technologies and processes. This resource-to-capability conversion is consistent with the NRBV. Zairbani and Senthil Kumar (2025) provide direct evidence that green innovation mediates the relationship between GKS and sustainable business performance, and Al-Hakimi et al. (2022) show that green innovation links green manufacturing practices with corporate sustainable performance. GIC should therefore explain part of the pathway through which shared green knowledge contributes to sustainability outcomes.

H7: Green innovation capability mediates the positive relationship between green knowledge sharing and sustainable performance.

2.9 Serial Mediation of Green Knowledge Sharing and Green Innovation Capability

The central proposition of the model is that GIL is transformed in two steps, first into GKS and then into GIC. GIL establishes managerial conditions that make the exchange of environmental knowledge legitimate and psychologically safe; GKS then makes dispersed environmental knowledge available for combination and use; and GIC translates that knowledge into innovative products and processes that enhance sustainable performance. This sequence goes beyond single-mediator explanations by showing how a leadership resource becomes a knowledge resource and subsequently an innovation capability. Zhang et al. (2025) provide evidence for the GIL–GKS–green innovation segment of this chain, Siddiquei et al. (2025) show that GIL can operate through sequential organizational capabilities, and Junejo et al. (2025) demonstrate the relevance of both GKS and green innovation for SME sustainable performance. Evidence from an adjacent context is also consistent with this logic: Zada et al. (2025) found that green knowledge sharing sequentially transmits the effect of ecocentric leadership to organizational green innovation.

H8: Green knowledge sharing and green innovation capability sequentially mediate the positive relationship between green inclusive leadership and sustainable performance.

2.10 Moderating Role of Green Organizational Culture

The effect of GIL on GKS may depend on the wider environmental values of the firm. GOC reflects the shared values, norms and expectations regarding environmental responsibility that guide everyday organizational life. When GOC is strong, employees receive consistent environmental signals from leaders and from the organizational context, which may increase the credibility of GIL and strengthen employees' willingness to share green knowledge. Wang et al. (2022) show that organizational green culture moderates the relationship between green knowledge management and green innovation. Al-Hakimi et al. (2022) find that GOC strengthens the relationship between green manufacturing practices and the sustainable performance of SMEs, and Raza et al. (2025) identify GOC as a contextual factor in the relationship between sustainable leadership and sustainable performance among Pakistani manufacturing SMEs. In agricultural SMEs, Simmou et al. (2025) similarly show that organizational culture and leadership jointly foster green knowledge sharing and, in turn, green innovation. GOC is therefore expected to strengthen the relationship between GIL and GKS.

H9: Green organizational culture positively moderates the relationship between green inclusive leadership and green knowledge sharing, such that the relationship is stronger when green organizational culture is high.

Because a moderator located at the first stage of a mediation chain can shift the strength of the

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

entire downstream indirect pathway, the study also tests whether GOC conditions the serial indirect effect itself, using the index of moderated mediation.

H10: Green organizational culture moderates the serial indirect effect of green inclusive leadership on sustainable performance through green knowledge sharing and green innovation capability, such that the indirect effect is stronger when green organizational culture is high.

Because the model treats green innovation capability as two constructs (product and process) and sustainable performance as three dimensions (economic, environmental and social), the hypotheses are tested at the dimension level: H1a–H1c refer to the effects of GIL on economic, environmental and social performance; H3a–H3b to the effects of GKS on green product and process innovation capability; H4a–H4c to the effects of GKS on the three performance dimensions; H5a–H5c to the effects of green product innovation capability on the three performance dimensions; and H5d–H5f to the effects of green process innovation capability on the three performance dimensions. H6–H8 and H10 are assessed for the corresponding dimension-specific indirect paths. Figure 1 presents the conceptual framework.

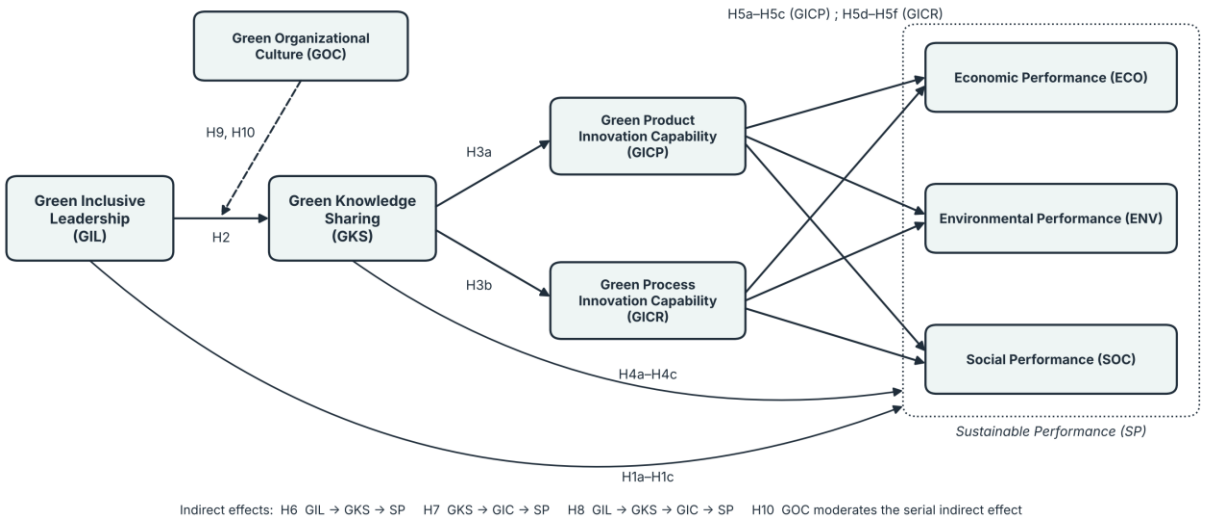


Figure 1. Conceptual framework

3. Methodology

3.1 Research Design

This study used a quantitative, explanatory design based on a two-wave, time-lagged survey of employees and managers in Pakistani manufacturing SMEs. To reduce common method bias through temporal separation (Podsakoff et al., 2024), the predictor and moderator were measured before the mediators and outcomes. In Wave 1 (Time 1, May 2026), respondents rated green inclusive leadership and green organizational culture and provided demographic and firm information. In Wave 2 (Time 2, July 2026), the same respondents rated green knowledge sharing, green product and process innovation capability, and economic, environmental and social performance. Each respondent was assigned a unique code in Wave 1, and responses from the two waves were matched using this code together with the respondent's phone number. The questionnaires

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

were administered in English, both in person and through Google Forms.

3.2 Population, Sampling and Sample Size

The target population comprised owners, managers, supervisors, executives and experienced employees of manufacturing SMEs in sectors such as textiles, food processing, chemicals, plastics, leather, engineering and allied manufacturing. Data were collected from firms located in four major industrial and commercial cities of Pakistan: Lahore, Faisalabad, Islamabad and Sialkot. Respondents were recruited through purposive sampling, using organizational access to the participating firms. In Wave 1, 315 questionnaires were collected, and the Wave 2 questionnaire was distributed to all 315 Wave 1 respondents. After the two waves were matched and screened, 23 cases were removed: nine with incomplete responses, six that could not be matched across the two waves, and eight showing careless response patterns (identical answers to all items or outlying response profiles). The final matched sample comprised 292 respondents (92.7% of Wave 1 respondents) from 33 manufacturing SMEs, with an average of seven to nine respondents per firm. The respondent and firm profile is reported in Table 2.

Sample adequacy was assessed with the inverse square root method (Kock & Hadaya, 2018), under which the minimum sample size at a 5% significance level and 80% power is $(2.486/|\beta min|)^2$. With N = 292, the sample is sufficient to detect path coefficients of approximately .15 or larger (minimum required n = 275 for βmin = .15). Because purposive sampling was used, the findings should be generalized with caution beyond the sampled firms.

3.3 Measures

All substantive constructs were measured with 34 items adapted from established scales and rated on five-point Likert scales (1 = strongly disagree, 5 = strongly agree). Green inclusive leadership was measured with three items adapted from Bhutto et al. (2021), selected as the items most relevant to the manufacturing SME context. Green knowledge sharing was measured with five items adapted from Saleem et al. (2024). Green product innovation capability and green process innovation capability were each measured with four items adapted from Chen (2008) and Borah et al. (2023). Green organizational culture was measured with seven items adapted from Wang et al. (2022). Economic, environmental and social performance were measured with three, four and four items, respectively, adapted from Ali et al. (2021). Table 1 summarizes the constructs, number of items and sources.

Table 1. Constructs, number of items and sources

Construct	Code	Items	Primary source
Green Inclusive Leadership	GIL	3	Bhutto et al. (2021)
Green Knowledge Sharing	GKS	5	Saleem et al. (2024)
Green Product Innovation Capability	GICP	4	Borah et al. (2023); Chen (2008)
Green Process Innovation Capability	GICR	4	Borah et al. (2023); Chen (2008)
Green Organizational Culture	GOC	7	Wang et al. (2022)
Economic Sustainable Performance	SPE	3	Ali et al. (2021)
Environmentally Sustainable Performance	SPENV	4	Ali et al. (2021)
Social Sustainable Performance	SPSOC	4	Ali et al. (2021)
Total		34	

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

3.4 Pilot Testing, Ethics and Procedural Remedies

Before the main survey, the questionnaire was pilot tested with 53 respondents from the target population, and the results of the pilot were consistent with those obtained in the main study. Demographic and firm characteristics (gender, age, education, position, tenure, industry, firm size and firm age) were collected to describe the sample and were not included as predictors in the structural model. The study was approved by the institutional review and ethics committee (approval no. 13632). Participation was voluntary, and written informed consent was obtained from all respondents before data collection. Respondents were assured that their answers would remain confidential, that the matching codes and phone numbers would be used only to link the two waves, and that results would be reported only in aggregate form. Together with the temporal separation of predictor and outcome measures, these assurances were intended to reduce evaluation apprehension and socially desirable responding (Podsakoff et al., 2024).

3.5 Data Analysis

The data were analysed using partial least squares structural equation modelling (PLS-SEM) in SmartPLS 4. PLS-SEM was chosen because the study is prediction-oriented and the model is complex, comprising eight constructs, serial mediation and moderation, which PLS-SEM estimates efficiently with moderate sample sizes (Hair et al., 2021; Hair & Alamer, 2022; Becker et al., 2023). The analysis followed two stages. First, the measurement model was assessed through indicator loadings, indicator collinearity (VIF), internal consistency reliability (Cronbach's α, rho_A and composite reliability), convergent validity (AVE) and discriminant validity (HTMT, the Fornell–Larcker criterion and cross-loadings). Second, the structural model was assessed through path coefficients, f^2, R^2, PLSpredict and the standardized root mean square residual (SRMR) (Hair et al., 2021; Shmueli et al., 2019). Significance was tested by bootstrapping with 5,000 resamples (two-tailed, 95% percentile confidence intervals); HTMT confidence intervals were based on 2,000 resamples. Green product and process innovation capability and the economic, environmental and social performance dimensions were modelled as separate constructs. To test H9, GOC and a GIL × GOC interaction term were entered as predictors of GKS. For indirect and conditional indirect effects, inferences were based on the 95% percentile bootstrap confidence intervals, because products of coefficients typically have asymmetric sampling distributions, for which confidence intervals are more accurate than normal-theory p-values (Preacher & Hayes, 2008). Mediation types were classified following Zhao et al. (2010). Common method bias was examined with the full collinearity VIF approach (Kock, 2015) and Harman's single-factor test.

4. Results

4.1 Descriptive Statistics

Table 2 presents the respondent and firm profile. Most respondents were male (64.7%), aged 31–40 years (38.4%) and held a bachelor's (40.1%) or master's degree (37.3%). The sample included owners (14.7%), managers (30.5%), supervisors or executives (34.9%) and employees (19.9%), most of whom had six or more years of tenure (57.6%). Textiles was the largest industry (28.4%), followed by food processing (16.8%) and engineering (15.1%), and respondents were drawn from Lahore (38.4%), Faisalabad (28.4%), Sialkot (17.5%) and Islamabad (15.8%). Most respondents worked in firms with 51–250 employees (83.2%) that had been operating for at least five years (87.0%). Table 3 presents construct-level descriptive statistics and correlations.

Table 2. Respondent and firm profile (N = 292)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	189	64.7

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Characteristic	Category	Frequency (n)	Percentage (%)
	Female	103	35.3
Age (years)	20–30	68	23.3
	31–40	112	38.4
	41–50	79	27.1
	Above 50	33	11.3
Education	Intermediate or below	29	9.9
	Bachelor's degree	117	40.1
	Master's degree	109	37.3
	MPhil/PhD	37	12.7
Position	Owner	43	14.7
	Manager	89	30.5
	Supervisor/Executive	102	34.9
	Employee	58	19.9
Tenure (years)	Less than 3	48	16.4
	3–5	76	26.0
	6–10	105	36.0
	More than 10	63	21.6
Industry	Textiles	83	28.4
	Food processing	49	16.8
	Chemicals	35	12.0
	Plastics	32	11.0
	Leather	27	9.2
	Engineering	44	15.1
	Other	22	7.5
City	Lahore	112	38.4
	Faisalabad	83	28.4
	Islamabad	46	15.8
	Sialkot	51	17.5
Firm size (employees)	1–50	49	16.8
	51–100	79	27.1
	101–150	91	31.2
	151–250	73	25.0
Firm age (years)	Less than 5	38	13.0
	5–10	83	28.4
	11–20	109	37.3
	More than 20	62	21.2

Note. Percentages may not total 100 because of rounding.

Table 3. Descriptive statistics and latent variable correlations

Construct	Items	M	SD	Skew	Kurt	1	2	3	4	5	6	7	8
1. GIL	3	2.99	0.92	0.02	−0.71	—							
2. GOC	6	2.99	0.93	−0.01	−0.80	.10	—						
3. GKS	5	3.00	0.90	0.01	−0.61	.37	.32	—					

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Construct	Items	M	SD	Skew	Kurt	1	2	3	4	5	6	7	8
4. GICP	4	2.99	0.94	−0.04	−0.79	.19	.16	.37	–				
5. GICR	4	2.99	0.87	−0.08	−0.62	.20	.20	.43	.46	–			
6. ECO	3	3.00	0.92	0.03	−0.65	.15	.28	.31	.28	.26	–		
7. ENV	4	3.01	0.88	0.09	−0.56	.26	.18	.35	.31	.31	.42	–	
8. SOC	4	3.01	0.92	0.14	−0.66	.30	.21	.35	.28	.27	.36	.41	–

Note. N = 292. Means are averages of item scores on 1–5 scales. Skew = skewness; Kurt = excess kurtosis. Correlations are between PLS latent variable scores; $|r| \geq .12$ is significant at $p < .05$. GIL = green inclusive leadership; GOC = green organizational culture; GKS = green knowledge sharing; GICP = green product innovation capability; GICR = green process innovation capability; ECO, ENV, SOC = economic, environmental and social performance.

Table 3 shows that construct means range from 2.99 to 3.01 on the five-point scales, with standard deviations between 0.87 and 0.94, indicating responses distributed around the scale midpoint with adequate variability. Skewness (−0.08 to 0.14) and kurtosis (−0.80 to −0.56) are small. All correlations are positive and in the expected directions; for example, GIL is correlated with GKS (r = .37), and green product and process innovation capability are correlated with each other (r = .46). No correlation exceeds .50, which provides initial evidence that the constructs are empirically distinct.

4.2 Measurement Model

Table 4. Outer loadings and indicator collinearity

Construct	Item	Loading	VIF
Green inclusive leadership	GIL1	0.539	1.088
	GIL2	0.802	1.229
	GIL3	0.810	1.230
Green organizational culture	GOC2	0.781	1.806
	GOC3	0.764	1.852
	GOC4	0.770	1.890
	GOC5	0.528	1.130
	GOC6	0.784	1.896
	GOC7	0.803	1.874
	GOC1 (removed)	0.436	–
Green knowledge sharing	GKS1	0.753	1.536
	GKS2	0.735	1.469
	GKS3	0.740	1.459
	GKS4	0.589	1.271
	GKS5	0.793	1.579
Green product innovation capability	GICP1	0.789	1.544
	GICP2	0.786	1.508
	GICP3	0.621	1.241
	GICP4	0.816	1.603
Green process innovation capability	GICR1	0.592	1.123
	GICR2	0.752	1.369

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

	GICR3	0.747	1.416
	GICR4	0.747	1.320
Economic performance	SPE1	0.881	1.244
	SPE2	0.708	1.169
	SPE3	0.547	1.136
Environmental performance	SPENV1	0.851	1.573
	SPENV2	0.848	1.559
	SPENV3	0.405	1.102
	SPENV4	0.651	1.255
Social performance	SPSOC1	0.784	1.462
	SPSOC2	0.820	1.565
	SPSOC3	0.753	1.453
	SPSOC4	0.645	1.270

Note. GOC1 (loading = .436) was removed. Indicators with loadings between .40 and .70 were retained because the composite reliability and AVE of their constructs met the recommended thresholds (Hair et al., 2021). All VIF values < 3.3.

Table 4 presents the outer loadings and indicator VIFs. Most loadings exceed the recommended value of .708. Six indicators have loadings between .40 and .70: GIL1 (.539), GOC5 (.528), GKS4 (.589), GICR1 (.592), SPE3 (.547) and SPENV3 (.405). Following Hair et al. (2021), indicators in this range should be deleted only when their removal is needed to raise composite reliability or AVE above the recommended thresholds. Because all constructs met these thresholds with the indicators included (Table 5), the indicators were retained to preserve the content validity of their constructs; this is particularly important for SPENV3, which is one of only four indicators of environmental performance. GOC1 (.436) was removed, as GOC remained adequately represented by six items. All indicator VIF values are below 3.3 (1.088–1.896), indicating no collinearity problems.

Table 5. Internal consistency reliability and convergent validity

Construct	Items	Cronbach's α	rho_A	rho_C (CR)	AVE
Green inclusive leadership	3	0.559	0.607	0.766	0.530
Green organizational culture	6	0.834	0.842	0.880	0.554
Green knowledge sharing	5	0.774	0.793	0.846	0.526
Green product innovation capability	4	0.749	0.768	0.842	0.573
Green process innovation capability	4	0.673	0.680	0.804	0.508
Economic performance	3	0.570	0.684	0.762	0.526
Environmental performance	4	0.674	0.780	0.794	0.508
Social performance	4	0.746	0.767	0.839	0.567

Note. Recommended thresholds: rho_A and rho_C (CR) ≥ .70; AVE ≥ .50 (Hair et al., 2021). Cronbach's α is a conservative lower bound of reliability in PLS-SEM.

As shown in Table 5, composite reliability (rho_C) ranges from .762 to .880 and AVE from .508 to .573, meeting the recommended thresholds of .70 and .50, respectively, and supporting convergent validity. Cronbach's α is

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

below .70 for GIL (.559), green process innovation capability (.673), economic performance (.570) and environmental performance (.674), and rho_A is below .70 for GIL (.607), green process innovation capability (.680) and economic performance (.684). Because Cronbach's α assumes equal indicator loadings and therefore tends to underestimate reliability in PLS-SEM, composite reliability is used as the primary criterion (Hair et al., 2021). Nevertheless, the lower α and rho_A values of the three-item GIL and economic performance scales are acknowledged as a limitation.

Table 6. Heterotrait–monotrait ratio (HTMT)

Construct	GIL	GOC	GKS	GICP	GICR	ECO	ENV	SOC
Green inclusive leadership								
Green organizational culture	0.150 [0.331]							
Green knowledge sharing	0.530 [0.670]	0.380 [0.496]						
Green product innovation capability	0.279 [0.446]	0.209 [0.352]	0.491 [0.613]					
Green process innovation capability	0.329 [0.506]	0.260 [0.407]	0.586 [0.699]	0.638 [0.761]				
Economic performance	0.265 [0.460]	0.388 [0.535]	0.422 [0.577]	0.381 [0.543]	0.414 [0.570]			
Environmental performance	0.445 [0.608]	0.225 [0.377]	0.425 [0.561]	0.378 [0.524]	0.437 [0.582]	0.591 [0.751]		
Social performance	0.439 [0.596]	0.256 [0.390]	0.439 [0.571]	0.352 [0.488]	0.367 [0.523]	0.540 [0.690]	0.507 [0.644]	

Note. Values in brackets are bootstrapped 97.5% upper confidence bounds (2,000 resamples). All HTMT values and upper bounds are below .85.

Table 6 reports the HTMT values with bootstrapped upper confidence bounds. The highest HTMT value is .638, between green product and green process innovation capability, with an upper bound of .761. All values and upper bounds are below the conservative threshold of .85, supporting discriminant validity.

Table 7. Fornell–Larcker criterion

Construct	GIL	GOC	GKS	GICP	GICR	ECO	ENV	SOC
Green inclusive leadership	0.728							
Green organizational culture	0.097	0.744						
Green knowledge sharing	0.366	0.325	0.725					
Green product innovation capability	0.195	0.160	0.370	0.757				
Green process innovation capability	0.205	0.199	0.432	0.463	0.713			
Economic performance	0.150	0.282	0.314	0.284	0.265	0.725		
Environmental performance	0.264	0.181	0.349	0.306	0.309	0.420	0.713	

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Social performance	0.300	0.209	0.347	0.275	0.266	0.365	0.409	0.753

Note. Diagonal = √AVE; off-diagonal = latent-variable correlations. Each √AVE exceeds the construct's correlations with all other constructs.

Under the Fornell–Larcker criterion (Table 7), the square root of each construct's AVE (.713–.757) exceeds its correlations with all other constructs (maximum .463, between GICP and GICR), further supporting discriminant validity. The cross-loadings further show that every indicator loads more highly on its own construct than on any other construct, confirming discriminant validity.

Procedural remedies were used to limit common method bias, including temporal separation of the predictor and outcome measures, assurance of confidentiality and voluntary participation (Podsakoff et al., 2024). Statistically, the full collinearity VIFs range from 1.172 to 1.576, below the threshold of 3.3 (Kock, 2015), and the first unrotated factor in Harman's single-factor test explains 20.6% of the variance, well below 50% These results indicate that common method bias is unlikely to be a serious concern, although it cannot be ruled out entirely.

4.3 Structural Model

Table 8. Direct effects

Hyp.	Path	β	SE	t	p	95% CI	f^2	VIF	Decision
H2	GIL → GKS	0.335	0.049	6.79	<.001	[0.237, 0.431]	0.140	1.025	Supported
H9	INT → GKS	0.022	0.049	0.44	0.657	[-0.072, 0.119]	0.001	1.018	Not supported
H3a	GKS → GICP	0.345	0.056	6.17	<.001	[0.238, 0.457]	0.120	1.155	Supported
H3b	GKS → GICR	0.413	0.051	8.16	<.001	[0.316, 0.516]	0.182	1.155	Supported
H1a	GIL → ECO	0.024	0.063	0.38	0.704	[-0.093, 0.149]	0.001	1.162	Not supported
H4a	GKS → ECO	0.204	0.063	3.25	0.001	[0.087, 0.330]	0.034	1.415	Supported
H5a	GICP → ECO	0.158	0.067	2.36	0.019	[0.026, 0.287]	0.022	1.336	Supported
H5d	GICR → ECO	0.099	0.066	1.49	0.137	[-0.031, 0.228]	0.008	1.416	Not supported
H1b	GIL → ENV	0.140	0.061	2.28	0.023	[0.019, 0.260]	0.021	1.162	Supported
H4b	GKS → ENV	0.186	0.069	2.70	0.007	[0.049, 0.319]	0.030	1.415	Supported
H5b	GICP → ENV	0.149	0.067	2.23	0.026	[0.019, 0.279]	0.021	1.336	Supported
H5e	GICR →	0.131	0.06	1.97	0.049	[0.006, 0.262]	0.01	1.41	Supported

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

	ENV		6		5		5	6	
H1c	GIL → SOC	0.186	0.056	3.33	<.001	[0.081, 0.298]	0.036	1.162	Supported
H4c	GKS → SOC	0.196	0.063	3.09	0.002	[0.074, 0.323]	0.033	1.415	Supported
H5c	GICP → SOC	0.128	0.062	2.07	0.040	[0.004, 0.247]	0.015	1.336	Supported
H5f	GICR → SOC	0.084	0.065	1.29	0.200	[-0.040, 0.218]	0.006	1.416	Not supported

Note. 5,000 bootstrap resamples; two-tailed tests; 95% percentile confidence intervals. f^2 values of .02, .15 and .35 indicate small, medium and large effects. INT = GIL × GOC interaction term.

Table 8 presents the direct effects. GIL is positively related to GKS (β = .335, p < .001), supporting H2, GKS positively predicts both green product (β = .345, p < .001) and green process innovation capability (β = .413, p < .001), supporting H3a and H3b. GIL is not significantly related to economic performance (β = .024, p = .704) but is positively related to environmental (β = .140, p = .023) and social performance (β = .186, p < .001); H1 is therefore partially supported (H1b and H1c). GKS is positively related to economic (β = .204, p = .001), environmental (β = .186, p = .007) and social performance (β = .196, p = .002), supporting H4a–H4c. Green product innovation capability predicts economic (β = .158, p = .019), environmental (β = .149, p = .026) and social performance (β = .128, p = .040), supporting H5a–H5c, whereas green process innovation capability predicts environmental performance only (β = .131, p = .0495; H5e) and not economic (H5d) or social performance (H5f). The effects on the performance dimensions are small (f^2 = .015–.036), whereas the effects of GIL on GKS and of GKS on the innovation capabilities are small-to-medium (f^2 = .120–.182).

Table 9. Explanatory and predictive power

Endogenous construct	R^2	Adj. R^2	Q^2predict (mean)	Items RMSE_PLS < RMSE_LM
Green knowledge sharing	0.219	0.211	0.101	4 of 5
Green product innovation capability	0.141	0.135	0.026	4 of 4
Green process innovation capability	0.190	0.184	0.030	4 of 4
Economic performance	0.139	0.127	0.027	2 of 3
Environmental performance	0.188	0.177	0.039	4 of 4
Social performance	0.181	0.170	0.054	4 of 4

Note. Q^2predict values are from PLSpredict (10 folds, 10 repetitions); all indicator-level Q^2predict values are > 0. SRMR (saturated model) = 0.063.

Table 9 shows that the model explains 21.9% of the variance in GKS, 14.1% in green product innovation capability, 19.0% in green process innovation capability, and 13.9%, 18.8% and 18.1% in economic, environmental and social performance, respectively. These values indicate modest explanatory power, which is common for organizational outcomes that have many determinants. All Q^2predict values are positive (.026–.101), and the PLS model yields lower prediction errors (RMSE) than the linear benchmark for 22 of the 24 indicators, indicating

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

medium predictive power (Shmueli et al., 2019). The SRMR of .063 is below the .08 guideline, indicating acceptable model fit.

4.4 Mediation and Serial Mediation (H6–H8)

Table 10. Specific indirect effects

Hyp.	Effect	β	SE	t	p	95% CI	Decision
H6	GIL → GKS → ECO	0.069	0.025	2.73	0.007	[0.027, 0.123]	Supported
H7	GKS → GICP → ECO	0.054	0.025	2.14	0.033	[0.008, 0.109]	Supported
H7	GKS → GICR → ECO	0.041	0.028	1.44	0.150	[-0.013, 0.097]	Not supported
H8	GIL → GKS → GICP → ECO	0.018	0.009	2.06	0.041	[0.003, 0.038]	Supported
H8	GIL → GKS → GICR → ECO	0.014	0.010	1.38	0.170	[-0.004, 0.035]	Not supported
H6	GIL → GKS → ENV	0.062	0.026	2.41	0.017	[0.016, 0.117]	Supported
H7	GKS → GICP → ENV	0.052	0.026	2.01	0.045	[0.007, 0.107]	Supported
H7	GKS → GICR → ENV	0.054	0.029	1.85	0.066	[0.002, 0.117]	Supported
H8	GIL → GKS → GICP → ENV	0.017	0.009	1.90	0.059	[0.002, 0.038]	Supported
H8	GIL → GKS → GICR → ENV	0.018	0.010	1.79	0.075	[0.001, 0.040]	Supported
H6	GIL → GKS → SOC	0.066	0.025	2.67	0.008	[0.023, 0.120]	Supported
H7	GKS → GICP → SOC	0.044	0.022	1.98	0.049	[0.001, 0.090]	Supported
H7	GKS → GICR → SOC	0.035	0.028	1.24	0.217	[-0.017, 0.094]	Not supported
H8	GIL → GKS → GICP → SOC	0.015	0.008	1.92	0.056	[0.000, 0.031]	Not supported
H8	GIL → GKS → GICR → SOC	0.012	0.010	1.21	0.228	[-0.006, 0.032]	Not supported

Note. 5,000 bootstrap resamples. Decisions are based on 95% percentile bootstrap confidence intervals (an effect is supported when the interval excludes zero). Bootstrap t-based p-values are reported for completeness and can differ from interval-based inferences because indirect effects have asymmetric sampling distributions (Preacher & Hayes, 2008). Mediation type: indirect-only for ECO; complementary for ENV and SOC (Zhao et al., 2010).

Table 10 reports the specific indirect effects. GKS mediates the relationship between GIL and economic (β = .069, 95% CI [.027, .123]),

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

environmental (β = .062, [.016, .117]) and social performance (β = .066, [.023, .120]), supporting H6. Green product innovation capability mediates the relationship between GKS and economic (β = .054, [.008, .109]), environmental (β = .052, [.007, .107]) and social performance (β = .044, [.001, .090]), and green process innovation capability mediates the relationship between GKS and environmental performance (β = .054, [.002, .117]) but not economic or social performance; H7 is therefore partially supported (four of six paths). For the serial paths, GIL → GKS → GICP → ECO (β = .018, [.003, .038]), GIL → GKS → GICP → ENV (β = .017, [.002, .038]) and GIL → GKS → GICR → ENV (β = .018, [.001, .040]) are supported, whereas the confidence intervals of the other three serial paths include zero; H8 is therefore partially supported (three of six paths). For three of the supported effects (GKS → GICR → ENV and the two serial paths to environmental performance), the bootstrap p-values are slightly above .05 (.059–.075), so these effects should be regarded as weaker. Because the direct effect of GIL on economic performance is not significant while its indirect effect is, the GIL–economic performance relationship reflects indirect-only (full) mediation; for environmental and social performance, both direct and indirect effects are significant and positive, indicating complementary (partial) mediation (Zhao et al., 2010).

4.5 Moderation and Moderated Mediation (H9–H10)

Table 11. Interaction effect and simple slopes

Effect	β	SE	t	p	95% CI
GOC → GKS (main effect)	0.293	0.045	6.49	<.001	[0.212, 0.388]
Interaction GIL × GOC → GKS (H9)	0.022	0.049	0.44	0.657	[-0.072, 0.119]
Simple slope GIL → GKS at Low GOC (−1 SD)	0.313	0.076	4.14	<.001	[0.164, 0.458]
Simple slope GIL → GKS at Mean GOC	0.335	0.049	6.79	<.001	[0.237, 0.431]
Simple slope GIL → GKS at High GOC (+1 SD)	0.357	0.063	5.69	<.001	[0.238, 0.481]

Note. INT = GIL × GOC interaction term; f^2 for the interaction term = 0.001. Simple slope = β(GIL → GKS) + β(INT) × GOC level (in standard deviation units).

Table 11 shows that GOC has a positive main effect on GKS (β = .293, p < .001), but the GIL × GOC interaction is small and not significant (β = .022, p = .657, 95% CI [−.072, .119], f^2 = .001). The simple slope of GIL on GKS is positive and significant at low (β = .313), mean (β = .335) and high (β = .357) levels of GOC, and the slopes are almost parallel (Figure 2). H9 is therefore not supported: GIL promotes GKS to a similar extent regardless of the level of GOC.

Table 12. Conditional indirect effects and index of moderated mediation

Hyp.	Indirect path	Low GOC (−1 SD)	Mean GOC	High GOC (+1 SD)	Index (IMM)	Decision
H10	GIL → GKS → GICP → ECO	0.017 [0.003, 0.038]	0.018 [0.003, 0.038]	0.019 [0.003, 0.041]	0.001 [-0.005, 0.008]	Not supported
H10	GIL → GKS → GICR → ECO	0.013 [-0.004, 0.035]	0.014 [-0.004, 0.035]	0.015 [-0.004, 0.038]	0.001 [-0.004, 0.007]	Not supported

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

H10	GIL → GKS → GICP → ENV	0.016 [0.002, 0.037]	0.017 [0.002, 0.038]	0.018 [0.002, 0.042]	0.001 [-0.004, 0.008]	Not supported
H10	GIL → GKS → GICR → ENV	0.017 [0.001, 0.041]	0.018 [0.001, 0.040]	0.019 [0.001, 0.044]	0.001 [-0.004, 0.008]	Not supported
H10	GIL → GKS → GICP → SOC	0.014 [0.000, 0.030]	0.015 [0.000, 0.031]	0.016 [0.000, 0.034]	0.001 [-0.004, 0.007]	Not supported
H10	GIL → GKS → GICR → SOC	0.011 [-0.006, 0.031]	0.012 [-0.006, 0.032]	0.012 [-0.006, 0.035]	0.001 [-0.003, 0.007]	Not supported

Note. 95% percentile bootstrap confidence intervals in brackets (5,000 resamples). Because GOC moderates only the first stage (GIL → GKS), the index of moderated mediation equals β(INT) multiplied by the remaining path coefficients of the indirect path.

Table 12 reports the conditional indirect effects at low, mean and high levels of GOC, together with the index of moderated mediation (IMM). The conditional indirect effects change only marginally across GOC levels; for example, the GIL → GKS → GICP → ECO effect rises from .017 at low GOC to .019 at high GOC, but its IMM (.001, 95% CI [−.005, .008]) includes zero. All IMM confidence intervals include zero, so GOC does not moderate the serial indirect effects, and H10 is not supported.

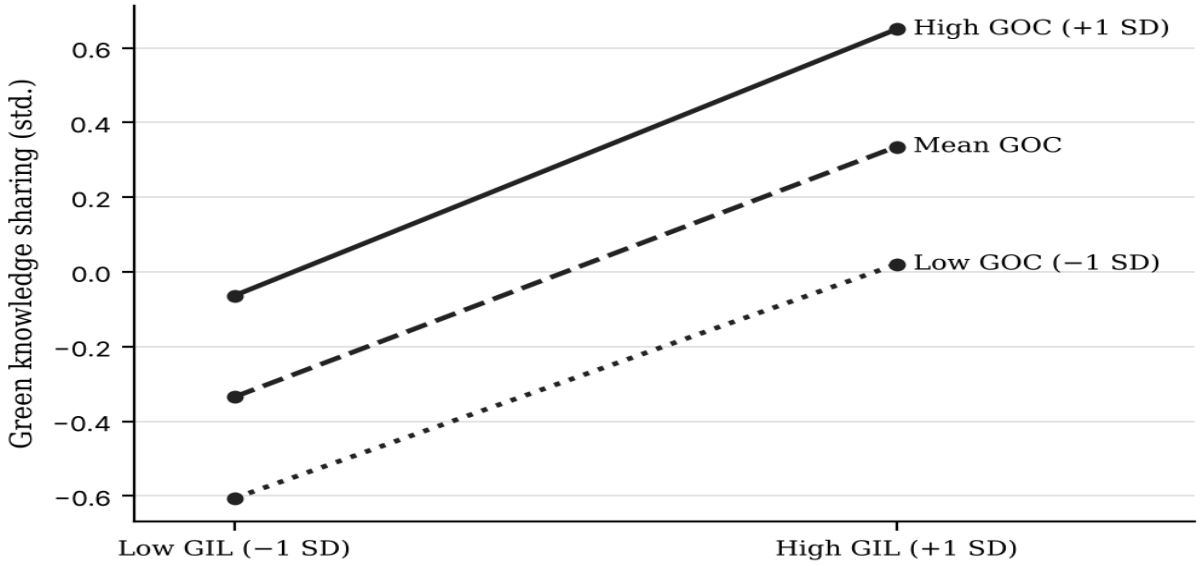


Figure 2. Simple slopes of GIL on GKS at low, mean and high levels of GOC

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

4.6 Hypothesis Summary

Table 13. Summary of hypothesis testing

Hypothesis	Relationship	Result
H1	GIL → SP (ECO / ENV / SOC)	Partially supported (2 of 3)
H2	GIL → GKS	Supported
H3	GKS → GIC (product / process)	Supported
H4	GKS → SP (ECO / ENV / SOC)	Supported
H5	GIC → SP (2 dimensions × 3 outcomes)	Partially supported (4 of 6)
H6	GIL → GKS → SP	Supported
H7	GKS → GIC → SP	Partially supported (4 of 6)
H8	GIL → GKS → GIC → SP (serial)	Partially supported (3 of 6)
H9	GOC × GIL → GKS	Not supported
H10	GOC moderates the serial indirect effect	Not supported

Note. Detailed results for the sub-hypotheses are reported in Tables 8, 10 and 12.

Table 13 summarizes the results. H2, H3, H4 and H6 are supported; H1, H5, H7 and H8 are partially supported; and H9 and H10 are not supported. Partial support reflects differences across the three performance dimensions and between the product and process innovation routes, rather than inconsistent evidence for a single overall effect.

5. Discussion

This study examined how green inclusive leadership is translated into the economic, environmental and social performance of manufacturing SMEs. Drawing on the NRBV (Hart, 1995) and Social Learning Theory (Bandura, 1977), it tested a sequence in which GIL stimulates green knowledge sharing, which in turn builds green product and process innovation capabilities that improve sustainable performance. The results largely support this resource-transformation logic, while revealing important differences across performance dimensions and innovation types. By examining the three performance dimensions separately, the study shows that the mechanisms linking GIL to performance are dimension-specific.

GIL was directly related to environmental and social performance but not to economic performance. This suggests that inclusive environmental leadership is more closely associated with responsible practices and stakeholder-oriented outcomes than with short-term financial gains. The finding qualifies earlier evidence that GIL enhances sustainable performance and competitive advantage (Samo et al., 2024; Siddiquei et al., 2025): in resource-constrained SMEs, the economic benefits of green leadership appear to materialize only indirectly, through knowledge sharing and innovation.

The positive relationship between GIL and GKS is consistent with Zhang et al. (2025) and with the employee-centred view of GIL proposed by Bhutto et al. (2021). Inclusive leaders appear to make it safe and worthwhile for employees to share environmental experience, which helps firms mobilize knowledge that would otherwise remain dispersed. The positive effects of GKS on both product and process innovation capability further support studies that identify knowledge as a key driver of green innovation (Borah et al., 2023; Zhang et al., 2025).

The distinction between product and process innovation capability proved important. Green product innovation capability was related to all

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

three performance dimensions, whereas green process innovation capability was related only to environmental performance. One explanation is that greener products can generate market differentiation and benefits for customers and communities, whereas process improvements such as waste and emissions reduction primarily yield environmental gains, with economic returns that may take longer to appear. This pattern refines the NRBV view of innovation capabilities as resources whose value depends on the outcome considered (Hart, 1995; Al-Hakimi et al., 2022). However, a difference in statistical significance does not necessarily mean that the coefficients differ significantly from each other, and this should be tested formally in future research.

GKS was also directly related to economic, environmental and social performance, consistent with Saleem et al. (2024), Junejo et al. (2025) and Zairbani and Senthil Kumar (2025). This indicates that shared environmental knowledge improves routine operational decisions, such as reducing waste or energy use, even before it is embedded in formal innovation capability.

GKS mediated the effect of GIL on all three performance dimensions. This extends Zhang et al. (2025) by showing that knowledge sharing links GIL not only to green innovation but also to sustainability outcomes. In particular, the absence of a direct GIL–economic performance relationship, combined with significant indirect effects, indicates indirect-only mediation: green inclusive leadership improves economic performance to the extent that it mobilizes knowledge sharing and innovation capability.

Green product innovation capability mediated the relationship between GKS and all three performance dimensions, whereas green process innovation capability mediated only the relationship with environmental performance. These results are consistent with studies linking green knowledge sharing and innovation to sustainable performance (Al-Hakimi et al., 2022; Zairbani & Senthil Kumar, 2025) and show that the conversion of knowledge into capability is most consequential for product-related capabilities.

The proposed serial sequence received partial support. The full chain from GIL through GKS and innovation capability was supported for economic performance via product innovation capability and for environmental performance via both product and process innovation capability, but not for social performance. The serial effects were small, and some had bootstrap p-values slightly above .05, so they should be interpreted with caution. The theoretical contribution therefore lies in identifying differentiated sequential pathways rather than a single, universally applicable causal chain (Siddiquei et al., 2025; Zada et al., 2025).

Finally, GOC did not moderate the GIL–GKS relationship or the indirect effects. This does not imply that green culture is unimportant: GOC had a substantial positive direct relationship with GKS (β = .293). Rather, the results suggest that leadership and culture act as independent, additive sources of support for green knowledge sharing rather than as synergistic ones, in contrast to studies in which culture amplified green relationships (Wang et al., 2022; Al-Hakimi et al., 2022; Raza et al., 2025).

5.1 Theoretical Implications

First, the study contributes to the NRBV by distinguishing three types of green resources, namely a managerial resource (GIL), a knowledge resource (GKS) and innovation capabilities (GIC), and by showing that they form a partially sequential chain of resource transformation (Hart, 1995). The value of green leadership depends on its ability to activate complementary knowledge and capability resources, and this value differs across the product/process and economic/environmental/social dimensions.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Second, the study shows the usefulness of combining the NRBV with Social Learning Theory (Bandura, 1977). Social learning explains the employee-level link between GIL and knowledge sharing, whereas the NRBV explains how shared knowledge is converted into firm-level capabilities and outcomes. Future studies could formalize this cross-level logic through multilevel designs.

Third, the findings challenge the assumption that green innovation affects all dimensions of sustainability uniformly. Product and process innovation capabilities were associated with different sustainability outcomes, suggesting that they should be theorized and measured as distinct capabilities.

Fourth, the absence of an interaction between GIL and GOC indicates that green organizational resources do not necessarily reinforce each other. Green culture and inclusive leadership appear to contribute independently to knowledge sharing, which refines contingency arguments about the role of green culture (Wang et al., 2022; Raza et al., 2025).

5.2 Practical Implications

First, managers of manufacturing SMEs should strengthen inclusive environmental leadership by involving employees in environmental decisions, actively inviting green ideas and creating safe opportunities to share sustainability practices. Cross-functional forums on environmental issues can help translate leadership intentions into routine operational improvements.

Second, managers should distinguish between product-development and process-improvement initiatives and should not expect identical economic, environmental and social returns from both. Investments in green product innovation appear to offer the broadest performance benefits, whereas process innovation primarily improves environmental outcomes. SME associations and support organizations in Pakistan, such as the Small and Medium Enterprises Development Authority (SMEDA), could support knowledge-sharing and cleaner-production programmes tailored to local industry needs.

Third, firms should establish simple procedures for screening environmental ideas, assessing their technical feasibility, piloting promising projects and tracking environmental indicators, because the value of knowledge sharing depends on the extent to which shared knowledge is converted into implementable changes.

Fourth, because green culture and inclusive leadership each contributed independently to knowledge sharing, managers should invest in both rather than assuming that one will amplify the other.

5.3 Limitations and Future Research

This study has several limitations. First, although a two-wave design was used, green knowledge sharing, innovation capability and performance were measured at the same time, which limits conclusions about the temporal order among the mediators and outcomes; future research should use three or more waves or longitudinal designs. Second, purposive sampling of manufacturing SMEs in four Pakistani cities limits generalizability to other regions, sectors and countries. Third, organizational capabilities and performance were rated by individual respondents nested within 33 firms; future studies should use multilevel models, multiple informants and objective performance indicators. Fourth, the three-item GIL scale and the economic performance scale showed lower Cronbach's α and rho_A values, and future research should use fuller scales. Fifth, despite procedural and statistical remedies, common method bias cannot be ruled out completely. Finally, some indirect effects were small, and the minimum detectable effect size for the sample was approximately .15; larger samples would allow more precise estimation of small serial effects. Future research could also examine alternative roles of organizational culture, for

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

example as a mediator or as a moderator of later stages of the sequence.

6. Conclusion

This study shows that green inclusive leadership contributes to the sustainable performance of manufacturing SMEs mainly by mobilizing green knowledge sharing and building green innovation capability. GIL was directly related to environmental and social performance and indirectly related to all three performance dimensions through GKS. GKS strengthened both green product and process innovation capabilities, and product innovation capability was the more versatile route, linking knowledge to economic, environmental and social outcomes. Green organizational culture supported knowledge sharing directly but did not strengthen the effect of leadership. The study therefore offers a dimension-specific account of how environmental leadership is converted into sustainability outcomes in resource-constrained manufacturing SMEs.

REFERENCES

Al-Hakimi, M. A., Al-Swidi, A. K., Gelaidan, H. M., & Mohammed, A. (2022). The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis. Journal of Cleaner Production, 376, 134346. https://doi.org/10.1016/j.jclepro.2022.134346

Ali, H., Chen, T., & Hao, Y. (2021). Sustainable manufacturing practices, competitive capabilities, and sustainable performance: Moderating role of environmental regulations. Sustainability, 13(18), 10051. https://doi.org/10.3390/su131810051

Almeida, F., & Okon, E. (2026). Impact of green knowledge sharing on the organizational performance of SMEs: The mediating role of green organizational culture and technological innovation. Knowledge and Process Management, 33(2), 232-242. https://doi.org/10.1002/kpm.70018

Bandura, A. (1977). Social learning theory. Prentice Hall.

Becker, J.-M., Cheah, J.-H., Gholamzade, R., Ringle, C. M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. International Journal of Contemporary Hospitality Management, 35(1), 321-346. https://doi.org/10.1108/IJCHM-04-2022-0474

Bhutto, T. A., Farooq, R., Talwar, S., Awan, U., & Dhir, A. (2021). Green inclusive leadership and green creativity in the tourism and hospitality sector: Serial mediation of green psychological climate and work engagement. Journal of Sustainable Tourism, 29(10), 1716-1737. https://doi.org/10.1080/09669582.2020.1867864

Borah, P. S., Dogbe, C. S. K., Pomegbe, W. W. K., Bamfo, B. A., & Hornuvo, L. K. (2023). Green market orientation, green innovation capability, green knowledge acquisition and green brand positioning as determinants of new product success. European Journal of Innovation Management, 26(2), 364-385. https://doi.org/10.1108/EJIM-09-2020-0345

Chen, Y.-S. (2008). The driver of green innovation and green image - Green core competence. Journal of Business Ethics, 81, 531-543. https://doi.org/10.1007/s10551-007-9522-1

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Dinibutun, S. R. (2024). From green inclusive leadership to green creativity: The mediating role of green passion and green absorptive capacity. Journal of Open Innovation: Technology, Market, and Complexity, 10(2), 100272. https://doi.org/10.1016/j.joitmc.2024.100272

Hair, J. F., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. Research Methods in Applied Linguistics, 1(3), 100027. https://doi.org/10.1016/j.rmal.2022.100027

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). SAGE Publications.

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

Junejo, I., Sohu, J. M., Alwadi, B. M., Ejaz, F., Nasir, A., & Hossain, M. B. (2025). Green supply chain management and SMEs sustainable performance in developing country: Role of green knowledge sharing, green innovation and big data-driven supply chain. Discover Sustainability, 6, 342. https://doi.org/10.1007/s43621-025-01055-6

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration, 11(4), 1–10. https://doi.org/10.4018/ijec.2015100101

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information Systems Journal, 28(1), 227-261. https://doi.org/10.1111/isj.12131

Pham, Q. H., & Vu, K. P. (2025). Changing times: Does the critical success factors boosting green transition of SMEs remain unchanged? Journal of Innovation and Entrepreneurship, 14(1), 1-32. https://doi.org/10.1186/s13731-024-00449-6

Podsakoff, P. M., Podsakoff, N. P., Williams, L. J., Huang, C., & Yang, J. (2024). Common method bias: It's bad, it's complex, it's widespread, and it's not easy to fix. Annual Review of Organizational Psychology and Organizational Behavior, 11, 17-61. https://doi.org/10.1146/annurev-orgpsych-110721-040030

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40(3), 879–891. https://doi.org/10.3758/BRM.40.3.879

Raza, M. W., Imran, M., Raza, M. A., Usman, S. M., & Malik, A. A. (2025). The impact of sustainable leadership on sustainable performance: The moderated mediation of green organizational culture and organizational commitment. Pakistan Journal of Commerce and Social Sciences, 19(3), 495-521. https://doi.org/10.64534/Commer.2025.514

Saleem, F., Pinto, L., & Malik, M. I. (2024). Green knowledge sharing and the green performance nexus: A moderated mediation model. Sustainability, 16(22), 9654. https://doi.org/10.3390/su16229654

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 6 • October 2026

Samo, A. H., Ahmed, Q. N., & Rizvi, S. A. A. (2024). Influence of green inclusive leadership on sustainable performance through innovative behavior: Moderating role of green psychological climate and climate for inclusion. Pakistan Journal of Commerce and Social Sciences, 18(3), 676-702. https://doi.org/10.64534/Commer.2024.034

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. European Journal of Marketing, 53(11), 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

Siddiquei, A. N., Ahmed, Z., Zaman, K., Badar, K., Khosa, M., & Zameer, H. (2025). Top management's green inclusive leadership and sustainable competitive advantage in manufacturing firms: The enabling role of internal CSR communication. Journal of Environmental Management, 395, 127825. https://doi.org/10.1016/j.jenvman.2025.127825

Simmou, W., Shehadeh, M., Ed-Dafali, S., Hussainey, K., & Nandy, M. (2025). From culture to green innovation: The interplay of social capital, entrepreneurial leadership, and green knowledge sharing in Moroccan agricultural SMEs. Business Strategy and the Environment, 34(5), 6264-6282. https://doi.org/10.1002/bse.4303

Wang, S., Abbas, J., Sial, M. S., Alvarez-Otero, S., & Cioca, L.-I. (2022). Achieving green innovation and sustainable development goals through green knowledge management: Moderating role of organizational green culture. Journal of Innovation & Knowledge, 7(4), 100272. https://doi.org/10.1016/j.jik.2022.100272

Ye, F., Yang, Y., Xia, H., Shao, Y., Gu, X., & Shen, J. (2022). Green entrepreneurial orientation, boundary-spanning search and enterprise sustainable performance: The moderating role of environmental dynamism. Frontiers in Psychology, 13, 978274. https://doi.org/10.3389/fpsyg.2022.978274

Zada, M., Abdalla, A. A., Contreras-Barraza, N., & Vega-Munoz, A. (2025). The impact of ecocentric leadership on organizational green innovation examining the serial mediation of green knowledge sharing and ambidexterity. Scientific Reports, 15, 35410. https://doi.org/10.1038/s41598-025-07512-6

Zairbani, A., & Senthil Kumar, J. P. (2025). How does green knowledge sharing improve sustainable business performance? Knowledge and Process Management, 32(1), 42-53. https://doi.org/10.1002/kpm.1796

Zhang, S., Li, Y., & Hong, A. (2025). The impact of green inclusive leadership on green innovation in Chinese SMEs: The mediating roles of green knowledge sharing and green organizational identity. Sustainability, 17(3), 1180. https://doi.org/10.3390/su17031180

Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. Journal of Consumer Research, 37(2), 197–206. https://doi.org/10.1086/651257