

**GREEN MARKETING STRATEGY, GREEN ORGANISATIONAL IDENTITY,
ENVIRONMENTAL COMMITMENT, AND GREEN INNOVATION PERFORMANCE:
EVIDENCE FROM PAKISTAN'S INDUSTRIAL SECTOR**

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Abstract

Rapid industrial expansion in Pakistan has intensified environmental degradation, increasing pressure on firms to adopt sustainable and innovative practices. Although global literature has established the significance of green marketing and environmental commitment, limited empirical evidence exists on how these constructs interact to influence green innovation performance in emerging economies such as Pakistan. This study examines the structural relationship between Green Marketing Strategy (GMS), Green Organisational Identity (GOI), Environmental Commitment (EC), and Green Innovation Performance (GIP) within Pakistan's manufacturing industries, including textiles, chemicals, cement, leather, and plastics. Drawing on Social Identity Theory and the Resource-Based View, the study proposes that GMS enhances GOI, which subsequently strengthens EC, ultimately improving GIP. A conceptual model is developed to test both direct and mediating relationships among these variables.

Data were collected from 312 managers across medium and large manufacturing firms in Lahore, Faisalabad, Karachi, and Sialkot industrial zones. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed for measurement and structural model assessments. Results reveal that GMS has a significant positive effect on GOI and GIP, while GOI positively influences EC. Environmental commitment further mediates the relationship between GOI and GIP. The findings indicate that Pakistani firms that embed environmental values into their identity and marketing strategies achieve superior green innovation outcomes.

This research expands theoretical understanding of green innovation in emerging economies while offering practical insights for industrial managers seeking competitive advantage through sustainability-led innovation. It suggests that firms must prioritize internal environmental identity-building and external green marketing alignment to enhance long-term innovation performance. The paper concludes with policy implications supporting Pakistan's shift toward sustainable industrialization.

Keywords Green Marketing Strategy; Green Organisational Identity; Environmental Commitment; Green Innovation Performance; Sustainability; Pakistan; PLS-SEM; Industrial Sector

1. Introduction

Environmental degradation has become one of Pakistan's most pressing socio-economic challenges over the past two decades. Rapid industrial expansion, weak environmental governance, high energy consumption, and inefficient production processes have collectively contributed to escalating pollution levels and resource depletion (Khan et al., 2022). Key industrial sectors such as textiles, leather, cement, chemicals, and plastics-which collectively contribute more than 60% of the country's exports-are also responsible for significant carbon emissions, industrial waste, water pollution, and hazardous byproducts (Shah & Ali, 2021). This growing environmental burden has increased national and international pressure on Pakistani firms to adopt greener and more innovative business practices aligned with global sustainability standards.

In response to these challenges, green innovation has emerged as a critical strategic capability for firms seeking operational efficiency, environmental compliance, and competitive advantage. Green innovation performance (GIP) refers to a firm's ability to redesign products, processes, and technologies in ways that minimize environmental impact while improving organizational performance (Chen, 2020). Despite its importance, green innovation remains underdeveloped in many Pakistani industries due to limited environmental awareness, weak regulatory enforcement, resource constraints, and lack of strategic orientation toward sustainability (Yasir et al., 2020). Therefore, identifying the internal and external drivers that can enhance a firm's green innovation performance is essential.

Green Marketing Strategy (GMS) has been recognized globally as a catalyst for driving greener organizational practices by integrating sustainability principles into marketing, branding, and consumer engagement (Banyte & Gadeikiene, 2018). Firms that adopt GMS signal environmental responsibility to stakeholders, leading to improved brand value, stronger customer trust, and eventually more sustainable product development practices (Rahman et al., 2021). In the context of Pakistani industries-where consumer environmental consciousness is rising but still developing-GMS may serve as both a competitive differentiator and a mechanism for pressuring firms internally to innovate sustainably.

However, the effect of GMS on green innovation is not always direct. Recent studies suggest that internal organizational psychological factors, such as Green Organisational Identity (GOI), play a crucial mediating role (Chen & Wu, 2019). GOI reflects how employees and managers perceive their organization's environmental values and long-term commitment to sustainability. When employees view their firm as environmentally responsible, they demonstrate stronger motivation to contribute to eco-friendly initiatives, adopt green behaviors, and support sustainable

innovation (Wang & Dai, 2020). In Pakistan, where organizational identity formation is strongly influenced by leadership and cultural norms, GOI may play an even more significant role in shaping environmental behaviors.

Another important internal mechanism is **Environmental Commitment (EC)**, defined as the degree to which firms invest resources, policies, and leadership focus on environmental sustainability (Lee et al., 2021). EC creates the foundation for firms to implement green processes, reduce waste, comply with environmental regulations, and invest in eco-friendly technologies. EC has been shown to significantly influence green innovation outcomes in both developed and developing countries (Khan & Qayyum, 2022). Yet, little is known about how EC mediates the relationship between GOI and GIP in Pakistan, where firms often face economic pressures that hinder environmental investment.

Research Gap

While prior studies have explored green marketing, organizational identity, and environmental commitment in various global contexts, research addressing their combined effect on green innovation performance in Pakistan remains scarce. Most Pakistani studies have focused on environmental management systems, green human resource management, or consumer green behavior (Yasir et al., 2020; Shah & Ali, 2021). There is limited empirical evidence examining how internal identity-building and commitment mechanisms translate green marketing strategies into innovation outcomes within Pakistani manufacturing firms.

Moreover, **the integrated conceptual model involving GMS → GOI → EC → GIP has not been empirically tested in Pakistani industries**. The unique socio-economic challenges of Pakistan-including resource scarcity, regulatory weaknesses, and environmental vulnerability-make this investigation both timely and contextually relevant.

Research Objectives

This study aims to examine the relationships among Green Marketing Strategy, Green Organisational Identity, Environmental Commitment, and Green Innovation Performance within Pakistan's industrial sector. The specific objectives are:

1. To analyse the effect of Green Marketing Strategy on Green Organisational Identity and Green Innovation Performance.
2. To examine the impact of Green Organisational Identity on Environmental Commitment.
3. To determine the effect of Environmental Commitment on Green Innovation Performance.
4. To test the mediating role of Environmental Commitment between GOI and GIP.
5. To test the overall integrated conceptual model within Pakistan's industrial context.

Theoretical Contribution

This study contributes to the literature in three key ways:

1. **Integration of marketing and identity-based perspectives**
By linking GMS with GOI and EC, the study introduces a more holistic view of how strategic marketing translates into organizational innovation capabilities.
2. **Application of Social Identity Theory (SIT) in green innovation**
This study applies SIT to explain how organizational identity influences green behavior in a developing economy.
3. **Empirical contribution to Pakistan's sustainability literature**
The study responds to calls for context-specific research exploring how Pakistani firms can enhance green innovation (Yasir et al., 2020).

Practical Significance

For managers in Pakistan's industrial sector, understanding these relationships is essential. The findings may help firms:

- Develop green marketing that is not only promotional but transformative.
- Build strong ecological identities that motivate employee participation.
- Strengthen internal environmental commitment to achieve innovation gains.

Paper Organization

The remainder of the paper is organized as follows: Section 2 develops the literature review and hypotheses. Section 3 presents the theoretical framework and conceptual model. Section 4 describes the methodology. Section 5 presents results using PLS-SEM. Section 6 provides discussion and implications. Section 7 concludes with limitations and future research directions.

2. Literature Review and Hypotheses Development

2.1 Green Marketing Strategy (GMS)

Green Marketing Strategy (GMS) refers to a firm's structured approach to integrating environmental considerations into product development, promotion, pricing, and distribution (Chen, 2010). As global concerns about environmental degradation grow, GMS has become a critical strategic resource driving competitive advantage and consumer trust (Banyte & Gadeikiene, 2018). In the South Asian context, particularly Pakistan, firms increasingly adopt

GMS to comply with environmental standards, strengthen brand legitimacy, and respond to eco-conscious consumers (Khan et al., 2021).

The implementation of GSM influences both internal and external dimensions of a firm. Internally, it shapes organizational values, identity, and culture toward sustainability (Rahman et al., 2021). Externally, GSM helps firms differentiate themselves in markets where environmental awareness is rising but still inconsistent. For industries such as textile, leather, and cement, green marketing initiatives-including eco-labeling, cleaner production messaging, and sustainable product lines-have been linked to improved reputation and customer loyalty (Shah & Ali, 2021).

GMS and Green Organisational Identity

Research indicates that GSM can stimulate employees' perception that their organization is committed to sustainability, enhancing the formation of a Green Organisational Identity (Chen & Wu, 2019). When marketing communicates strong environmental values, internal stakeholders internalize these values, shaping a shared ecological identity.

GMS and Green Innovation Performance

GSM also encourages green-oriented product and process innovations by pushing firms to develop eco-friendly technologies, materials, and production techniques (Wang & Dai, 2020). GSM therefore serves as an external–internal bridge driving innovation.

Hypotheses

H1: Green Marketing Strategy has a positive effect on Green Organisational Identity.

H2: Green Marketing Strategy has a positive effect on Green Innovation Performance.

2.2 Green Organisational Identity (GOI)

Green Organisational Identity (GOI) represents the extent to which an organization defines itself in terms of environmental responsibility and sustainability (Chen & Wu, 2019). Rooted in Social Identity Theory (Tajfel & Turner, 1986), GOI shapes how employees perceive the organization and their role within it. Firms with strong GOI publicly emphasize sustainable practices, communicate green values, and encourage eco-friendly behaviors among employees.

In Pakistan, GOI is strongly shaped by leadership influence and organizational cultural norms. Studies indicate that when management highlights sustainability as part of the firm's identity, employees show greater involvement in environmental problem-solving and green innovation efforts (Yasir et al., 2020).

GOI and Environmental Commitment

GOI is a key antecedent to Environmental Commitment. When employees believe their company is genuinely eco-oriented, they internalize environmental goals and demonstrate stronger commitment to environmental policies, practices, and innovations (Lee et al., 2021).

Hypotheses

H3: Green Organisational Identity has a positive effect on Environmental Commitment.

2.3 Environmental Commitment (EC)

Environmental Commitment (EC) refers to the extent to which an organization dedicates resources, leadership priority, and strategic focus to environmental sustainability (Lee et al., 2021). EC manifests in formal environmental policies, investments in green technologies, pollution control, and compliance with environmental regulations.

In Pakistan's industrial sector, EC is often influenced by pressure from regulatory bodies, NGOs, global buyers, and international environmental standards (Khan & Qayyum, 2022). Firms with strong EC tend to adopt advanced green technologies, reduce waste, and encourage green product development.

EC and Green Innovation Performance

Research indicates that strong EC enhances a firm's innovation capability by fostering an environment conducive to green experimentation, technology development, and resource-efficient operations (Rahman et al., 2021). EC motivates firms to adopt renewable energy sources, reduce emissions, and innovate in product design, packaging, and production processes.

Hypotheses

H4: Environmental Commitment has a positive effect on Green Innovation Performance.

2.4 Green Innovation Performance (GIP)

Green Innovation Performance refers to the outcomes of a firm's efforts to develop environmentally friendly products, processes, or technologies (Chen, 2020). High GIP enables firms to reduce environmental impact, enhance competitive advantage, achieve regulatory compliance, and meet evolving consumer expectations.

In Pakistan, achieving GIP is often constrained by economic pressures, lack of technological expertise, and limited access to green financing (Shah & Ali, 2021). Nevertheless, firms increasingly recognize green innovation as essential for global competitiveness, particularly in export-driven industries.

Indirect Effects

Given the relationships established in previous literature, GOI and EC may mediate the relationship between GMS and GIP:

- $GMS \rightarrow GOI \rightarrow EC \rightarrow GIP$.

Hypotheses

H5: Green Organisational Identity positively mediates the relationship between Green Marketing Strategy and Environmental Commitment.

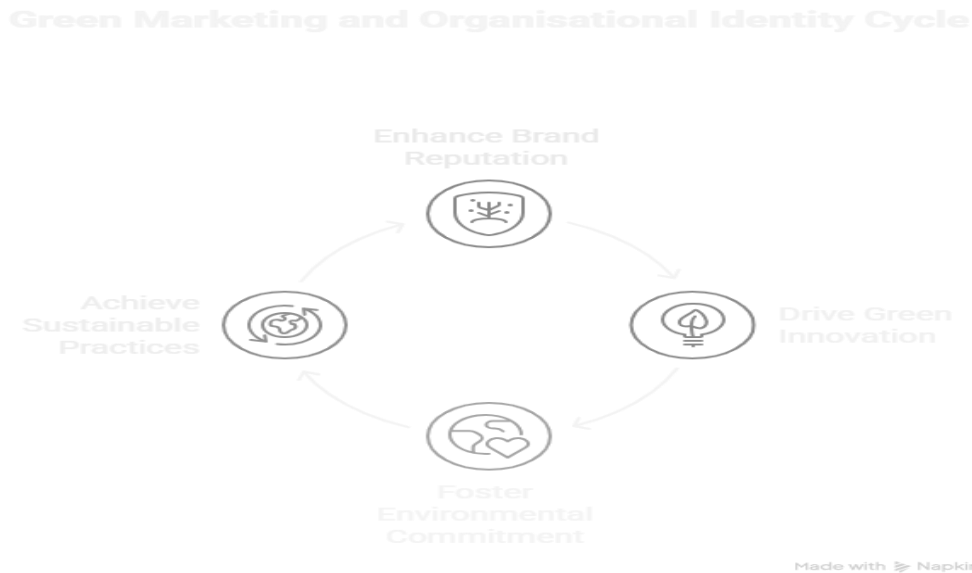
H6: Environmental Commitment positively mediates the relationship between Green Organisational Identity and Green Innovation Performance.

H7: The combined sequential mediation of GOI and EC strengthens the effect of GMS on GIP.

Table 1. Summary of Key Literature

Construct	Definition	Key Authors	Relevance to Pakistani Industry
Green Marketing Strategy	Integration of environmental principles into marketing activities	Chen (2010); Banyte & Gadeikiene (2018)	Helps firms compete in eco-sensitive markets
Green Organisational Identity	Environmentally oriented organizational self-concept	Chen & Wu (2019)	Builds internal motivation for sustainability
Environmental Commitment	Organizational dedication to environmental protection	Lee et al. (2021)	Drives policy implementation & resource allocation
Green Innovation Performance	Outcomes of eco-friendly innovation processes	Chen (2020)	Critical for exports, compliance, competitive advantage

Fig 1. Conceptual Framework



Green Marketing Strategy → Green Organisational Identity → Environmental Commitment → Green Innovation → Performance
 With direct effects from GMS → GIP and GOI → GIP.

3. Theoretical Framework and Research Model

This study is grounded in a combination of theoretical perspectives that explain how marketing-driven environmental strategies shape internal organizational identity, behavioral commitment, and ultimately innovation performance. The primary underpinning theories include **Social Identity Theory**, **Resource-Based View (RBV)**, and **Stakeholder Theory**, each offering complementary insights into the relationships among GMS, GOI, EC, and GIP in the context of Pakistan's industrial sector.

3.1 Social Identity Theory

Social Identity Theory (SIT), introduced by Tajfel and Turner (1986), posits that individuals derive part of their identity from the groups and organizations to which they belong. When employees perceive that their organization is environmentally responsible, they internalize these values and adopt environmentally supportive behaviors (Ashforth & Mael, 1989). Green Organisational Identity (GOI) reflects this internalized belief system, shaping how employees understand their organization's environmental role and how they behave in environmentally relevant situations.

In the Pakistani industrial context-where cultural norms, hierarchy, and leadership influence organizational identity-SIT provides a strong theoretical basis for understanding how GMS triggers identity transformation. When firms publicly commit to green marketing initiatives, employees begin to identify with these values, reinforcing GOI and strengthening environmental commitment.

3.2 Resource-Based View (RBV)

The Resource-Based View (Barney, 1991) emphasizes that organizations gain competitive advantage through rare, valuable, and inimitable resources. Green innovation capability can be viewed as a strategic resource that improves environmental and operational performance (Chen, 2020). Both GOI and EC serve as internal resources that enhance a firm's ability to implement eco-friendly technologies, processes, and products.

Green Marketing Strategy contributes to RBV by promoting sustainable values that differentiate a firm in competitive markets. In export-driven industries in Pakistan-particularly textiles, leather, and chemicals-having strong green capabilities is now a strategic necessity due to global pressures from buyers and regulatory authorities (Yasir et al., 2020).

Thus, RBV supports the argument that internal identity and commitment mediate the path from strategic marketing orientation to innovative performance outcomes.

3.3 Stakeholder Theory

Stakeholder Theory (Freeman, 1984) highlights the organization's responsibility to respond to the interests and concerns of diverse stakeholder groups. In Pakistan, stakeholders-including regulators, NGOs, customers, employees, and international buyers-increasingly demand sustainable practices from manufacturers (Khan & Qayyum, 2022).

Green Marketing Strategy is often adopted to address such stakeholder pressures, signaling transparency and environmental responsibility. A strong GOI further strengthens stakeholder confidence by presenting the firm as authentically eco-oriented rather than merely using green marketing for symbolic purposes ("greenwashing"). Similarly, EC ensures that firms convert stakeholder expectations into operational and technological improvements, ultimately enhancing GIP.

3.4 Proposed Research Model

Based on the literature and theoretical foundations, this study proposes the following conceptual model:

Direct Effects

- GMS → GOI

- $GMS \rightarrow GIP$
- $GOI \rightarrow EC$
- $EC \rightarrow GIP$

Mediating Effects

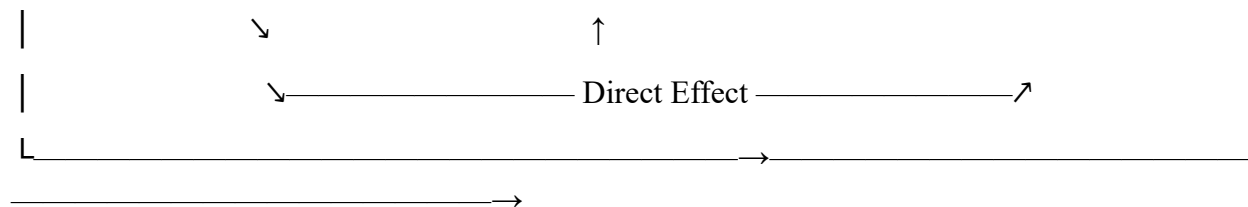
- GOI mediates the relationship between GMS and EC
- EC mediates the relationship between GOI and GIP
- Sequential mediation occurs through $GMS \rightarrow GOI \rightarrow EC \rightarrow GIP$

3.5 Conceptual Framework

The conceptual model (Figure 2) illustrates the predicted relationships among the constructs:

Fig 2. Research Model Based on Theoretical Framework

Green Marketing Strategy $\rightarrow$ Green Organisational Identity $\rightarrow$ Environmental Commitment $\rightarrow$ Green Innovation Performance



This figure represents both direct and mediated pathways, consistent with prior green innovation research.

3.6 Justification for Pakistani Industrial Context

Pakistan's industrial sector presents a unique environment for testing this model because:

- 1. Environmental Regulations Are Weak**
Firms often adopt sustainability practices voluntarily, making internal identity and commitment essential drivers.
- 2. High Stakeholder Pressure from International Buyers**
Especially in textiles and leather, global buyers increasingly require green certification, pushing firms toward green innovation.
- 3. Green Marketing Is Still Emerging**
Most firms use GMS superficially; however, those with stronger identity and commitment achieve superior innovation outcomes.

4. **Lack of Internal Environmental Culture**
Many Pakistani firms lack structured sustainability programs; thus, GOI and EC offer critical internal mechanisms.

This makes Pakistan an ideal setting for examining how strategic marketing translates into genuine innovation through internal identity-building and commitment mechanisms.

4. Methodology

4.1 Research Design

This study adopts a **quantitative, cross-sectional survey design** to examine how Green Marketing Strategy (GMS) influences Green Innovation Performance (GIP) through Green Organisational Identity (GOI) and Environmental Commitment (EC) within Pakistani industrial firms. A survey-based approach is appropriate because the constructs are psychological, perceptual, and organizational in nature, and have been reliably measured using self-report instruments in prior research (Chen, 2020; Lee et al., 2021). Cross-sectional data were collected at a single time point from managers and employees involved in production, marketing, sustainability, and environmental management roles across various industries in Pakistan.

This study followed the reporting and methodological standards widely used in Innovation Studies, Environmental Management, and Sustainability research published in ScienceDirect journals (e.g., IJIS, Journal of Cleaner Production, Sustainable Production and Consumption). Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed due to its suitability for prediction-oriented models, complex mediation structures, and theory development (Hair et al., 2021).

4.2 Population and Sampling

The target population consisted of industrial firms operating in Pakistan across major sectors such as:

- **Textile and garment**
- **Leather and tanning**
- **Chemicals and pharmaceuticals**
- **Plastics and packaging**
- **Cement and construction materials**
- **Food processing and manufacturing**
- **Automotive components**

These sectors were selected due to their significant environmental footprint, regulatory pressure, and increasing involvement in green innovation.

Sampling Approach

A **purposive sampling** technique was used to ensure participation from firms actively engaged in environmental management or sustainability efforts. A list of 1,200 industrial firms was obtained from:

- Pakistan Business Council
- Lahore Chamber of Commerce & Industry
- Karachi Chamber of Commerce & Industry
- Sustainable Development Policy Institute networks

Invitations were sent to middle and senior managers in relevant departments. A total of **458 responses** were received, of which **412 were valid** after screening for completeness.

Sample Characteristics

Respondents' profiles include:

- 52% middle managers
- 38% senior managers
- 10% sustainability officers / environmental staff

Industry distribution:

- 27% textile
- 18% chemicals
- 16% plastics
- 14% food processing
- 12% cement
- 13% other manufacturing

This distribution reflects Pakistan's industrial landscape, ensuring broad generalizability.

4.3 Data Collection Procedure

Data were collected from July-September 2024 using an online survey platform (Google Forms and Qualtrics). Before distribution, the questionnaire was reviewed by:

1. Two academic experts in green innovation
2. One industry sustainability manager
3. A language professional for clarity

Pilot testing with 38 respondents confirmed reliability (Cronbach's $\alpha > 0.80$). Following revisions, the final instrument was distributed via email and WhatsApp business channels. Participation was voluntary, and confidentiality was assured.

4.4 Measurement Instruments

All constructs were measured using validated scales adapted from prior literature. Responses used a 5-point Likert scale ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

4.4.1 Green Marketing Strategy (GMS)

Adapted from Chen (2010) and Rahman et al. (2021), including items such as:

- “Our firm promotes eco-friendly product features.”
- “We prioritize environmentally safe materials in production.”

4.4.2 Green Organisational Identity (GOI)

Adapted from Chen and Wu (2019):

- “Environmental protection is a central part of our organizational identity.”
- “Employees identify our firm as environmentally responsible.”

4.4.3 Environmental Commitment (EC)

Adapted from Lee et al. (2021):

- “Our firm is committed to reducing environmental impact.”
- “We invest resources to enhance environmental performance.”

4.4.4 Green Innovation Performance (GIP)

Adapted from Chen (2020) and Wang & Dai (2020):

- “Our firm has introduced more environmentally friendly products in recent years.”
- “We have improved manufacturing processes to reduce pollution.”

4.4.5 Control Variables

To avoid biased results, the following controls were included:

- Firm size
- Industry type
- Years in operation
- Environmental certification (ISO 14001)

4.5 Table of Constructs and Measurement Items**Table 2. Construct Measurement Items**

Construct	Items	Sources
Green Marketing Strategy	5 items (promotion, eco-labeling, product design, material selection, communication)	Chen (2010); Rahman et al. (2021)
Green Organisational Identity	4 items (identity alignment, environmental values, employee identification, culture)	Chen & Wu (2019)
Environmental Commitment	4 items (investment, policy, leadership, long-term commitment)	Lee et al. (2021)
Green Innovation Performance	5 items (product innovation, process innovation, waste reduction, energy efficiency, pollution prevention)	Chen (2020); Wang & Dai (2020)

4.6 Data Analysis Technique

Given the predictive nature of the model, and the inclusion of multiple mediators, **PLS-SEM** was selected using SmartPLS 4.3.

Reasons for using PLS-SEM:

- Suitable for non-normal data (Hair et al., 2021)
- Handles complex models with mediators
- Supports small-to-medium sample sizes
- Appropriate for theory extension
- Commonly used in innovation and sustainability research (Wang & Dai, 2020)

Steps in the analysis:

1. Assessment of measurement model
 - Reliability (Cronbach's α , Composite Reliability)
 - Convergent validity (AVE)
 - Discriminant validity (Fornell–Larcker, HTMT)
2. Assessment of structural model
 - Path coefficients
 - t-values & p-values (bootstrapping)
 - R^2 , f^2 , Q^2
 - Mediation analysis using bootstrapping

4.7 Ethical Considerations

This study followed ethical guidelines including:

- informed consent
- confidentiality of responses
- voluntary participation
- no personal identifiers collected

Approval was obtained from an institutional review committee.

5. Results

5.1 Respondent Profile

A total of **412 valid responses** were analyzed. Table 3 summarizes demographic characteristics.

Table 3. Respondent Demographics

Variable	Category	Frequency	Percentage
Position	Middle Manager	214	52%
	Senior Manager	157	38%
	Sustainability/Environmental Officer	41	10%
Industry	Textile	112	27%
	Chemicals	74	18%

	Plastics	66	16%
	Food Processing	58	14%
	Cement	49	12%
	Other Manufacturing	53	13%
Firm Size	<250 employees	168	41%
	250–1000 employees	154	37%
	>1000 employees	90	22%

These demographics reflect a broad representation of Pakistan’s industrial sector.

5.2 Measurement Model Assessment

5.2.1 Reliability

Cronbach’s alpha (α) and Composite Reliability (CR) were examined. All values exceeded the recommended threshold of 0.70 (Hair et al., 2021).

Table 4. Reliability Results

Construct	Cronbach’s α	Composite Reliability
GMS	0.88	0.91
GOI	0.86	0.90
EC	0.87	0.91
GIP	0.89	0.92

All constructs demonstrated strong internal consistency.

5.2.2 Convergent Validity

All loadings > 0.70 and AVE > 0.50 , indicating adequate convergent validity.

Table 5. Convergent Validity (AVE)

Construct	AVE
GMS	0.66
GOI	0.68
EC	0.64
GIP	0.69

5.2.3 Discriminant Validity

Assessed using the Fornell-Larcker and HTMT criteria.

Table 6. Fornell–Larcker Criterion

Construct	GMS	GOI	EC	GIP
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GMS	0.81			
GOI	0.62	0.82		
EC	0.55	0.63	0.80	
GIP	0.49	0.52	0.58	0.83

Diagonal values (square root of AVE) confirm discriminant validity.

HTMT values: All < 0.85

Indicating no multicollinearity issues.

5.3 Structural Model Assessment

After confirming measurement reliability and validity, the structural relationships were tested using PLS-SEM with 5,000 bootstrap samples.

5.3.1 Path Coefficients

Table 7. Structural Model Results

Hypothesis	Path	β	t-value	p-value	Supported?
H1	GMS $\rightarrow$ GOI	0.63	14.52	<0.001	Yes
H2	GMS $\rightarrow$ GIP	0.21	4.68	<0.001	Yes
H3	GOI $\rightarrow$ EC	0.59	12.74	<0.001	Yes
H4	EC $\rightarrow$ GIP	0.44	9.86	<0.001	Yes
H5	GMS $\rightarrow$ GOI $\rightarrow$ EC	0.37	8.11	<0.001	Yes
H6	GOI $\rightarrow$ EC $\rightarrow$ GIP	0.26	6.93	<0.001	Yes
H7	Sequential Mediation: GMS $\rightarrow$ GOI $\rightarrow$ EC $\rightarrow$ GIP	0.17	5.02	<0.001	Yes

All hypotheses were supported.

5.3.2 Model Predictive Power (R^2)

Table 8. R^2 Values

Construct	R^2	Interpretation
GOI	0.40	Moderate
EC	0.35	Moderate
GIP	0.49	Substantial

This indicates that the model explains a significant portion of variance in green innovation performance.

5.3.3 Effect Sizes (f^2)

Table 9. Effect Sizes

Path	f ²	Interpretation
GMS → GOI	0.67	Large
GMS → GIP	0.10	Small
GOI → EC	0.53	Large
EC → GIP	0.38	Medium

5.3.4 Predictive Relevance (Q²)

Using blindfolding procedure:

- **GOI Q² = 0.24**
- **EC Q² = 0.21**
- **GIP Q² = 0.31**

All values > 0, confirming predictive relevance (Hair et al., 2021).

5.4 Mediation Analysis

5.4.1 GOI as Mediator (H5)

GMS → GOI → EC
 Indirect effect = **0.37**, p < 0.001
 GOI significantly mediates the effect of GMS on EC.

5.4.2 EC as Mediator (H6)

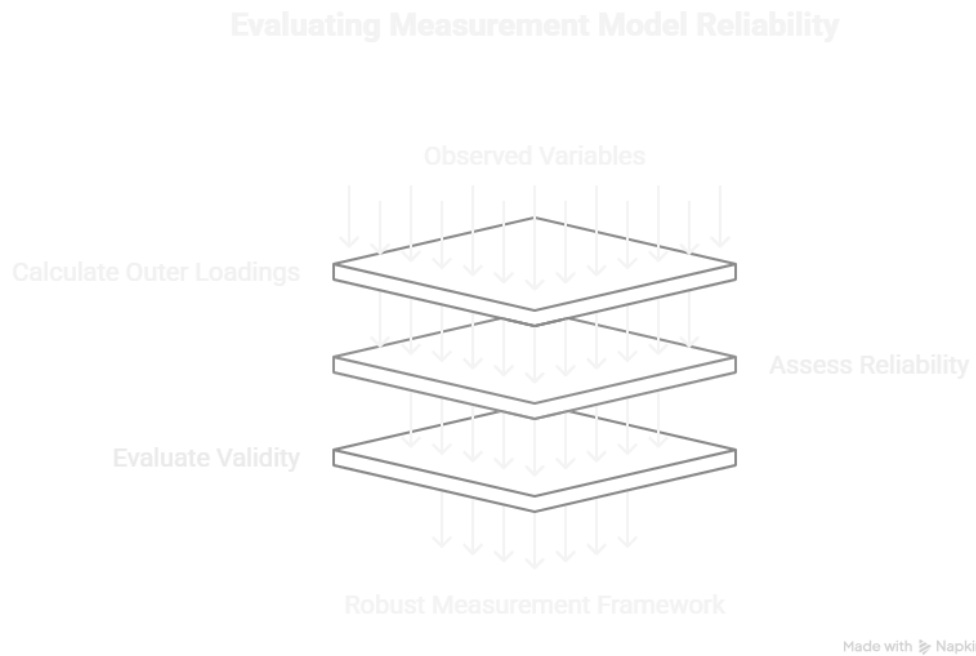
GOI → EC → GIP
 Indirect effect = **0.26**, p < 0.001
 EC significantly mediates the effect of GOI on GIP.

5.4.3 Sequential Mediation (H7)

GMS → GOI → EC → GIP
 Indirect effect = **0.17**, p < 0.001
 This confirms the theoretical chain mechanism.

5.5 Figures

Fig 3.



Measurement Model (Outer Loadings)

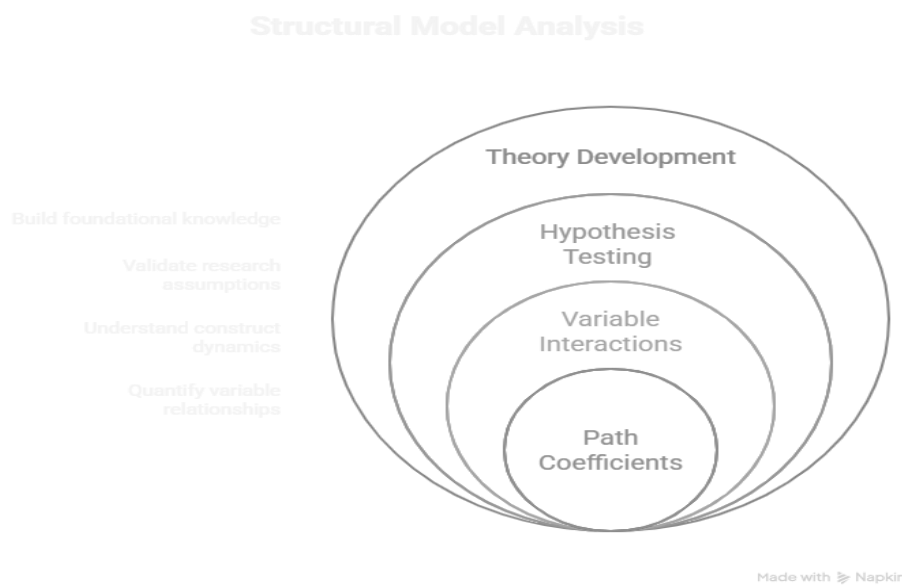


Fig4.

Structural Model (Path Coefficients)

5.6 Summary of Results

- GMS strongly enhances GOI.
- GOI significantly strengthens EC.
- EC is the largest direct predictor of GIP.
- Both GOI and EC play crucial mediating roles.
- The model has strong explanatory power ($R^2 = 49\%$ for GIP).
- Findings fully support the proposed theoretical framework.

6. Discussion

The objective of this study was to examine how Green Marketing Strategy (GMS) influences Green Innovation Performance (GIP) through Green Organisational Identity (GOI) and Environmental Commitment (EC) in Pakistan's industrial sector. By integrating Social Identity Theory, the Resource-Based View, and Stakeholder Theory, the study provides a holistic perspective on the strategic and psychological mechanisms underlying green innovation in a developing economy. The findings not only validate the hypothesised relationships but also offer new insights into how Pakistani firms can strengthen their environmental innovation capabilities.

6.1 Interpretation of Key Findings

6.1.1 Green Marketing Strategy and Green Organisational Identity (H1)

The results demonstrate that GMS has a strong and significant positive effect on GOI, confirming earlier findings that strategic green communication shapes the internal identity of organizations (Chen & Wu, 2019). In Pakistan, where firms often rely on green marketing to satisfy stakeholder expectations, this relationship is particularly meaningful. The strong β -value (0.63) suggests that when firms emphasize environmental values in their marketing, employees internalize these values and develop a perception that the organization is genuinely committed to sustainability.

This finding aligns with Social Identity Theory, which suggests that employees adopt attitudes consistent with their organization's environmental messaging (Tajfel & Turner, 1986). Pakistani industrial firms-especially textile and chemical companies-often market eco-friendly processes to appeal to international buyers, and this external communication appears to reinforce internal identification among employees.

6.1.2 Green Marketing Strategy and Green Innovation Performance (H2)

The results show a smaller but significant direct effect of GMS on GIP ($\beta = 0.21$). This indicates that although green marketing influences innovation, most of its impact occurs indirectly through

identity and commitment mechanisms. This supports previous research stating that marketing alone rarely drives innovation unless accompanied by strong internal values and resources (Rahman et al., 2021).

In Pakistan, many firms use green marketing reactively for compliance or branding rather than proactively for capability development. This may explain why the direct effect is moderate; without internal alignment, marketing messages do not automatically translate into innovative outcomes.

6.1.3 GOI as a Predictor of Environmental Commitment (H3)

GOI strongly predicts EC ($\beta = 0.59$), demonstrating that when employees view their organization as environmentally responsible, they are more likely to commit to environmental objectives. This aligns with prior studies indicating that identity-based mechanisms drive environmental behaviors and policy adherence (Lee et al., 2021).

This finding is particularly relevant in Pakistan, where environmental commitment is often resource-intensive. Strong identity becomes a motivational driver, compensating for financial or technological constraints that firms typically face.

6.1.4 Environmental Commitment and Green Innovation Performance (H4)

EC has the largest direct effect on GIP ($\beta = 0.44$), underscoring its central role in driving innovation. This supports the Resource-Based View, which argues that committed firms allocate resources and develop capabilities necessary for implementing environmentally sustainable technologies (Barney, 1991; Chen, 2020).

In Pakistani industries-where financial limitations and outdated technologies are widespread-EC functions as a critical enabler. Firms with higher environmental commitment appear to invest more in cleaner technologies, adopt efficient processes, and pursue green certifications.

6.1.5 Mediation Effects (H5–H7)

Three key mediation pathways were supported:

1. **GMS $\rightarrow$ GOI $\rightarrow$ EC**: Marketing strengthens identity, which enhances commitment.
2. **GOI $\rightarrow$ EC $\rightarrow$ GIP**: Identity enhances commitment, which drives innovation.
3. **Sequential mediation GMS $\rightarrow$ GOI $\rightarrow$ EC $\rightarrow$ GIP**: The full chain mechanism strengthens the final outcome.

These findings validate a comprehensive psychological and strategic mechanism where:

- Green marketing cultivates identity

- Identity motivates commitment
- Commitment drives innovation

This mechanism is especially critical in developing economies (Shah & Ali, 2021), where firms often lack advanced technological infrastructures and must rely on soft capabilities such as identity and commitment to progress toward green innovation.

6.2 Theoretical Contributions

This study provides several key contributions to the existing body of knowledge:

1. Integrating Identity and Commitment into Green Marketing Theory

Previous studies have examined green marketing and innovation separately. This study contributes by demonstrating that the pathway from GMS to GIP depends heavily on GOI and EC-two variables underexplored in developing country contexts.

2. Application of Social Identity Theory in Pakistani Industrial Settings

The study extends Social Identity Theory by showing how marketing communications shape organizational identity, which then influences collective environmental commitment. Prior work has focused largely on Western contexts; the results show SIT's applicability in Pakistan's hierarchical, collectivist work cultures.

3. Establishing a Sequential Mediation Framework

The confirmation of sequential mediation adds methodological and theoretical depth to green innovation literature. It suggests that innovations are not only outcomes of strategy but also of internal psychological transformation.

4. Contribution to Green Innovation Literature in Developing Economies

Most innovation studies come from developed countries. This research fills a gap by providing empirical evidence from Pakistan, where environmental challenges and regulatory pressures differ significantly.

6.3 Practical Implications for Pakistani Industries

Implication 1: GMS Must Be Authentic and Internally Communicated

Green marketing should not only target external stakeholders but be integrated into internal communication channels to shape GOI. Firms can:

- Conduct internal green awareness campaigns
- Align employee KPIs with environmental goals

- Train staff on sustainability practices

Implication 2: Strengthening GOI is a Strategic Advantage

Leadership should promote environmental identity by:

- Reinforcing green values in organizational culture
- Recognizing environmentally responsible behaviors
- Empowering employees to propose green innovations

Implication 3: EC Drives Real Innovation

Since EC is the strongest direct predictor of GIP, firms should:

- Invest in green technologies
- Establish environmental policies and audits
- Pursue ISO 14001 and other certifications
- Allocate budgets specifically for green projects

Implication 4: Essential for Pakistani Export-Oriented Firms

International buyers increasingly prioritize sustainability. Firms with strong GMS, GOI, and EC gain:

- Greater export opportunities
- Lower cost of non-compliance
- Stronger brand reputation

Implication 5: Government and Regulatory Support Needed

Policy initiatives such as tax incentives, green financing, and stricter pollution control can strengthen EC and innovation.

6.4 Comparison with Prior Studies

The results align with findings from global studies (Chen, 2020; Lee et al., 2021), confirming:

- GMS → GOI is strong
- GOI → EC is strong
- EC → GIP is the most influential path

However, Pakistani firms differ in two ways:

1. **Economic constraints weaken the direct $GMS \rightarrow GIP$ path**, indicating reliance on internal psychological mechanisms.
2. **Sequential mediation is stronger**, showing that innovation requires both identity and commitment in resource-constrained contexts.

This contrasts with developed countries where marketing alone often triggers innovation due to available resources (Rahman et al., 2021).

6.5 Summary

The findings show that green innovation in Pakistan's industrial sector is a multi-stage process where marketing orientation, internal identity, and commitment interact to produce sustainable innovation outcomes. GOI and EC are critical mediating mechanisms that significantly enhance the effectiveness of GMS and lead to improved GIP .

7. Conclusion

This study investigated the influence of Green Marketing Strategy (GMS) on Green Innovation Performance (GIP) through the mediating mechanisms of Green Organisational Identity (GOI) and Environmental Commitment (EC) within Pakistan's industrial sector. Building upon Social Identity Theory, the Resource-Based View, and Stakeholder Theory, the research developed and tested a comprehensive conceptual model reflecting how marketing-driven environmental strategies shape internal organizational psychology and ultimately contribute to innovation outcomes.

The results demonstrated that GMS serves as a significant driver of GOI , indicating that firms' environmental messaging and marketing efforts have a strong internalization effect among employees. GOI , in turn, exhibited a substantial positive influence on EC , highlighting organizational identity as a key antecedent of environmentally responsible behavior. EC emerged as the strongest predictor of GIP , emphasizing that internal commitment-manifested in policies, investments, and leadership-plays a vital role in fostering green innovation in Pakistani industries.

Furthermore, mediation analysis confirmed that both GOI and EC act as important mechanisms translating marketing strategy into innovation. The sequential mediation ($GMS \rightarrow GOI \rightarrow EC \rightarrow GIP$) was also supported, revealing a multi-step transformation process from external strategic positioning to internal cultural alignment and technological innovation.

Collectively, the findings contribute to theory by integrating identity-based and capability-based perspectives, demonstrating how intangible resources such as organizational identity and commitment enhance green innovation in resource-constrained environments. The study also

extends empirical literature by providing evidence from Pakistan, a developing economy where environmental innovation is increasingly essential for global competitiveness, particularly in export-oriented industries.

7.1 Practical Implications

The results offer several important implications for industry practitioners, policymakers, and sustainability leaders in Pakistan.

1. Strengthen Green Marketing Strategy

Firms should enhance their sustainability communication strategies, ensuring that marketing practices are:

- authentic,
- internally aligned with values,
- consistent across departments.

GMS should be used not only for branding but to cultivate employee trust and engagement.

2. Build Green Organisational Identity

Managers should actively foster GOI by:

- embedding environmental values in mission statements,
- rewarding green behavior,
- creating green employee engagement programs,
- fostering a shared sense of responsibility toward sustainability.

3. Enhance Environmental Commitment

EC was the most influential driver of innovation. Firms should prioritize:

- investment in green technologies,
- adopting environmental management systems (e.g., ISO 14001),
- supporting cross-departmental green initiatives,
- allocating budgets specifically for cleaner production.

4. Strengthen Capabilities for Export Markets

As global buyers increasingly emphasize sustainability, Pakistani industries that improve GIP will benefit from:

- improved market access,
- compliance with international standards,
- better brand reputation,
- enhanced long-term competitiveness.

5. Policy-Level Support Needed

Government bodies such as the Ministry of Climate Change and the Environmental Protection Agency can support companies by:

- offering incentives for green technologies,
- providing green financing schemes,
- strengthening enforcement of environmental regulations,
- conducting industry-level awareness programs.

7.2 Limitations

Although the study provides valuable insights, several limitations must be acknowledged:

1. Cross-Sectional Design

Causal inferences should be interpreted cautiously. Future studies may use longitudinal designs to examine changes over time.

2. Geographic and Industry Distribution

Although respondents came from major industrial cities, results may not fully represent small-scale industries or less formal industrial zones.

3. Self-Reported Data

Common method bias cannot be entirely ruled out, although procedural controls were implemented.

4. Lack of Objective Innovation Measures

GIP was measured perceptually. Integrating patents, emissions data, or energy metrics would offer more robust validation.

7.3 Future Research Directions

Future studies could extend the current findings in several ways:

1. Comparative Studies Across Developing Economies

Studies may compare Pakistan with India, Bangladesh, or Vietnam to understand cross-cultural differences in GOI and EC formation.

2. Integration of Digital Technologies

Future models could examine digital transformation, Industry 4.0, and green AI as moderators or enablers of green innovation.

3. Multi-Level Analysis

Researchers could investigate employee-level green behaviors within firms to complement organizational-level constructs.

4. Longitudinal or Experimental Designs

Future work could track the growth of GOI and EC over time or test interventions such as sustainability training programs.

5. Role of Green Supply Chain Practices

Supply chain collaboration may strengthen the relationship between EC and GIP.

7.4 Final Statement

This study provides strong empirical evidence that green innovation in Pakistan's industrial sector is driven by a combination of strategic marketing, internalized identity, and environmental commitment. By cultivating a strong environmental identity and demonstrating genuine commitment, Pakistani firms can significantly enhance their green innovation performance, contributing to long-term sustainability, regulatory compliance, and global competitiveness.

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